Elementary Students' Perceptions of Classroom Technology

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at George Mason University

By

Amie Weinberg
Master of Education
Rhode Island College, 1994
Bachelor of Arts
Wheaton College, 1986

Director: Dr. Priscilla Norton, Professor
College of Education and Human Development

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George Mason University
Fairfax, VA

DEDICATION

This is dedicated to my parents, Frada and Franklin Weinberg, with admiration, gratitude, and unconditional love.

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This study could not have taken place without its participants. My most sincere thanks to both teachers who allowed me into their classrooms and to the numerous students whose perceptions are represented in this study.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

ELEMENTARY STUDENTS' PERCEPTIONS OF CLASSROOM TECHNOLOGY

Amie Weinberg, Ph.D.

George Mason University, 2010

Dissertation Director: Dr. Priscilla Norton

Students are beneficiaries of the educational system, yet little is known about their perceptions of the system. Furthermore, despite an increased focus on educational technology, many questions persist. Several previous studies about technology perceptions have focused on high school and college students. This study was designed to explore elementary students' perceptions of educational technology.

A qualitative study was conducted in a third grade and a fifth grade classroom, where 16 technology lessons were observed between November 2009 and February 2010. Both classroom teachers were currently enrolled in a Master's degree program in Instructional Technology. In addition to the observations, 24 focus-group interviews were conducted with 3 students in each group. An inductive, grounded approach was used for data analysis.

This study began with a conceptual framework consisting of three main parts: Technology and Its Affordances, Teachers as Designers of Curriculum, and Students'

Experienced Perceptions. The focus of this research was at the intersection of those three areas, that is Students' Perceptions about Educational Technology. Specifically, the goal of the study was to find out what students like about technology, what they dislike about technology, and how they work with others during technology activities.

Data analysis revealed that most of these students maintained a positive perception about educational technology despite some frustrations with issues of functionality. Furthermore, most of these elementary students believed that technology makes their school work more enjoyable as well as improving its quality.

This study suggests that teachers take students' technology perceptions into account when designing lessons. It also offers additional recommendations for classroom use.

1. Introduction

Many teachers are striving to prepare students for life and work in the 21st century. Although nobody can predict the future, many agree that modern life may focus on globalization and technology. The Partnership for 21st Century Skills (2009) described student outcomes and abilities important for modern day life and work to include "a range of functional and critical thinking skills related to information, media, and technology" for 21st century citizens (Overview section, para. 1). Specifically, these modern day skills include being able to access and evaluate information; create media products; apply technology effectively; adapt to change; manage goals and time; and produce results.

Despite an increased focus on educational technology, many questions persist. Is educational technology an effective medium for delivering instruction? Is it effective to have students use technology at all grade levels? How do teachers decide which technology to use during a lesson? Will students use technology or will teachers use technology? Does the way technology is used in the classroom affect its impact? What about students and their relationship with technology? Do students like using technology? What are students' impressions of educational technology use?

This study attempted to understand elementary students' perceptions of educational technology. Students are beneficiaries of the educational system, yet little is

known about their perceptions of the system. In particular, there is much to learn about students' impressions of educational technology. Several studies about technology perceptions have focused on high school and college students. However, there have been few studies of the perceptions of elementary students and the use of technology in their classrooms. Furthermore, since elementary students are likely using technology differently than students in advanced grades, their perceptions may be quite different.

Framework for the Study

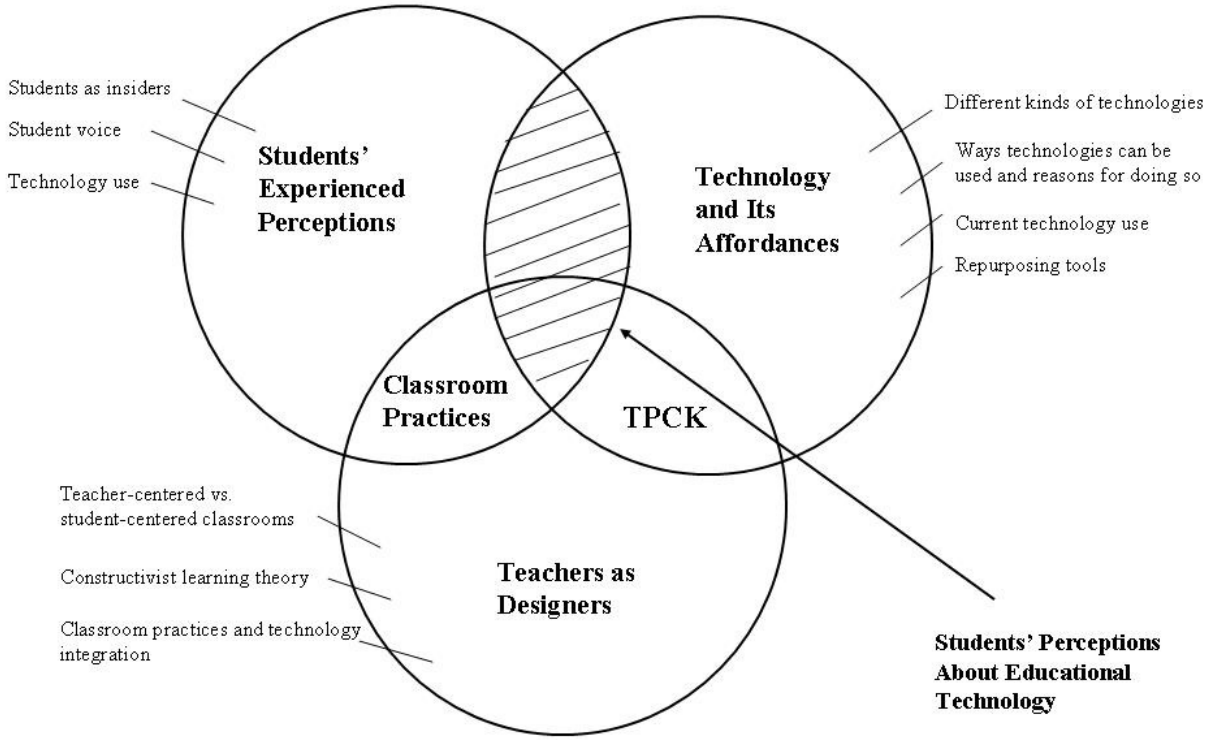

Figure 1. The conceptual framework.

Figure 1 visually represents three areas of interest that intersect in this study. Those areas are "Technology and Its Affordances," "Teachers as Designers," and "Students' Experienced Perceptions."

The first theme includes technology and the affordances it offers elementary classroom teachers. There are different kinds of technologies that may be available as well as distinct ways to use each technology within the classroom. In fact, each technological tool offers unique affordances (Gaver, 1991; Mishra & Koehler, 2009). However, various schools provide varying degrees of access to technologies, which subsequently impacts students. Furthermore, each teacher draws upon his/her expertise and philosophy in making the most of those affordances. In chapter two, I will detail how technology's affordances may impact the way it is used in the elementary classroom and, subsequently, students' perceptions of educational technology. I will also provide information about current technology use in elementary classrooms.

The second topic for this study refers to teachers as designers of curricula. Teachers are not usually referred to as "designers," but I will clarify it as their primary role (Koehler & Mishra, 2008; Norton & Wiburg, 2003). Not only do teachers design learning opportunities, but they also structure students' roles within the classroom. I will provide details about teacher-centered classrooms and student-centered classrooms. The former model encompasses a didactic model of teaching where teachers provide information to students. The latter model supports a constructivist view of learning where students are active participants in the learning process.

Elementary teachers design a multitude of lessons and activities throughout the school year. Some lessons may include technology while others do not. When teachers choose to incorporate technology during a lesson, there exist additional decisions to be made such as who will use technology, how it will be used, and for what purpose. The next chapter will explain teachers' decisions about technology use and how those decisions may impact students' perceptions of technology.

Finally, the third part of the conceptual framework includes students' experienced perceptions of learning opportunities. Each student is unique and views lessons and activities in his own way. I will highlight the importance of "student voice" where students share their insights about education. Students' interactions with lessons may be quite different from the teacher's perspective. By asking students about their experiences, we can better understand how to improve education. In chapter two, I will focus on elementary students' experiences with educational technology, and describe what informs the experiences.

Statement of the Problem

Many students are using educational technology and preparing for their futures. They are the stakeholders in their own education. Researchers and teachers can provide information about technology's impact on test scores, how technology is being used, and the reasons for choosing technology. However, only elementary students can provide feedback about their experiences with and impressions of technology. What do they think about technology? What do they perceive as its benefits and drawbacks? How do students think technology helps them? Until now, little research has focused on

elementary students and their perceptions. Therefore, the problem of this study is to describe and learn from elementary students' perceptions of their classroom technology experiences.

Research Questions

The research questions that this study addresses are:

1) What are these students' perceptions of and experiences with lessons that integrate technology?

    a) What do students like about these lessons?

    b) What do students dislike about these lessons?

    c) How do students interact with others during these lessons?

Significance of the Study

This study builds upon the research genre of technology integration. Through classroom observations and focus group interviews, this study will shed light on elementary students' experiences with classroom technology. Many researchers review test scores and analyze trends in education, but the optimal way to understand students' experiences is to ask them (Levin & Wadmany, 2006). The concept of "student voice" is integral to this study. Student voice refers to students' perceptions and understandings of their experiences. After all, students are the "ultimate insiders and experts on their own experiences" (Levin & Wadmany, p. 281).

The results of this study may affect future theory and practice within the technology realm as teachers take students' experiences into account when designing lessons (Mitra, 2004). I hope to improve educational technology use in elementary

classrooms. My future goal is to identify students' perceptions about various uses of technology and to have teachers use those perceptions as a guide when designing technology-integrated lessons for their students.

Definitions of Terms

Educational Technology – contemporary electronic technological tools including, but not limited to computers; computer software; telecommunications; the Internet and its applications such as searching, online games, and web chats; interactive whiteboards; multimedia such as LCD projectors and video cameras; and interactive response systems.

Students' Perceptions – elementary students' impressions and understandings about their experiences, especially their experiences with classroom technology.

Target Lessons – lessons the researcher observed and discussed with students. In this study, target lessons are technology-integrated lessons.

Technology Integration – using technology and technological tools as part of the teaching and learning process.

Organization of the Study

The remaining chapters detail this study about students' perceptions of technology. Chapter 2 provides an in-depth look at the study's theoretical framework. Chapter 3 explains the methodology for this qualitative study. In Chapter 4, I provide an explanation of the study's findings before the final chapter (Chapter 5) summarizes the research and looks to the future.

2. Conceptual Framework

The conceptual framework of this study includes "the system of concepts, assumptions, expectations, beliefs, and theories that supports and informs" the research (Maxwell, 2005, p33). A vital part of this framework includes my experiences (Maxwell) as an elementary teacher who reflected on and tried to improve her students' technology integration activities. It was through my classroom challenges and successes that I realized the power of educational technology. This study selectively focuses on current beliefs and theories that directly relate to the study, rather than a broad spectrum of reviewing the literature. My goal in is not to summarize prior research but "to *ground* [my proposed] study in the relevant previous work" (Maxwell, p. 123).

In this chapter I will first review my experiences as an elementary teacher who learned to incorporate various technologies. Those experiences served as the motivation for this research. Second, I will re-introduce and expand upon three areas that intersect in this study: technology and its affordances; teachers as designers; and students' experienced perceptions. I will examine each area in-depth before finally discussing where the themes intersect. That intersection is the topic of study for this research.

Experiential Knowledge

There exists wide support for a researcher to integrate experience into one's research (Maxwell, 2005, p. 38). In fact, my interest in this research topic stems from my

12 years of experience teaching elementary students. As I became more comfortable with my own computer use over the years, I steadily increased my use of classroom technologies.

I felt excited and invigorated when I first included my own PowerPoint (PPT) slideshows in lessons for my third grade students. I thought they would be excited about the slideshows too and would want to view them over and over. I then taught myself HyperText Markup Language (HTML) and created a class website where I posted the PPT lessons. During the school day I used the slideshows to teach content as well as for test review. I encouraged students to view the slideshows during free class time or at home, but students quickly lost interest in the digital lessons. Ultimately, the slideshows did not have the strong impact I desired and students did not perform any better on school assessments.

Learning to Integrate Technology

As I learned about technology integration and pedagogical methods in my classes at George Mason University, I gained an understanding about the importance of authentic learning activities, student-centered instruction, and constructivist learning theory. "Knowledge, if it is to be useful, must be inextricably linked with activities and situations. It must be in continual construction" (Norton & Wiburg, 2003, p. 121). I began to undergo a transformation in my teaching style and shifted the focus from the teacher as an information giver to the teacher as a guide and facilitator. I implemented activities where students were active technology users and not merely observers of my technology use. My students were now "doing" their own learning, and I noticed a

positive shift in their attitudes as well as their learning experiences. My third graders were excited about what they were doing, and they often asked more meaningful questions and looked deeper into the implications of each activity than they had previously. They seemed more energetic and enthusiastic about assignments that included computer use. I understood the power of authentic learning activities as I revised my teaching style and observed encouraging results

If I wanted to prepare students to apply their knowledge outside of the classroom, I needed to structure their learning opportunities appropriately. In other words, we can not separate "what is learned from how it is learned and used" (Brown, Collins, & Duguid, 1989, p. 32). I focused on the importance of situated cognition where students learn through active participation in authentic activities (Brown et al.). While helping students learn about technology use, I placed the tool in the context of its future use where "activity, concept, and culture are interdependent" (Brown et al., p. 33).

The Classroom Technology User

Over time, I understood that it is important for teachers who are planning lessons to consider that they as well as their students could be classroom technology users. Although there exists value in a teacher demonstrating how to navigate a website, the learning power inherent in a website lies in the student navigating the site himself. Vygotsky (1978) described the zone of proximal development which lies between what a child can accomplish on his own and what he can accomplish with guidance. In my elementary classroom, I saw that children could advance their own learning when I designed technology lessons within their zones of proximal development. I provided

students with appropriate support and allowed them to use technology. Additionally, I shifted from having students simply use technology, to focusing on the way students used the tool. I realized that I had to design learning activities that would support 21st century skills (The Partnership For 21st Century Skills, 2009).

My classroom and academic experiences have shown me that students will benefit from directly experiencing technology integration activities in school. When students actively use technology in school, they can create a deeper understanding of how to use it on their own (Papert, 1993). If a teacher wants to teach students how an Excel spreadsheet can be helpful, it makes sense to have students create and manipulate spreadsheets and their data. Not only will they develop their physical technology expertise, but students can also add to their understanding by being active participants in the classroom.

Conceptual Framework

This study attempts to understand elementary students' perceptions of educational technology. However, students' perceptions do not exist in a vacuum. They are influenced by and are part of a larger context. The framework for students' technology perceptions includes three principal topics:

- Technology and its affordances.
- Teachers as designers.
- Students' experienced perceptions.

Technology and Its Affordances

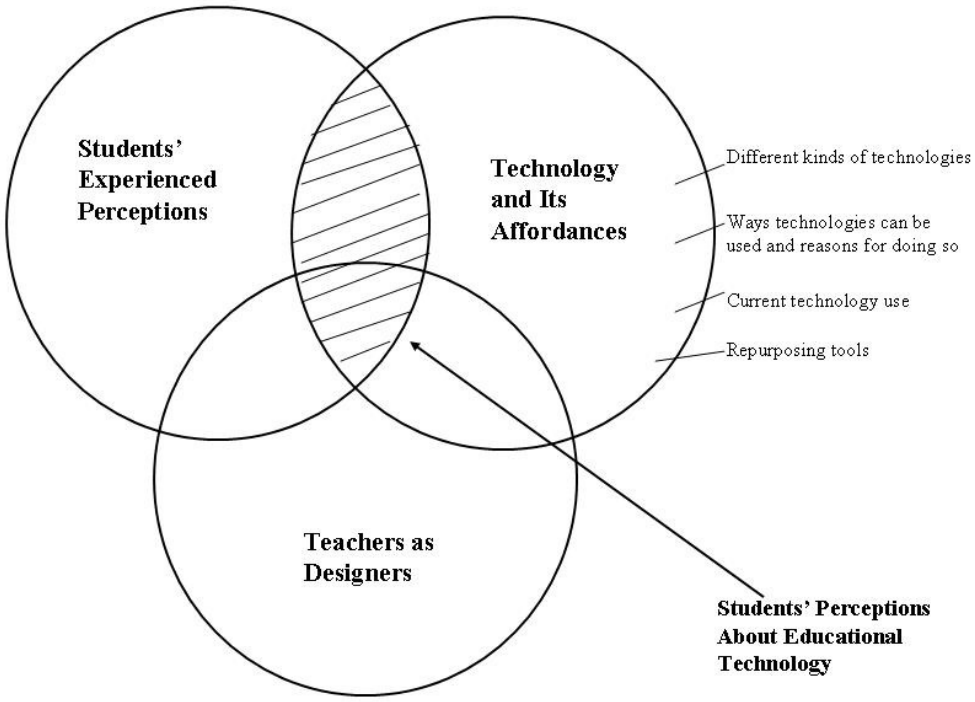

Figure 2. Technology and its affordances.

This section of the conceptual framework provides details about educational technologies and their affordances. First, I provide an introduction to educational technology. Second, I introduce various technologies and explain the affordances they offer. Finally, I present information about current classroom technology use, focusing specifically on computers.

Introducing new technologies. Technologies have expanded over the years, but society's expectations and enthusiasm for new technologies has always been robust. The

Encarta World English Dictionary (2009) defines technology in three ways that are applicable to this study. Technology is:

1. the study, development, and application of devices, machines, and techniques for manufacturing and productive processes;

2. a method or methodology that applies technical knowledge or tools;

3. machines, equipment, and systems considered as a unit.

Thus, the term "technology" can have various meanings. Technology can be an individual tool or technique, or it can represent a category that encompasses all tools, techniques, and knowledge. Koehler and Mishra (2008) explain that educational technologies encompass "the sum of the tools, techniques, and collective knowledge applicable to education" (p. 5). Considering the multi-faceted definition, educational technologies may run the spectrum from pencils to books to interactive whiteboards and laptop computers. However, for the purposes of this study, I focus exclusively on contemporary, electronic, digital technologies.

When a new technology is introduced to society, many believe it could be the solution to education's challenges. As early as 1913 Thomas Edison proclaimed, "Books will soon be obsolete in the schools" due to the introduction of motion pictures (as cited in Cuban, 1986, p. 11). Almost 20 years later, Benjamin Darrow asserted that radio would "bring the world to the classroom" (1932, as cited in Cuban, 1986, p. 19). In the mid-1950s, television became popular and was touted as a contemporary catalyst for education reform (Cuban, 1986). However, for a variety of reasons (Cuban), none of

these tools produced a dramatic shift in educational practices. Schools and schooling remained basically unchanged.

Computers in education. In 1982, Time Magazine's "Man of the Year" was neither a man nor a woman. The magazine's "Man of the Year" for 1982 was the computer. Time Magazine predicted an "information revolution" (as cited in Cuban, 1986, p. 72) as "cultural forces pressed schools to embrace computers" (Cuban, p. 75). School districts rushed to allocate funds to purchase the new technology and distribute it throughout their constituencies. Computers were placed in classrooms throughout the country, but many questions remained. Would teachers be the primary computer users or would students use the tools? Will computers become their own subject, much like Math or Science? How will teachers learn to implement computers in their classrooms?

Although research results vary on the effectiveness of classroom computers, it seems likely they are here to stay. In addition, digital electronic technologies have emerged over the past few years and are increasingly available in schools. Those technologies include, but are not limited to, Internet access, digital video and still cameras, interactive whiteboards, and cell phones. In the next section, I will discuss specific technologies used in education and the affordances they offer.

About digital technologies. Classroom technology is a key component to this study, thus deserving additional explanation. Koehler and Mishra (2008) describe digital technologies in three ways. Digital technologies are:

1. protean. This means that the technologies have various uses and meanings for different people. For example, some view computers as communication tools (email) while others regard computers as design instruments (such as for website creation) (p. 7).

2. unstable because of their rapid changes. These frequent adjustments present unique challenges to those who use digital technologies. For example, software programs often contain errors or bugs when they are first developed. Therefore, it is time-consuming to acquire the skills and knowledge base needed to use digital technologies (p. 8).

3. functionally opaque since their inner workings are hidden from view. Much of one's interactions with a computer are symbolic and can be related to learning a new language. Thus, interaction with computer technologies is unique (p. 8).

Technologies' affordances. Technology integration is an integral part of modern-day education and schooling. However, as Mishra and Koehler (2009) explain, technologies have "affordances and constraints, potentials and problems that we as educators need to understand before we can start using them for pedagogical purposes" (p. 15). Technologies' affordances refer to the "capabilities and limitations" (Gaver, 1991, p. 79) they offer. Gaver explains,

> An affordance of an object…refers to attributes of both the object and the actor. This makes the concept a powerful one for thinking about technologies because it focuses on the interaction between technologies and the people who will use them. (p. 79)

When educators encounter new technology tools outside of school, such as Twitter or Facebook, they may consider how to use the tools within the classroom. Mishra and Koehler describe "repurposing of tools for educational purposes" as using tools within the classroom in a different way than the tools were originally intended to be used. Repurposing is an important concept because most classroom technologies were not originally designed for classroom use. For example, blogs began as a medium to write and distribute opinions and information (Penrod, 2007) although some teachers use them in classrooms. Mishra and Koehler caution that "such repurposing is possible only when the teacher knows the rules of the game and is fluent enough to know which rules to bend, which to break, and which to leave alone" (p. 16). In other words, teachers must be aware of and competent in best teaching practices and have a solid understanding of the curriculum when repurposing technological tools.

Next, I provide examples of technologies that may be used in elementary classrooms as well as their affordances. It is important to understand technology's affordances to develop an understanding of ways to use technology both in and out of the classroom.

1. Computers – Most contemporary schools provide a combination of desktop and laptop computers (Morrison & Lowther, 2010). Where laptops are available, schools may make available a mobile laptop cart which can temporarily supply each student with an individual computer, often with Internet access. When computers are connected to the Internet they can be hard wired with physical devices like cables or they can use radio waves and be connected wirelessly. Wireless Internet connections offer flexibility

because computers can be moved to individual desks or to other places within range of the wireless signal. Computers offer many affordances based on their software capabilities, availability of Internet access, and coordinating tools. Many of those tools are included as part of this list.

2. Internet – When computers can access the World Wide Web they provide an almost-unlimited range of possibilities for their users. Computers access the Internet through web browsers like Internet Explorer or Firefox. Once online, students then use search engines like Google or Yahoo to begin their pursuit of information. They can access massive databases of information on virtually any topic as they research for class assignments. In addition to searching the Web, the Internet provides access to online videos and games that can support various aspects of the curricula. Thus, the primary affordance of the Internet is access to information.

3. Two Way Web Communication and Web Cams – There are several ways to communicate using Internet-ready computers. First, students can take part in asynchronous (not at the same time) communication and save a copy of their discussions through email. By using email access learners can communicate with experts on various topics, thus increasing their interactions with the outside world. Another way to use the Web to stay connected is through web-based phone call services such as Skype. Skype allows users to make phone calls via the Internet. It also offers a video feature that is similar to another communication process, web-based video conferencing. In order to take part in this synchronous (real-time) interaction both parties need a web camera (web cam), microphone, speakers, computer, and a high-speed Internet connection. When

taking part in web-based video conferences students can interact directly with experts in various fields. Thus, the primary affordance of web-based communication tools is communication – the exchange of information and ideas.

4. Websites and Wikis – Communication between school and home is important to students' success. In order to optimize communication opportunities, many schools have created websites. Oftentimes teachers are provided a web page within the school's site so they can supply information about classroom policies and homework assignments. Class websites or web pages can also be used within the classroom in several ways. Teachers can provide access to helpful websites or games, and can post teacher-created lessons for students to view. Wikis, which are websites that can be edited by many people, can be used as class websites or they can be created for students in support of a class project. Both websites and Wikis involve web publishing and communication. Thus, the primary affordance of web publishing is for communication between and among school and home.

5. Blogs and Microblogs – Blogs and microblogs such as Twitter are media that are used to share one's ideas and opinions. Students can share ideas and get involved in discussions through both of these media. Both tools can be used to complement face-to-face class discussions when the teacher appropriately scaffolds their use (Mishra & Koehler, 2009). Furthermore blog and microblog discussions must be incorporated in class to become a valuable part of the learning process (Mishra & Koehler). Thus, the primary affordance of blogs and microblogs is to share information and opinions from individuals.

6. Printers – Printers provide a hard copy of work that has been completed in a word processing program or of articles and images found on the Internet. Oftentimes students refer to their completed, printed work as their "published work." Printing assignments provides a neat, professional-looking document and allows for multiple copies to be easily produced. Thus, the primary affordance of printers is to create physical representations of technology creations.

7. Computer Software – Software is an important component of computer use, and there are many variations on software used in elementary classrooms. Word processing software, such as Microsoft Word, enhances the writing process while spreadsheet software like Microsoft Excel can be used for organizing and calculating. Microsoft PowerPoint is a software product that helps present lessons and information. Inspiration and Kidspiration are popular graphic organizer programs that allow students to create concept maps and visually represent their ideas.

Software can also include games and simulations. Games can provide a fun, motivating way for students to gain new skills or to practice them. Students can play games against other students, against the computer, or even against themselves. Simulations are different from games because they provide access to situations that would be difficult to explore or do not exist in real life. In simulations students can manipulate variables and make choices, thus taking an active role in the activity. Thus, the primary affordance of computer software varies, depending on the individual software.

8. Interactive Whiteboards – These tools look like ordinary dry erase boards but encompass touch-screen capabilities and attributes much like a computer. Interactive whiteboards (IWBs) operate by touch with a finger or a special pen-like tool to operate its applications. IWBs act as a public writing space and are convenient for whole class viewing. Thus, the primary affordance of interactive whiteboards is to present whole group lessons in an interactive manner.

9. Projectors – Modern projectors can display information from a computer as well as media from a VCR, DVD player, or television. Projectors can display media on walls, screens, or interactive whiteboards and provide whole group viewing. Thus, the primary affordance of projectors is to share information with the entire class.

10. Digital Video and Still Cameras – These cameras allow instant viewing as well as the prospect of immediately deleting unwanted photos or footage. Both tools can be used as learning aids in the classroom as students film activities and view their products. When used in conjunction with digital editing software students can create movies with titles and music. Thus, the primary affordance of video and still cameras is to express oneself through an original creation.

11. Personal Response Systems – These polling tools can be used to display real-time, individual student responses. Students are provided with the tools and enter their answers or responses to be displayed on a computer screen or an interactive whiteboard. Personal response systems are often used to check lesson comprehension or for test review. Thus, the primary affordance of personal response systems is to gather immediate feedback about students' understanding.

12. Other technologies – There are other technologies used in classrooms that I have not discussed in this section. Some of those tools include: science probes; scanners; global positioning system (GPS) navigation receivers; cell phones; digital media players such as iPods; digital audio recorders; synchronous communication like chat rooms and Instant Messaging (IM); and social networking media such as Facebook. Each technology presents its own affordances and limitations.

As can be seen from the previous list there are numerous technologies available for classroom use. Many of these technologies were not created specifically for classroom use, but have been adapted to fit an educational setting. One may now ask, "How is technology currently used in the education setting?" Next I will provide general information about current technology use and then focus specifically on elementary schools.

Current technology uses in education. Presently, all 50 states maintain technology standards for students (Editorial Projects in Education, 2009). Locally, Virginia's standards "provide a framework for technology literacy and demonstrate a progression from physical manipulation skills for the use of technology, to intellectual skills necessary for information use," (Virginia Department of Education, 2009). These standards set forth guidelines for students to learn physical uses of technology tools as well as thinking dispositions that accompany well-structured learning opportunities. Not only do all states focus on students' technology use, but 16 states also maintain policies about teachers' technology competencies (Editorial Projects in Education, 2009). Those

policies require teachers to demonstrate technology proficiency through either initial licensure or recertification (Editorial Projects in Education, 2009).

How students are using computers. Considering the federal, state, and local mandates for students and teachers, one may wonder, "How are computers being used in the elementary classroom?" Unfortunately, the literature often groups technology use across the grade levels, thus integrating facts and figures for elementary, middle, and high schoolers. Furthermore, technology and its uses are continually expanding, making it difficult to collect current data on classroom use. Data quickly become outdated as technology and its uses evolve.

In 2000, Beers, Paquette, and Warren surveyed 95 students from kindergarten through grade 12 about how technology was integrated in their classes. The researchers found that elementary students often used computers to support classroom lessons. Students in the lower elementary grades (kindergarten through second grade) typically worked alone and used computers for games and typing stories. The same study found that students in grades 3 through 5 worked with technology differently than their younger counterparts. While K-2 students often worked alone, third through fifth graders used technology either alone or with a partner. The third through fifth graders also used computers for specialized purposes like art, and occasionally accessed the Internet or watched videos (Beers et al.).

Hadley and Sheingold (1993) studied prevailing classroom computer use in grades 4 through 12 and found that word processing tools were used more than any others across the grade levels. Teachers reported that word processing was a versatile and

productive way to use computers across the curriculum (Hadley & Sheingold). The second most popular technology used was instructional software such as tutorials and drill and practice programs (Hadley & Sheingold).

Repurposing technologies. With all the focus on technology integration, one may wonder, "Do digital technologies improve education simply by being added to classroom routines?" Many researchers would say, "No" (Becker, 2000; Jonassen, 1996; Mishra & Koehler, 2006; Norton & Wiburg, 2003; Schwartz & Beichner, 1999). It is not the introduction of technology that makes the difference in the classroom, but how that technology is used (Koehler & Mishra, 2008). Technologies often must be "repurposed" for educational situations which mean they will be used in a new way that could transform practice (Mishra & Koehler, 2009). Levin and Wadmany (2006) caution that repurposing tools is "a highly complex task" for teachers (p. 282) but that it is a necessary one. "The teacher is the primary, if not exclusive, conduit for any changes that can occur in the classroom" (Koehler & Mishra, p. 20).

When technologies are incorporated into classrooms and are used in ways that are appropriate for learning, they can have a positive impact. "Change is not generated by the technology, but by the restructured, collective vision of the students and the teacher, after experiencing new modes of learning in a rich, technology-based environment" (Levin & Wadmany, 2006, p. 285).

This section of the conceptual framework has provided information about technology and its affordances. I defined "technology" and "affordances" as well as provided background information about computers in education. Next, I described

specific digital technologies and the affordances they offer in elementary classrooms. Finally, I provided details about current technology use in education, including the importance of repurposing tools for educational purposes.

The next part of the conceptual framework focuses on teachers as curriculum designers, including teachers' roles and various teaching models. I also provide details about teachers' choices when integrating various uses of technology.

Teachers as Designers

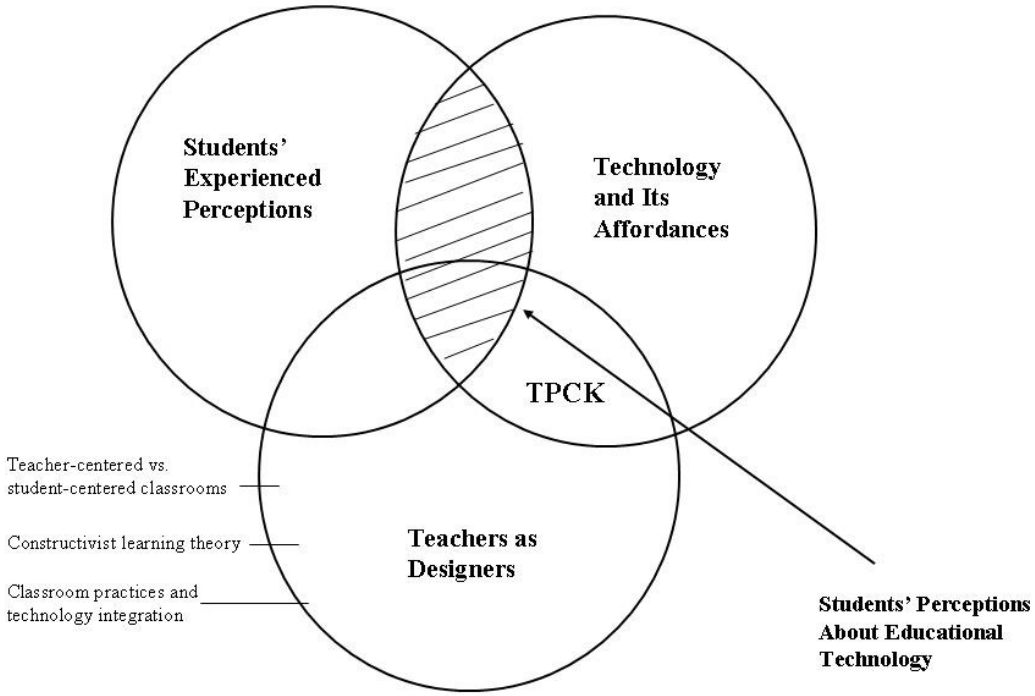

Figure 3. Teachers as designers.

Teachers fulfill many roles throughout the school day, including instructor, director, caretaker, mentor, planner, guide, nurse, and friend. However, one role supersedes all others – that of curriculum designer (Koehler & Mishra, 2008; Norton & Wiburg, 2003). "Student learning is not accidental; it is the direct result of students' experience of the learning opportunities teachers design" (Norton & Wiburg, p. xii). Although federal, state, and local authorities provide frameworks for education, teachers are the ones who decide how to implement the curriculum.

> Teachers construct curricula through an organic process of iterative design and refinement, negotiating among existing constraints, to create contingent conditions for learning. This process, of enacting teaching…in ways that are uniquely shaped by their personalities, histories, ideas, beliefs, and knowledge…emphasizes situational creativity and flexibility, through tactically and contingently selecting and unselecting elements from what is available. (Koehler & Mishra, 2008, p. 21)

Although the responsibility of designing learning opportunities has a profound impact on classroom practices, it is not usually acknowledged (Norton & Wiburg), perhaps because it is not visible. Norton (personal communication, January 14, 2010) suggested that 75% of curriculum design takes place outside of the classroom. Thus, it is an invisible yet vital role with a direct impact on students and their learning experiences.

The way teachers view their roles and structure their classrooms has an impact on the way they design learning opportunities and provide instruction. Some teachers advocate a traditional, teacher-centered model while others support a student-centered

classroom model. Each stance directly affects teachers' roles as curriculum designer and instructor, including when and how they integrate technology. Subsequently, these varying views of classroom design can also impact students' classroom roles, the way they learn, what they learn, and perhaps, their perceptions of learning.

Teacher-centered classrooms. Traditional 20th century schools operated on the factory model of schooling (Morrison & Lowther, 2010), graduating workers to participate in an industrial society. Schools mirrored factories as students sat in rows and completed individual tasks as directed by teachers. Within this model, teachers and students had specific roles: teachers are information providers and students are information receivers. In this didactic model, student learners are not expected to question, but rather to be obedient to authority figures in order to become competent workers. There is little emphasis on independent thinking and creativity since those characteristics were deemed unnecessary for working in contemporary society.

The teacher-centered classroom "focused…on the authoritative passing of knowledge to a passive, receptive student (Cornelius-White & Harbaugh, 2010, p. xxv). Within these teacher-centered classrooms, teachers pass on information to their students and take on the role of "director" or "sage on the stage" (Norton & Wiburg, 2003, p. 43). Teachers tell students what they need to know, often through lectures, and students respond by returning that information on tests and quizzes. Such teacher-centered approaches "focus on memorization of facts, formulas, dates, names, and so on" (Morrison & Lowther, 2010, p. 9).

A time for change. During the latter part of the 20th century, society's needs for education changed and the education reform movement began to take hold. Education's focus is shifting from memorization of facts to valuing deep thinking skills (Morrison & Lowther, 2010) that have the potential to produce the kinds of creative, deep-thinking citizens that are needed (Norton & Wiburg, 2003). Glasgow (1997) describes reformers' goals that students take part in "rigorous" and "challenging" programs that included "analyzing and working with complex problems and projects, not recalling content out of context for tests" (p. 4). Although changes in education take a long time to happen (Glasgow), student-centered classrooms are beginning to emerge.

Student-centered classrooms. The student-centered classroom stands as an alternative to the didactic, teacher-centered classroom. Student-centered methods focus on meeting students' individual needs through a variety of means. The student-centered approach to teaching balances structure and freedom, process and content, inquiry and knowledge, and thinking and memorizing (Cornelius-White & Harbaugh, 2010, p. xxiv). In this setting, the teacher's role shifts from expert to facilitator. Students' roles also shift as they move from knowledge receivers to creators of their own knowledge.

Constructivist learning theory. Constructivist learning theory is often discussed in conjunction with student-centered classrooms. A constructivist theory of learning represents the learning process as a dynamic one where students create their own, internal meanings (Brooks & Brooks, 1999; Clancey, 2009; Cornelius-White & Harbaugh, 2010; Jonassen & Strobel, 2006). A teacher who supports this theory will engage learners in deep thinking behaviors so students can generate new ideas based on their developing

understanding. Discovery learning, where a student actively asks questions and seeks answers is an important aspect of constructivist theory (Alessi & Trollip, 2001). The constructivist perspective is based on the proposition that students are better able to apply what they learn when they are active creators of their own knowledge.

Instructional practices consistent with constructivist learning theory encourage students to generate meaning through active experiences. These experiences can include physical ones but are also focused on students' thought processes (Falbel, 1991). Unlike teacher-centered approaches where information is provided to students, a constructivist view promotes student engagement and reflection in order to resolve internal questions or conflict (Cornelius-White & Harbaugh, 2010). "Deep understanding occurs when the presence of new information prompts the emergence or enhancement of cognitive structures that enable us to rethink our prior ideas" (Brooks & Brooks, 1999, p. 15). This philosophy supports Piaget and Inhelder's theory of assimilation and accommodation of new information (1969) where students add to and enhance their schemata.

Cooperative and collaborative activities are characteristic of constructivist classrooms. Both activity structures encourage multisensory behaviors that allow students to undertake a variety of roles (Alessi & Trollip, 2001). Students often move between the teacher and learner roles (Alessi & Trollip) as they work with their learning partners. Sometimes they ask questions and obtain feedback while other times they answer questions and provide feedback to their partner. These various interactions may improve students' metacognitive skills (Alessi & Trollip) since they require students to look at information from a variety of angles.

Students also help to create meaning when they discuss their learning experiences during cooperative and collaborative activities. Interactive conversations are an important part of students' thinking and learning (Cornelius-White & Harbaugh, 2010; Hung, Tan, & Koh, 2006; Vygotsky, 1978) and are more than opportunities to summarize information. As students interact and discuss various topics and questions with each other, they are able to further process their understanding (Gould, 2005). The interaction and subsequent thinking and processing are an integral part of the active learning process.

The International Society for Technology in Education (ISTE) endorses constructivist technology use for K-12 students in American schools. ISTE updated its National Education Technology Standards for Students in 2007, and the standards highlight specific conditions necessary for effective classroom technology use. The standards refer to learning environments that focus on student-centered learning, collaboration, critical thinking skills, authentic activities, and inquiry based learning. One standard states that students should learn to "demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology."

In order to support ISTE's standards, a classroom teacher needs to move beyond functional fixedness with technology tools. When teachers do not adapt computer technologies to the classroom, it becomes evident that functional fixedness has taken hold (Koehler & Mishra, 2008). Functional fixedness refers to an inflexibility to deviate from standard uses for computers such as one would use at home or in the workplace. In order to help students develop inquiry and critical thinking skills, teachers need to overcome traditional ideas. Teachers need to find educational uses for computers different from

traditional uses outside of the classroom. In addition, the teacher needs to provide students with opportunities to ask questions and explore while simultaneously seeking answers.

Classroom practices and technology integration. When observing contemporary classrooms in 2010, one may see both teacher-centered and student-centered classrooms. However, Niederhauser and Lindstrom (2006) found that teachers' use of instructional technology seems to be shifting away from a didactic model towards a more hands-on approach for their students. Although there are various educational implications for each model, I focus on only the implications that each model has for integrating technology in elementary classrooms as "technologies have the potential to fundamentally change the way we think about teaching and learning" (Mishra & Koehler, 2009, p. 15).

Teachers and technology. Although all 50 states have mandated technology standards for students and nearly one-third of states have set forth guidelines for teachers, many teachers have not adapted their teaching practices to take advantage of the tools (Cuban, 1986, 2001; Hadley, 1998; Hall & Higgins, 2005; Jonassen, 1996; Morrison & Lowther, 2010; Papert, 1993; Riedl, 1995). Researchers have learned that many educators use computers in the classroom by adapting them to fit customary, teacher-centered practices instead (Cuban, 1986, 2001; Hadley, 1998; Hall & Higgins, 2005; Jonassen, 1996; Papert, 1993; Riedl, 1995). When teachers adapt computers to fit customary practices, introducing computers to the classroom does not change learning routines or teacher-student dynamics.

In teacher-centered classrooms, it is often the teacher, not the student, who uses technological tools (Hall & Higgins, 2005; Morrison & Lowther, 2010; National Center for Educational Statistics, 2000). Furthermore, teachers in these classrooms often use technology to deliver instruction or for demonstration purposes (Hall & Higgins; Morrison & Lowther; National Center for Educational Statistics). For example, when teachers present a PowerPoint slideshow or use an interactive whiteboard as a demonstration tool, students are not interacting with technology but are merely observers of technology use. The use of a newer technology may capture students' interests, but the structure of the lesson and its delivery remains the same. "When technology is used to *deliver* instruction, 21st-century skills are not required and the context is less authentic and focused more on retention of fact[ual] or procedural knowledge" (Morrison & Lowther, p. 4).

When teacher-centered classrooms use software, they often use drill and practice activities (Morrison & Lowther, 2010). Drill and practice software affords rote memorization and a behaviorist approach to teaching and learning (Morrison & Lowther), thus maintaining the status quo. Students may learn from this technology as it displaces the teacher or acts as a teaching aid. However, students continue to be passive receivers of information as the model persists.

Learning *from* computers supports a traditional, didactic model of education whereas learning *with* computers represents a shift in the learning continuum (Mishra & Koehler, 2009).

Students and technology. Many teachers in student-centered classrooms support constructivist learning theory (Morrison & Lowther, 2010) and promote students' active participation in creating their own understandings. When used this way, technology can help students discover ideas for themselves (Burdette, McGraw, & Ross, 2001; Franklin, 2007; Jonassen, 1996; Riedl, 1995) as they think deeply and process their learning. When students use computers as a learning aid, they practice their critical thinking skills and actively engage in the learning process. Furthermore, Becker (2000) found that exemplary computer-using teachers emphasize authentic activities where students' computer use helps to accomplish a goal as opposed to being the goal.

Many technology-using teachers have redesigned their classrooms and their teaching philosophies to be more student-centered (Hadley & Sheingold, 1993). Over time, these teachers have learned how to design appropriate technology integration activities. These educators now include more collaborative learning opportunities for their students, and they spend less time lecturing. Students are provided with more time to explore with technology (Schwartz & Beichner, 1999). These technology-using teachers believe they are helping students develop and expand their higher order thinking skills by allowing students to engage with technologies. As one teacher described, "The more I used technology, the more self-reliant the students became, and they were *learning how to learn"* (Riedl, 1995, p. 7). When students "use computers to *retrieve, evaluate, and manipulate* real-world information to solve a meaningful problem, they not only increase their 21st-century skills, but also gain a deeper understanding of core content" (Morrison & Lowther, 2010, p. 4)

Students actively using technology, ACOT. The Apple Classrooms of Tomorrow Project (ACOT) began in 1985 and provided abundant support for technology's positive impact in the classroom. Most notably it became evident that over time, teachers' and students' roles shifted after the implementation of classroom technology (Hall & Higgins, 2005; Sandholtz, Ringstaff, & Dwyer, 1997). As technology became increasingly integrated into the curriculum, students became more involved and active in their learning. Instead of waiting for the teacher to respond to each question, students who used technology began to ask each other for help when they needed support. Students asking other students represented a shift in the classroom hierarchy. In fact, many students even volunteered technology information to their peers without being asked (Sandholtz et al.) since they wanted to share what they had learned. As a result, students' confidence in their technological abilities increased. Additionally, these sharing opportunities helped student technology users become subject matter experts as they demonstrated and applied their knowledge in class. The students' mentor opportunities also served to motivate their peers to expand their learning.

During the ACOT project, teachers reported that their students were more excited about learning than they were prior to the introduction of technology.

> Students displayed increased initiative by going beyond requirements of assignments and by independently experimenting with and exploring new applications. Students spent more time on assignments and projects when working on computers, and they chose to use the computers during free-time and after-school hours. (Sandholtz, Ringstaff, & Dwyer, 1997, p. 90)

Students' increased interest and excitement in their studies is a reflection of a constructivist view of learning where learners take an active role. For example ACOT teachers noted that students became excited about learning and demonstrated increased initiative by moving beyond the lesson and its technology applications. Students frequently completed more than the minimum class requirements and volunteered to do additional work outside of class. Furthermore, students showed greater experimentation, increased engagement, and more on-task behavior. Teachers in the study reported their students learned more quickly and spent more time on projects than they had prior to the introduction of technology (Sandholtz et al., 1997). Teachers also noted that students increasingly requested opportunities for active classroom participation instead of continuing their traditional roles as classroom observers (Sandholtz et al.).

Designing learning opportunities with technology. Why is it important to take teachers' design models into account when designing learning opportunities? First, students and teachers encompass different roles under each model. When instruction is delivered in a didactic manner, students are passive classroom participants. Their perceptions may be different from those of students in constructivist classrooms where students participate actively and are engaged in higher order thinking skills. Second, teachers make different design decisions based on the availability of technology. If a class has access to a computer lab once each week, the teacher may make different design decisions than a class with access to a laptop for every student (Mishra & Koehler, 2009). Finally, all teachers do not follow the same patterns for technology integration. Some teachers are more comfortable with technology and use it more often in the classroom

while others rarely or never use it. Mishra and Koehler (2009) describe an intersection of technology, pedagogy, and content knowledge as a unique relationship called Technological Pedagogical Content Knowledge.

Technological pedagogical content knowledge, TPCK. Koehler and Mishra (2008) characterize Technological Pedagogical Content Knowledge (TPCK) as "how teachers' understanding of technologies and pedagogical content knowledge interact with one another to produce effective teaching with technology" (p. 12). The T in TPCK refers to technology integration; P stands for pedagogy, which encompasses teaching and its practices; and CK stands for the specific subject matter content knowledge that is being taught. TPCK lies at the intersection of the three knowledge bases by which teachers repurpose tools and approaches for classroom use.

TPCK builds from Shulman's notion of pedagogical content knowledge. Shulman proposed that teachers have a special knowledge that is the result of content and pedagogy in combination (1987). In other words, decisions about what is taught and how it is taught depends on each teacher's special kind of knowledge called pedagogical content knowledge (PCK). Shulman's notion of PCK proposes that one must possess more than an understanding of the content area in order to be a successful teacher. A teacher must have mastery of content knowledge but also needs an understanding of pedagogical methods (Shulman). Thus, teaching emerges from thinking deeply about the discipline along with incorporating appropriate pedagogical strategies. PCK proposes that this specialized process moves beyond either pedagogy or content individually. Taken together, pedagogical and content knowledge combined create something unique.

Mishra and Koehler (2009) expanded Shulman's framework by adding technology. TPCK dictates that teachers go beyond knowledge of each discipline in isolation. The relationship between and among pedagogy, curricular content knowledge, and technology creates a unique framework for designing lessons and for teaching. Interestingly, Mishra and Koehler do not think teachers necessarily separate TPCK into content, pedagogy and technology on a conscious level, but rather there is a "dynamic equilibrium" (p. 17) when they overlap and work together well.

While the first section of the conceptual framework focused on technology and its affordances, this second part has provided details about teachers as curriculum designers. Technology and curriculum design overlap and interact in the classroom setting. The third and final part of the conceptual framework describes students' experienced perceptions of their learning opportunities. Each of these areas impacts and intersects with the others.

Students' Experienced Perceptions of Learning

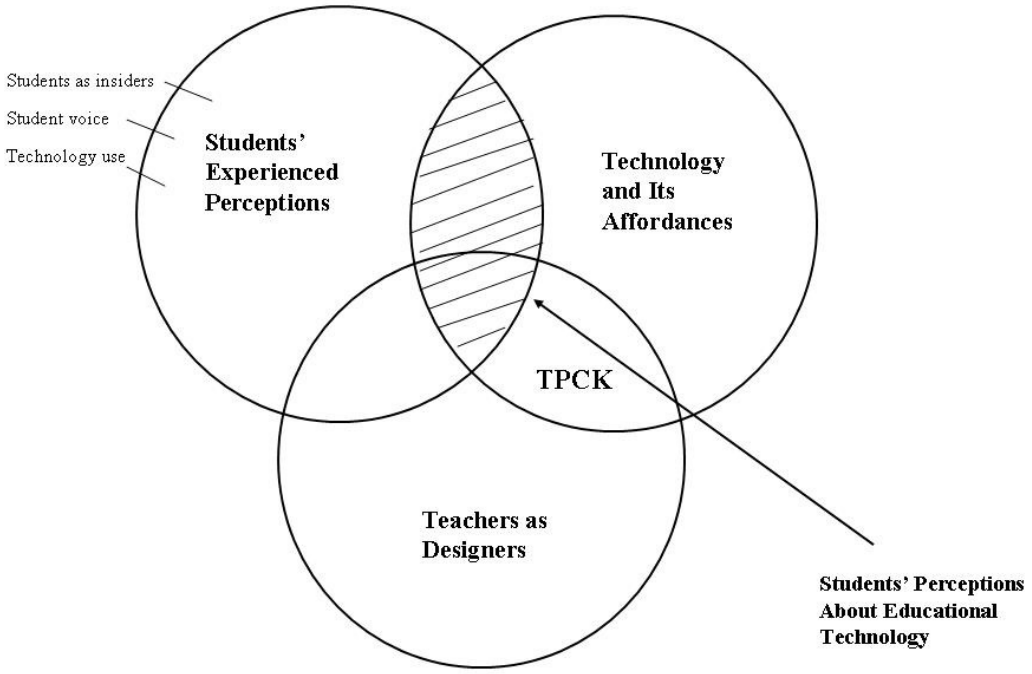

Figure 4. Students' experienced perceptions.

Students as insiders. Shuell (1996) explained that teaching is more than a "unidirectional" process from teacher to student (p. 726). "Teachers and students work together in the rich psychological soup of a classroom, a soup comprised of cognitive, social, cultural, affective, emotional, motivational, and curricular factors" (Shuell, p. 726). These many systems intersect and interact, contributing to a student's educational experience. For example, a student learns more than facts when studying Ancient Greek civilization. He also learns whether or not he enjoys history; about the influence of

Greek architecture; that people lived and fought a long time ago; and perhaps whether or not he is a good student (Shuell).

Since students are the "ultimate insiders and experts on their own experiences" (Levin & Wadmany, 2006, p. 281), it makes sense for researchers to ask them about their classroom perceptions. "Student voice" refers to students' perceptions and understandings of their experiences. The concept of student voice is increasing in importance as school reform focuses on the value of student participation (Mitra, 2004). Some suggest that "effective change in schools involves just as much cognitive, affective, motivational, and behavioral change from the student as it does from anyone else" (Levin & Wadmany, p. 282).

In constructivist learning environments, students are the creators of their own understanding as well as "assessors of their own learning" (Cook-Sather, 2002, p. 5). Therefore, it is reasonable that teachers would ask students for feedback about their learning processes. Specifically, it is important to talk to students in order to understand how they interpret various learning activities, thereby being better prepared to make improvements. "When teachers listen to and learn from students, they can begin to see the world from those students' perspectives" (Cook-Sather, 2002, p. 3). As a result, students may feel empowered and motivated to participate more fully in their education process (Cook-Sather, 2002). In fact, students' views often differ from those of their teachers when discussing the same lesson (Farrell, Peguero, Lindsey, & White, 1988; Levin & Wadmany, 2006). For example, teachers may believe that a lesson was interesting and successful while students may not necessarily agree.

Perceptions of technology use. Technology is now accepted as an integral part of the education system. The United States Department of Education has created the Office of Educational Technology (OET) which focuses exclusively on the coordination and implementation of technology policies. In addition, federal, state, and local governmental agencies sanction technology mandates for public schools. Despite these efforts, little is known about elementary students' perceptions of technology use. Much of the literature discusses high school and college students' attitudes about educational technologies. Furthermore, most studies have focused on student attitudes and satisfaction about learning with technology, not students' perceptions of the learning process.

Even so, when reviewing current research, it is evident that students do not always perceive computers in a positive light (Cotterall, 1995; Levin & Wadmany, 2006). Factors found to influence students' perceptions of technology are the amount of time spent on computers, where the machines are located, and students' desire to interact with others (Levin & Wadmany). Furthermore, Njagi, Smith, and Isbell (2003) explained that an important part of successfully using technology is students' acceptance of that technology. The researchers further explain that students' acceptance is strongly influenced by their attitudes and perceptions of technology (Njagi et al.). Those who trust it see it in a positive light and are able to "fully exploit" (Levin & Wadmany, p. 283) the tools while those with negative views may not use the tools successfully due to a fear of failure (Cotterall).

Hall and Higgins' 2005 study of British elementary students about interactive whiteboards (IWBs) revealed that students wanted to be directly involved with the new technology instead of watching teachers use the IWBs for demonstration purposes. The researchers found that students wanted to engage with interactive whiteboards because they thought the boards made lessons more fun. In fact, students viewed their lack of access as detrimental and reported feeling frustrated because they were not allowed to directly interact with the technology. It may well be that students hold similar perceptions of technology use beyond interactive whiteboards. Perhaps, "it is time that we count students among those with the authority to participate both in the critique and in the reform on education" (Cook-Sather, 2002, p. 3).

Looking Toward the Study

This study attempted to understand elementary students' perceptions of computer use in the classroom setting. Do students perceive computers as helpful for their learning? If computers are helpful for students, in what ways are they helpful? If computers are not helpful, why not? Do students enjoy working with computers? Once students are asked to provide feedback about their learning experiences, we might be better able to improve upon those experiences and help students become competent, well-educated members of 21st century society.

3. Methodology

This study focused on elementary students' perceptions of technology when used in a classroom setting. It attempted to uncover students' beliefs and understandings of technology integration through qualitative means. I observed technology-integrated lessons in a fifth grade and a third grade classroom, followed by focus group student interviews.

Research Design

This research study was influenced by the conception that "the activities of collecting and analyzing data, developing and modifying theory, elaborating or refocusing the research questions, and identifying and addressing validity threats are usually all going on more or less simultaneously, each influencing all of the others" (Maxwell, 2005, p. 2). Although I initially designed and structured the study, I continually revised the conceptual framework and methodology as I assimilated new information and moved through the research. I exercised a reflective, non-linear approach as I responded to my initial interview sessions, reviewed the transcripts, and adjusted my focus and methods accordingly. This approach supports the widespread belief that "design flexibility…is a hallmark of qualitative methods" (Marshall & Rossman, 1999, p. 55).

This qualitative study focused on elementary students' perceptions of learning activities and classroom processes when included as part of technology-integrated lessons. The research questions are:

1) What are these students' perceptions of and experiences with lessons that integrate technology?

a) What do students like about these lessons?

b) What do students dislike about these lessons?

c) How do students interact with others during these lessons?

I chose qualitative methods for this study with the understanding that they "stress the importance of context, setting, and the participants' frames of reference" (Marshall & Rossman, 1999, p. 58). Qualitative methods were most appropriate for my specific research questions and shed light on the phenomenon of "student voice" – giving students the opportunity to share their perspectives about technology and learning activities. This study encompassed two levels of participants, teachers and students. The study acknowledges the actions of teachers and the perceptions of student participants. The research is grounded in classroom practice, lending itself to lesson observations and student interviews (Weiss, 1994).

In the remainder of this chapter, I first describe how I chose the research site and teacher participants and gained access. Second, I describe the teacher participants, reasons for choosing two elementary classrooms, and research location. Third, I discuss the target lessons and research approvals. Next, I outline my procedures for conducting

observations and focus group interviews. Lastly, I focus on data analysis and validity threats.

Simultaneous Site and Participant Selection

Marshall and Rossman (1999) describe a "site specific" as a study that is "defined by and intimately linked to that place" (p. 68). I chose an elementary school for the study's setting because my research questions were focused on elementary students and their perceptions about technology-using lessons. However I took several criteria into account when choosing the particular school to insure that:

> (a) entry is possible; (b) there is a high probability that a rich mix of the processes, people, programs, interactions, and structures of interest are present; (c) the researcher is likely to be able to build trusting relations with the participants in the study; and (d) data quality and credibility of the study are reasonably assured. (Marshall & Rossman, p. 69)

While considering the school criteria, I simultaneously searched for two teacher participants. It was necessary that I find both a school and teacher participants that supported technology use. Otherwise, I would not have access to the phenomenon I was studying, which was grounded in technology integrated lessons.

Using Marshall and Rossman's (1999) site criteria described above, I focused on Potomac County Public Schools (a pseudonym), and subsequently Winding Creek Elementary School (also a pseudonym), for the following seven reasons:

1. My dissertation advisor, Dr. Priscilla Norton, facilitated entry to Potomac County Public Schools due to her positive reputation and networking within the county.

2. The assistant principal at Winding Creek Elementary School, as well as several teachers on the staff, were graduates of George Mason University's Integration of Technology in Schools (ITS) program, for which Dr. Norton is the founder and primary instructor. The ITS program is a Master's Degree program designed to guide classroom teachers about curriculum design and various ways to integrate technology. Dr. Norton's reputation and positive relationship with the assistant principal and various staff members helped negotiate access to the school.

3. Several teachers at Winding Creek Elementary School were enrolled in the ITS program and were studying best practices for technology integration. These teachers, along with Winding Creek's other ITS graduates, provided a high likelihood that teachers would be integrating technology throughout this school.

4. I had the potential to build trusting relationships with teacher participants since I am an ITS graduate who shares a common interest in pursuing an understanding of classroom technology use.

5. Winding Creek Elementary School provides each classroom with working technology, although the specific technologies vary among grade levels. Most classrooms have at least two student computers available and either a television or interactive whiteboard for projecting whole-class lessons.

6. The school maintains a computer lab with modern equipment and current software. In addition, there are several laptop computer carts available for check-out so each student in a classroom can have the opportunity to use an individual computer.

7. Some classrooms that do not have permanent interactive whiteboards were able to access one on a rotating schedule whereby they are assigned a temporary, movable interactive whiteboard for two weeks at a time.

First I conducted a purposeful selection for two teacher participants from George Mason University's Integration of Technology in Schools (ITS) program "in order to provide information that can't be gotten as well from other choices" (Maxwell, 2005, p. 88). My advisor and the director of the ITS program, Dr. Priscilla Norton, recommended two teachers who were currently enrolled in the ITS program and also worked in the same elementary school in Potomac County. After receiving information about these teachers, I investigated Winding Creek Elementary School and the status of its technology by viewing their school website and asking peers about the school. Next, I confirmed that the classrooms have current technology available in working order. Finally, Dr. Norton asked each teacher if she would be interested in working with me during my research. Both teachers agreed to meet with me to find out more about the study and their possible involvement.

Teacher Participants

The relationship between the study's participants and the researcher is an important component of the research methods (Marshall & Rossman, 1999; Maxwell, 2005), so I set out to develop an open, collegial connection with both teachers. Marshall and Rossman (1999) described the importance of the researcher's interpersonal skills and of determining the level of disclosure that is most appropriate with the study's participants. Therefore, at our first meeting I provided teacher participants with a one

page summary of my research goals and their potential roles and responsibilities in that research (Appendix A). I believed it was most appropriate to have full disclosure with the classroom teachers before they agreed to take part in the research since they would be opening their classrooms and spending time interacting with me. Maxwell believed that successful qualitative researchers build trust and maintain good relations with their research participants: "The researcher is the instrument of the research, and the research relationships are the means by which the research gets done" (p. 83).

After I described the research study to the teacher participants, I explained their potential roles. The teachers would need to communicate with me weekly about their upcoming technology using lessons. Since both teachers expressed a preference for email, we agreed that they would send me an outline of their following week's lessons by each Friday afternoon. Although a novice researcher, I was drawing upon Marshall and Rossman's (1999) suggestion that qualitative researchers should be efficient as well as cognizant that they are imposing into others' lives. At the conclusion of the meeting both teachers expressed their enthusiasm for taking part in the research study and explained that they had also spoken to their principal who supported my entry into the school.

This study took place with the cooperation and participation of two educators within the same school: a third grade teacher and a fifth grade teacher. Both teachers have earned Bachelor's of Arts degrees. The third grade teacher had been teaching for seven years and the fifth grade teacher had been teaching for three years. These professionals were purposively selected (Maxwell, 2005) because they were currently enrolled in George Mason University's ITS Master's degree program described earlier in

this paper. As current ITSers they would likely be incorporating technology on a regular basis, thereby providing probable access to the phenomenon under study.

I was continually aware that while my research was important to me, my contact and classroom observations were an intrusion into their lives (Maxwell, 2005). Therefore, I wanted to show my appreciation from the beginning of my collaboration with the teachers and students. During my first visit to each classroom, I presented each class with a George Mason University teddy bear to keep as a class mascot. In addition, I kept my visits unobtrusive by observing quietly along the perimeter of the room whenever possible. Throughout the study, I offered my thanks to the teachers for allowing me entry into their classrooms and always behaved as a guest in their school.

Two Classrooms

Within the elementary school, I focused my research on the upper elementary grades where I felt most familiar with the curricula. Since I am aware of the various stages of elementary school students' cognitive development as well as students' abilities, I additionally believed that I would be able to gather the most information from upper elementary students. I believed that children at these levels would likely be better able to communicate with a researcher when asked to reflect on their experiences. I needed to talk with students who could articulate their perceptions and opinions in a way I could understand. Furthermore, my experience led me to believe that upper elementary students are more likely to be provided with independent computer activities than students at the lower elementary levels, increasing the likelihood that I would have access to technology-integrated lessons.

Marshall and Rossman (1999) recommended that a researcher "maximize the opportunities for gathering data" (p. 85). Thus, I simultaneously conducted research in two classrooms at the same school for several reasons. First, I wanted to gather the maximum amount of data at one location. Additionally, I interviewed students from two distinct classrooms to see if the students responded similarly with both teachers and in both grades. Finally, I felt that my theory would be better supported if I could provide data analysis from two classrooms.

Research Site

This study took place at Winding Creek Elementary School in Potomac County, Virginia. This public elementary school serves students from kindergarten through grade 5 and is located in a northern Virginia suburb of Washington, D. C. There are 805 students enrolled in the elementary school, which has a capacity of 817 students. Almost all of the students at Winding Creek (96%) speak English as their primary language, and only 4% of the student population is considered economically disadvantaged. Ethnic diversity at the school comprised of

63% white,

21% Asian or Pacific Islander,

6% Hispanic, and

5% Black, not Hispanic.

Winding Creek Elementary School has made Adequate Yearly Progress (AYP) for the past seven years. AYP represents the minimum level of improvement that schools must achieve each year as determined by No Child Left Behind legislation. Ninety four

percent of the third and fifth graders (combined) passed the English Standards of Learning (SOL) test for the 2008-09 school year. Ninety nine percent of the third graders passed the History SOL exam last year, while ninety eight percent passed the Math exam.

The Target Lessons

Researchers make many decisions as they move through the design process, and I chose to focus on technology-using lessons and activities in order to address my research questions. My definition of classroom technology included:

computers, whether using software, Internet games or searches, word processing products,

projectors,

interactive whiteboards,

interactive response systems,

web chats,

any other technologies available to them at their school.

As we had discussed at our first meeting, the teacher participants emailed me in advance of any classroom activities or lessons that used technology. I did not make suggestions for how to integrate technology into lessons or suggest who the technology users should be during the target lessons. I requested only that the teachers let me know about any lessons or activities that would be taking place in their classrooms which integrated technology. I could then decide my availability to observe the specified lesson. Throughout the research process I maintained frequent email contact with the

participating teachers in order to find out what they were teaching and when so I could choose the lessons to observe and subsequently interview students.

Approvals

Before I began the study, I received appropriate approvals from George Mason University's Human Subjects Research Board (HSRB) as well as Potomac County Public Schools' Research Office. Following those approvals, the two participating teachers provided classroom parents with an informed consent form (Appendix B) as well as an age-appropriate assent form for student participants (Appendix C). I included in the focus groups only those students who returned the appropriate, signed forms. Students who did not return the forms continued with in-class activities along with those students who were not currently participating in that day's focus group.

Classroom Observations

Maxwell (2005) described research methods as "the *means* to answering your research questions" (p. 92). When selecting a study's research methods, it is important to consider several factors, including the research questions and the kind of data that one needs to address those questions (Maxwell). This research made use of two methods of data collection; classroom observations and focus group interviews. This two-pronged approach was selected in order to support triangulation of data. By triangulating data through observations and interviews, I was able to develop a deeper understanding of the way technology was used during each lesson and students' perceptions about that technology.

Miles and Huberman (1994) portrayed several strengths of qualitative data that support classroom observations. Qualitative data:

1. focus on naturally occurring, ordinary events in natural settings;

2. have local "groundedness" and are "collected in close proximity to a specific situation, rather than through the mail or over the phone;"

3. are rich and holistic, thereby providing thick descriptions; and

4. emphasize people's lived experience and help to understand "the *meanings* people place on the events, processes, and structures of their lives" (p. 10).

Glesne (2006) suggested that researchers record their observations in a field notebook, and distinguishes between descriptive and analytic notes. Descriptive notes describe a scene without any interpretation. They are "detailed, nonjudgmental, concrete descriptions of what has been observed" (Marshall & Rossman, 1999, p. 107). Mason (2002) urged researchers to enter each observation session with a focus in order to record meaningful observations. I systematically recorded descriptive notes during each observation as I wrote about the technological tool being used, variations on student groupings, and an explanation of the lesson or activity. My detailed notes helped me to understand how technology was used during lessons so I could have coherent discussions with focus group students following the observation. I adhered to Glesne's advice to depict the scene well enough to be able to visualize it one year later. I wrote questions and comments that I heard students ask the teacher and their peers. My "eyes, ears, and hands work[ed] together to portray the details" of the classroom setting (Glesne, p. 57).

My field notebook also included analytic notes which moved beyond description and contained reflections and ideas I had during and after the observations (Glesne, 2006). I recorded my impressions about the tone of the class during the target activity as well as anything that stood out to me and could possibly help address my research questions. I often wrote questions that I had or things I wondered about, possibly to be addressed during the interview sessions. The observations added richness to the data pool and served as a helpful starting point for each focus group discussion.

Interviews

This study attempted to uncover students' perceptions about technology-using lessons, where students are the "experiential experts on the phenomenon being studied" (Rudestam & Newton, 2007, p. 107). The most appropriate way to learn about students' perceptions, called "interior experiences" by Weiss (1994), was to interview them. The purpose of the interviews was for students to explain their perceptions of technology-integrated activities. Although I observed in the classroom and listened to students' questions and conversations, I needed to ask them direct questions in order to elicit their specific perceptions about technology. Therefore, small groups of students and I took part in "a conversation with a purpose" (Kahn & Cannell, 1957 as cited in Marshall & Rossman, 1999, p. 108).

Mason (2002) suggests several features that are common to qualitative, semi-structured interviews:

1. There is an exchange of dialogue;
2. The style is relatively informal, like a conversation or discussion;

3. The interviewer uses a thematic approach with starting points for discussion; and

4. A "perspective that knowledge is situated and contextual" (p. 62).

I conducted focus group interviews immediately following the technology-integrated lessons. I created an interview guide (Appendix D) for the focus group sessions to guide my questioning. Weiss (1994) described an interview guide as "a listing of areas to be covered in the interview along with, for each area, a listing of topics or questions that together will suggest lines of inquiry" (p. 48). Since qualitative research "is emergent rather than tightly prefigured" (Marshall & Rossman, 1999, p. 3), I modified the questions once actively engaged in each interview. By allowing myself to adjust the interview questions, I gained "coherence, depth, and density of the material" (Weiss, p. 3). However, it was important to begin with an interview guide that concentrated on the kinds of information I needed to gather (Weiss). In that way, I maintained my attention during each session and across multiple sessions.

Focus Groups

I chose to include focus groups rather than conducting individual interviews for several reasons. First, I felt that the group dynamics would be helpful for young students. Since students knew each other but did not know me, they had a built-in level of security with their peers. Also, conducting conversations in a focus group seemed to be more natural than one-on-one discussions between students and a visiting adult, which was important for students' emotional comfort. Third, focus groups allowed for a "permissive atmosphere that fosters a range of opinions, [and] a more complete and revealing

understanding of the issues" (Vaughn, Schumm, & Sinagub, 1996, p. 4). The group structure allowed individuals and their ideas to interact, and students often added to others' ideas or formed a new idea from participants' responses. Additionally, the interview participants were part of a small group and did not have to respond to every question but could choose when they wanted to add to the discussion. Finally, I wanted to reduce classroom distractions, so talking with several students at one time was an efficient use of classroom pull-out time.

Marshall and Rossman (1999) indicated special considerations to be taken into account when interviewing children. First, they encourage researchers to consider a child's age and developmental abilities. Second, the interviewer should reflect on the length of each interview session since young children may have difficulty sitting for extended periods of time. Third, Marshall and Rossman encouraged the interviewer to be flexible and sensitive to children's needs. Therefore, I led the groups in an open, conversational style to help students understand that I was not searching for a specific, "correct" answer. Finally, one must be aware that age and authority differences between children and adults exist within the general culture.

There exists little specific literature about conducting children's focus groups. Thus, I relied on my knowledge of working with young children in addition to focus group literature concerning adults. The first decision to make was, "How many students should take part in each focus group?" Vaughn, Schumm, and Sinagub (1996) suggest that focus groups with children should be smaller in number than for adults, and my experience as an elementary teacher supported that belief. I included 3 students in each

group because I believed it would create comfortable groups for the students. Also, I wanted everyone to have the opportunity to express themselves without getting "lost" in a larger group. I used my expertise and past experiences in conducting small groups of students within the classroom to decide that 3 would be the ideal number of students in each group for this study.

As I assessed and reflected upon the student groups throughout the study, I felt confident that 3 students per group was a successful number. I was comfortably able to keep track of the conversation with 3 students and it was an efficient number for transcribing. Most importantly, however, was the fact that the 3 students often engaged in a dialogue where everyone offered an opinion. In other words, I was successfully gathering information from the focus groups.

After deciding to include 3 students in each discussion group, I asked, "How will I choose the composition of the focus groups?" First the classroom teachers returned to me all signed assent and consent forms for students who had permission to participate. Then, I constructed a random table assigning each student a letter of the alphabet. Prior to each interview session, I arbitrarily chose 3 students to participate in the group discussion as demonstrated in Tables 1 and 2. I planned to include all students who had returned the appropriate permissions, so a random selection was appropriate.

Table 1

Third Grade Focus Group Student Rotation

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
A	G	C	N	S	I	B	C	F	A	K	D
O	E	T	D	L	M	K	I	J	G	B	N
J	P	R	H	Q	F	E	H	B	D	M	L

Table 2

Fifth Grade Focus Group Student Rotation

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
A	G	C	N	S	I	B	C	F	A	K	D
O	E	T	D	L	M	K	I	J	G	B	N
J	P	R	H	Q	F	E	H	B	D	M	L

Next I asked, "Where will I conduct the interviews?" Glesne (2006) advised that interview locations should be "convenient, available, [and] appropriate" (p. 86). Thus, focus group discussions were primarily held in a nearby empty classroom but sometimes in a quiet hallway corner. The hallway interviews visually appeared less formal as we sat in a circle on the floor, but upon analysis they were as effective as the classroom interviews. My goal was for the interview sessions to be comfortable for the students,

and most participants seemed to be at ease and quickly ignored the tape recorder as they shared their ideas.

Maxwell (2005) suggested that the process of transcribing interviews is a valuable part of data analysis. Therefore, I recorded all interviews and transcribed them verbatim as soon as possible after each session- usually immediately. By recording the interviews, I was able to capture exactly what was said including pauses in speech and any change in inflections. Furthermore, recording the sessions allowed me to focus on discussions instead of being absorbed in my note taking duties. During data analysis I read the transcripts "as a set of materials to be mined" (Weiss, 1994, p. 54). I also listened to the interviews several times to help develop an understanding of the data which I had collected.

Interview Sessions

I began each interview session the same way. First I reminded students who I was (a student and researcher from George Mason University) and why I was there (to find out what students think about certain kinds of lessons and activities). Second, I showed students the assent form that they had previously signed along with the consent form that their parents had signed. I wanted the student participants to have a clear understanding that their role was a voluntary one so I confirmed that they still wanted to talk with me for my research. Like Weiss (1994) and Vaughan, Schumm, and Sinagub (1996) I believed it was important to stress the value of the participant to my research. Therefore, I told students I needed their ideas and opinions, and I did not know everything on the topic. I reminded them that my research centered on students' ideas and perceptions, and

they were the experts in those areas not me. Finally I answered any questions, after which I turned on the tape recorder and began the session.

Following the focus group discussions, I wrote notes about my impressions and ideas. Some notes included students' nonverbal responses as well as themes and questions I developed during the session. I did not take notes during the dialogues since I discovered that it made students less likely to share. Additionally, it was challenging for me to stay in the moment and moderate as well as take notes. The sessions usually lasted twelve to fifteen minutes since students were finished with their discussions in that time.

Since Maxwell (2005) stated that, "the design of a qualitative study should be able to change in response to the circumstances under which the study is being conducted, rather than simply being a fixed determinant of research practice" (p. 7), I modified my plan after completing six observations and interviews. I assessed the study's design (Maxwell) and increased the number of focus groups from one per target lesson to two groups per target lesson because I could gather more information in less time by increasing the number of groups. Furthermore, I often felt that I had observed an interesting use of technology and that a single focus group may not have touched on all aspects of the lesson. It made sense to increase the focus groups from one to two for each lesson observed since my goal was to gather an "…understanding of an issue or topic in sufficient detail" (Vaughn, Schumm, & Sinagub, 1996, p. 58).

Not only did I modify the number of groups I interviewed for each target lesson, I also modified the interview protocol after examining my data from the first six interview sessions. I followed Weiss's (1994) suggestion and spent time looking at what I was

learning from the data and began to see several patterns emerging. Although I was still collecting data, I refocused some of my questions for subsequent interviews to see whether I could support my emerging ideas.

Prior to beginning the research, I anticipated observing and interviewing between seven and ten lessons. However, I quickly realized that I would need to interact with students more than that in order to gather sufficient data to analyze. I understood that I needed to gather information until I was not learning anything new and information was repeating itself. I wanted to "saturate a concept" (Rudestam, 2007, p. 107) so I could gather meaning from it. Thus I continued observing lessons and interviewing students until I was satisfied that I had gathered enough data. Additionally, I wanted to interview all students who had assented and whose parents had consented to participate at least one time.

Data Analysis

As the researcher in this qualitative study, I am the instrument "and [my] eyes and ears are the tools" (Maxwell, 2005, p. 79). Between November 2009 and February 2010 I conducted 16 classroom observations and 24 student focus group interviews with a total number of 44 students. I spoke to many students on more than one occasion.

Various approaches exist for qualitative data interpretation (Glesne, 2006; Mason, 2002; Maxwell, 2005; Rudestam & Newton, 2007), and I used a combination of methods. As Maxwell (2005) suggests, I began data analysis immediately after the first observation and focus group interview.

Wolcott (1994) described three approaches to move from organizing data to developing meaning from it, and I found the processes helpful during data analysis. The three methods include description, analysis, and interpretation. Description involves collecting data by reading transcripts and explaining the information found in the transcripts. The next step, analysis involves the researcher taking data and trying to make sense of it as a whole. Finally, interpretation requires combining analyzed data with current and evolving theories in order to develop meaning.

I followed Mason's (2002) approach by first reading the transcripts literally, allowing the data to "speak for themselves" (Glesne, 2006, p. 164). However, I also used an interpretive analysis (Mason, 2002) where I was "constructing or documenting a version of what [I] think the data mean or represent" (p. 149). In other words, I needed to "read through or beyond the data" (Mason, p. 149) to discover students' meanings. This was an important step since my interview subjects were elementary age students and were not necessarily skillful at conveying their precise meaning.

Second, I searched for and identified "the smallest amount of information that is informative by itself" (Vaughn, Schumm, & Sinagub, 1996, p. 106). I looked for words and phrases to comprise units that seemed interesting or that "jumped out" at me. Maxwell (personal communication, December 10, 2009) explained the significance of identifying these units as he suggested that ideas about data often change during analysis, but individual units usually prevail.

Next, I moved to Wolcott's (1994) second step, analysis, which identified key factors in the data and how they are related (Glesne, 2006). I first considered my pre-

identified units to determine if they represented big ideas (Vaughn, Schumm, & Sinagub, 1996). Second, I created headings for units that belonged together (Miles & Huberman, 1994) and listed units under the appropriate category. These headings were organizational in nature and helped me understand the data even further. Next, I added to and modified the categories as I transcribed subsequent interview sessions. I reviewed the transcripts multiple times, keeping my mind open for various interpretations of students' words as well as emerging categories.

Because of the reflexive nature of qualitative research (Mason, 2002; Maxwell, 2005; Rudestam & Newton, 2007), I continually analyzed information as it became available. I disregarded categories that were inaccurate or invalid and created new ones. I used analytical coding, "…creating new categories based on ideas that emerge as you reflect on the data" (Rudestam & Newton, 2007, p. 183). I created codes inductively using a grounded approach. Finally, I modified valid categories as I created themes (Vaughn, Schumm, & Sinagub, 1996).

Wolcott's third step, interpretation (1994), took place as I began to extend the analysis by considering existing theory and my own experiences. As I worked with the data I "rearrange[d] them into categories that facilitate comparison between things in the same category and that aid[ed] in the development of theoretical concepts" (Maxwell, 2005, p. 96). I asked "what I am seeing instances of, what I am learning about, and what questions the material raises" (Weiss, 1994, p. 155). Since developing theory was based in the actual data collected, I was continually "checking and revising an emerging theory against additional data" (Rudestam & Newton, 2007, p. 186). I consistently made

decisions about what things meant, looked for patterns, and tried to make sense out of the transcript data. Throughout data analysis I considered how well my data addressed the research questions (Mason, 2002). This ongoing data analysis "sharpens, sorts, focuses, discards, and organizes data in such a way that 'final' conclusions can be drawn and verified" (Miles & Huberman, 1994).

Validity

There are three validity threats to address for this study. The first concern is focused on the classroom teachers. I was dependent on these teachers and their abilities to integrate technology into daily lessons. I did not make specific requests for classroom technology use as I was a guest and researcher in the classroom and not a teacher. However, the cooperating teachers understood that I needed to see technology being used in the classroom in order to gather data and did their best to provide me with numerous opportunities.

The second validity threat involves the way technology was incorporated in the classrooms. The cooperating teachers may have incorporated technology in ways that I do not support or that I had not anticipated. However, by choosing teachers who shared the same academic preparation as I had in the ITS program, I minimized potential biases in the use of technology.

The final validity concern focuses on student participants. I was dependent on elementary students and their responses. I am aware that students may respond to me in ways that do not accurately reflect their opinions. Instead, they may have told me what they thought I wanted to hear or even something that they thought would surprise me.

Sometimes, students may not have been able to articulate or express themselves in a way that is helpful to me as a researcher. However, I felt comfortable working with third and fifth grade students due to my experience as an elementary teacher and framed my questions in a developmentally appropriate way. In addition, I triangulated data by using observation and focus group data together to paint a picture of each classroom.

4. Findings

The purpose of this study has been to discover elementary students' perceptions of technology-using lessons and activities. I gathered the study's data through two methods: classroom observations and student focus group interviews. Student perceptions and quotes are integrated throughout the chapter to provide support for the findings. In this chapter I will first describe the study's classroom technology uses to develop a background for data presentation. Second, I will present the findings around four emergent themes:

Technology is fun;

Technology is efficient;

Technology is convenient;

Technology can be frustrating.

Finally, I will use the data to address the research questions of this study.

What I Saw in the Classrooms

I observed 16 lessons and conducted 24 focus group interviews from November 2009 through February 2010. During my time at Winding Creek Elementary School, I observed in a third grade and a fifth grade classroom where both teachers are enrolled in a Master's degree program in technology integration. Although I observed target lessons that included technology integration, I did not observe every technology lesson the

teachers conducted each week. However both teacher participants kept me informed about their ongoing technology integration activities so I would be aware of all classroom technology use. In this manner I could refer to all technology uses when conducting focus group discussions. In fact, during focus group interviews, students often referred to technology used in class that that I had not specifically observed, but about which I was aware.

Table 3

Classroom Technology Lessons

Observation number	Grade	Technology Used
1	5	Internet and PowerPoint
2	5	Internet and PowerPoint
3	3	PowerPoint
4	3	Internet research
5	5	Interactive whiteboard, PowerPoint
6	5	PowerPoint
7	3	Inspiration software
8	3	Inspiration software
9	3	Word processing
10	5	Word processing
11	3	Internet
12	5	Word processing, online video
13	5	Interactive whiteboard
14	3	Word processing, Internet
15	5	Word processing, Publisher software
16	3	Video web chat

Technology Users

In 15 out of 16 lessons, students were active technology users, and they predominantly used computers. On 2 occasions fifth graders presented their PowerPoint slideshows to their peers. One group used a Promethean interactive whiteboard while the other group presented in a different classroom where there was no access to an IWB. That group of fifth graders presented their PPT slideshows on a white screen while the teacher operated the projector. I observed one interactive video web conference between the third grade class and a representative from the National Aeronautics and Space Administration (NASA).

During 5 lessons, classroom teachers used technology, although not throughout the entire period. Both teachers used technological tools for presentation purposes, although they each used different tools. The third grade teacher presented an example of a PowerPoint slide on the classroom television set before taking her class into the computer lab to individually complete an activity. The fifth grade teacher used an interactive whiteboard as a demonstration tool for PowerPoint slides. However, she also used an IWB during another lesson where she presented direct, whole-group instruction about nouns.

Technologies Used

During most observations, students used either desktop or laptop computers for a variety of purposes. Both classrooms had four computers available, although students often worked in the computer lab or with a mobile laptop cart in their regular classroom. In that way, each student had access to an individual, Internet-ready computer. The fifth

grade students also interacted with a Promethean interactive whiteboard during its two week rotation to their class or when their teacher took them to the school's Technology Lab where an IWB was available for use.

Technology Activities

Oftentimes there were several activities ongoing during the same time period since students completed assignments at different times. For example, during one third grade observation, several students were writing a final draft of an essay while others researched information using the Internet, or completed a graphic organizer using Inspiration software.

Table 4 summarizes the kinds of technology activities that I observed. Immediately following the table I will provide additional details about the activities.

Table 4

Technology Activities Observed

Type of activity	Number of lessons		
	3rd Grade	5th Grade	Total
Drill & Skill Software	4	2	6
Graphic Organizer Software	2	0	2
Internet Research	3	1	4
IWB or TV Presentation	1	4	5
PowerPoint Creation	1	1	2
Presenting PowerPoint	0	2	2
Video Web Conference	1	0	1
View Online Video	0	1	1
Word Processing	2	5	7
Worksheets with Internet	2	0	2

Note. Totals exceed the number of my classroom observations since several observations encompassed more than one use of technology.

Drill & Skill Software - All teachers at Winding Creek Elementary School provide their students with access to the math software program, SuccessMaker Enterprise (SMe). SMe is a drill and skill software program created by Pearson Digital Learning. SMe is a school-wide software program that is supported across the grade levels, thus students are encouraged to engage with it for several minutes at the beginning

of each computer lab session. I often observed students working on SMe whenever computer access was available, although the amount of time I observed them working on the program varied widely, from several minutes to ten minutes.

Graphic Organizer Software – Winding Creek Elementary School provides Inspiration software for its students. Inspiration is a visual learning tool that helps students create graphic organizers, diagrams, and outlines. The program allows students to use graphics in combination with words to create a unique visual product.

Internet Research – In order to structure students' Internet searches, Winding Creek Elementary School's website provides specific online research resources. Some resources include "Britannica Online School Edition" and "Grolier Online." Both the third and fifth grade students I observed conducted Internet searches by accessing the chosen websites. However, on one occasion the third grade students completed a pretend online shopping activity. The teacher provided students with specific shopping websites that they could use for the activity.

Interactive Whiteboards or Televisions – Although several classrooms at Winding Creek Elementary School have interactive whiteboards, most classes do not. However, the school maintains a Technology Lab that is separate from the Computer Lab where teachers can take their students and access a Promethean interactive whiteboard. Additionally, the fifth grade team rotates a mobile IWB to each grade level classroom so teachers can access it for two weeks at a time. In addition, all grade level classrooms are equipped with a television monitor that can be used to display information from the teacher's computer monitor.

PowerPoint Creation – Microsoft PowerPoint is a software program that is provided on all computers at this elementary school. Students can create presentations with words and images using PowerPoint. However, students do not always present their products in a whole-group setting, but may instead print their final product for their notebooks or to submit to the teacher.

Presenting PowerPoint – On several occasions I observed fifth grade students present their PowerPoint products to their teacher and peers. In order to show their slideshow to a large group, students needed access to a projector and a screen or interactive whiteboard on which to display their slides.

Video Web Conference – I observed a video web conference between the third grade class and a NASA representative. In order for the exchange to take place, the class had access to a web camera, microphone, speakers, and an interactive whiteboard on which they could view the speaker and the information he posted.

View Online Videos – Winding Creek Elementary School has purchased a subscription to BrainPop, an animated educational site specifically for students. BrainPop videos encompass the entire curriculum, including English, Science, Social Studies, and Health.

Word Processing – The entire elementary school has access to Microsoft products including the word processing program, Word. Students can compose, edit, and save documents using Word. They can also access image files and add them to documents.

Worksheets with Internet – I observed third graders completing a worksheet with information they gathered from a specific, teacher-chosen website. Students navigated through the website to complete fill-in-the-blank activities and to answer questions.

Students' Routines

Both classrooms operated in a similar manner whereby students demonstrated an understanding of routines for working on assignments, either with or without technology integration. For example, fifth grade students accessed a laptop cart on several occasions and students seemed confident about where to access the laptop cart as well as the procedures for borrowing a laptop, how to log in, and then access the Internet. In the third grade classroom students rotated to four classroom computer stations while their peers worked with partners on additional assignments. These third graders moved with relative ease from one work station to the next as the teacher instructed them to do so.

Both classes functioned similarly when working in the computer lab. Each student sat at an assigned desktop computer terminal and worked on an individual assignment. Although the specific assignments varied, students were always ready to help each other with technology questions. I often witnessed one student looking at another's computer monitor and asking, "How did you do that?" or "Can you help me with….?" It seemed natural for students to ask a peer sitting nearby for assistance before asking for help from the classroom teacher or Computer Lab teacher. In fact, asking a nearby peer was an efficient way to answer a quick question or to solve a problem.

Partner vs. Individual Work

Within both classrooms, there were often several activities ongoing simultaneously. Sometimes students were working on an assignment they had started earlier in the day or on another day. For example, during one observation several third graders were using Microsoft Word to create t-shirt designs while other students rotated to computer stations to complete a worksheet using a specific Internet website. Students moved to the appropriate location in the room to work with their partners at the computer terminals, but often moved back to their desks to gather necessary information or notes. Therefore, the lines were often blurred between partner work and individual assignments as students asked each other questions and moved between assignments.

A fifth grade girl spoke specifically about working with partners. She said that making the PowerPoint slideshow was fun because,

> …we got to spend time with our friends making it. Because if you partner up with someone you don't know too well, you can get to know them better than you did before…and you can make friends with someone new and you don't always have to be with someone you know.

Another student shared that he likes to work with partners because the work gets done faster when there are two of them completing one assignment. He also added that one person can "kind of cover for you" when the other one is absent.

Table 5 presents the total number of partner assignments and the number of individual assignments for both classes.

Table 5

Partner vs. Individual Assignments

Type of	Number of lessons		
activity	3rd Grade	5th Grade	Total
Partner	2	3	5
Individual	7	5	12

Note. Totals do not equal the number of lessons observed since students often blended partner and individual work during one observation. In addition, some lessons were neither partner nor individual but were whole group activities.

Teacher-led Technology Use

I observed teacher-led technology use on only 4 occasions. On 2 occasions, the fifth grade teacher used a moveable interactive whiteboard in her classroom as she demonstrated the appropriate way to create a PowerPoint slideshow. The teacher used the IWB for display purposes as she shared previously prepared sample PowerPoint slides with her students. She used the highlight function as she discussed various details of the slides with the class.

The third time I observed teacher-led technology use took place in the third grade classroom. The teacher did not have access to an interactive whiteboard, but instead displayed sample information on the class television monitor. The third grade teacher used the TV monitor for whole-group presentation as she modeled the way students were to complete a PowerPoint slide.

The fourth and final occasion when I observed teacher-led technology use took place during a fifth grade lesson about nouns. The fifth grade teacher used the interactive whiteboard for presenting direct instruction about nouns. During the lesson the teacher called on several students to use the writing tools on the IWB, but it was primarily used for whole-group viewing and demonstration purposes.

In this part of Chapter 4, I have described in detail what I observed and what took place during my classroom observations. I will now move on to present four themes about students' technology perceptions. These themes emerged from an in-depth review of the observation and interview data.

Students' Perceptions of Technology

After organizing, analyzing, and interpreting observation notes and focus group interview data, several themes emerged about these elementary students' perceptions of technology use. These themes can be summarized as follows:

Technology is fun;

Technology is efficient;

Technology is convenient;

Technology can be frustrating.

Technology is Fun

During my classroom observations and focus group interviews, students' notion of technology being fun came across clearly. Students believe that using technology in their classrooms positively adds to their experiences in a variety of ways and for a variety of reasons. Classrooms seemed filled with a positive "buzz" as students could be heard

asking each other questions, commenting on each other's work, and working in an uplifting atmosphere. Table 6 presents 6 categories that were the most common reasons cited for students describing technology as "fun."

Table 6

Technology is Fun Sub-Categories

Playing Games
Manipulating Images
Extending the Possibilities
Working Like Adults
Working With Partners
Specific Tools Are Fun

Playing games. Although students in these two classrooms used technology as part of their learning repertoire, students often described their enjoyment while playing games. Some students discussed games they could play upon completion of their class assignment. "Well, I like using the Internet because I finish early and all I have to do is close the site and open the gaming website. I can just have fun on the computer at the same time." Another student shared his enjoyment of using an iPod Touch: "The iPod Touch was fun because we got to play games on it….I liked that." Both playing games and the promise of playing games upon completion of their work seemed to be a

motivating factor for a number of students. A fifth grade girl stated, "I like the games because you don't realize you're learning."

Manipulating images. Like the promise of playing computer games, finding and working with images was an almost-universal source of enjoyment for these students. Most students shared their pleasure at being able to search for and find images to support their writing or presentations. After creating a PPT slideshow, a fifth grade girl responded, "It was fun because we got some pictures that were animations and they moved, and you could use sounds too." A third grader described her interest in creating a PPT slideshow: "Well, I thought it was fun because I like choosing pictures, different pictures, and playing around with it." Another third grader in the focus group added, "Yeah, it was fun because of the pictures….there were some really cool pictures."

Extending the possibilities. During a Math activity, a group of third grade students took part in a pretend shopping excursion. The students expressed pleasure about their task. One student said she liked computer work because the computer could take her to imaginary places, such as online shopping trips. The student and her peers thought it was fun to pretend they had money to spend at the online stores, all while taking part in a learning lesson.

On another occasion I observed the third grade class during an interactive video web conference between their class and a NASA representative. A third grade boy shared his impression of learning through this medium:

> I really like video conferences because they are more fun to learn with than having the lesson, because you get to meet somebody who knows a lot about that stuff instead of [our teacher] telling you about what she learned from books.

Students liked learning with web conferences because the experiences allowed experts to teach on specific subjects. The conferences were also a change from students' usual routine with their teacher leading instruction: "Another person is talking and you don't always want to listen to the same person all the time."

Working like adults. When asked about their perceptions of technology, several students referred to adults who work with technology. Some students said they liked working with computers and other technology because their parents use the tools, too. One third grade boy commented, "Well I just like using technology because my dad used to work at NASA and since I want to work at NASA, I just want to work with technology." A female member of the focus group added, "My dad actually works with computers in his job. It makes it more fun because I actually want to work with computers when I'm an adult."

Several students believed that their teachers integrate technology into the classroom to prepare them for their futures. A fifth grade girl explained, "You are going to be using that kind of technology when you're older and she wants you to get used to it." A peer in the focus group elaborated:

> Kids have more technology smarts than adults…I've noticed that the younger generation knows a lot more than the older generation because we're growing up with the things. They didn't have it back then. It's part of life.

Working with partners. Another reason that students enjoy using technology is because they often work with partners during technology activities. As mentioned previously, students can work officially with partners or may unofficially help each other as needed. Students frequently described their pleasure at being able to talk and work with one of their peers during an activity. They also said it was enjoyable to get to know their partner better. In fact, one student said she preferred to work with a student she did not know very well so she could get to know that classmate even better:

> Because if you partner up with someone you don't know too well, you can get to know them better than you did before, and you can make friends with someone new, and you don't always have to be with someone you know.

Specific tools are fun. Sometimes students described a specific tool as making their activity more enjoyable. Several fifth graders mentioned their pleasure at using personal response systems or "clickers." They said responding to questions using the electronic device was more fun that taking a test on paper. One student explained, "Because you can see how much percent you got right and then you could see what your classmates thought." Similarly, fifth grade students who completed their morning Daily Writing Assignment (DWA) preferred doing so during the two-week period when an IWB was on its rotation in the classroom. Students said they liked knowing they may be chosen to have a turn on the interactive whiteboard to make corrections in front of the class. In fact, one fifth grade girl said it was more exciting to have either the teacher or a classmate present on the IWB because of the color and sound effects that can be added.

A fifth grade boy expressed his preference for the IWB: "I like using it because you can write with different colors. And I like to write on it. You can actually interact with it."

Throughout my observations of both the third and fifth grade classes, it was obvious that students enjoyed using technology to complete their assignments. Students seemed upbeat and often joked or laughed while working through an activity. It seemed liked technology was a fun part of their learning experience. Next I explore students' responses about technology's efficiency.

Technology is Efficient

During focus group discussions, students often provided reasons why they preferred to use modern technological tools. Several categories emerged in reference to technology's efficiency. Table 7 provides a visual representation of these categories.

Table 7

Technology is Efficient Sub-Categories

Internet vs. Books

- Internet is Faster
- Internet is Newer
- Internet is Broader

Word Processing vs. Writing by Hand

- Word Processing is Faster and Neater
- Word Processing Has a Built-in Editor

Working with Partners

Technology Helps Learning

Internet vs. books. During many focus group discussions, students shared their beliefs about the differences between using the Internet versus books for gathering information. When the fifth grade teacher provided students with the option of using books, the Internet, or a combination of the two as they researched national symbols, all groups used either the Internet alone or in combination with books. None of the groups chose to research exclusively with books. Students cited several reasons for their preference for using the Internet instead of books:

Internet is Faster – Many students said using the computer to conduct research is faster than looking through books. Students described the ease with which they could locate information with a "click" on the computer as opposed to searching through a

Table of Contents and various pages in a book. “After all,” said a fifth grade boy, “it’s easier to look at a website because you don’t have to turn a bunch of pages.” A third grader felt the same way: “Using the Internet is easier because it would take forever to find something in a book.”

Internet is Newer - Oftentimes students told me that the Internet was more up-to-date than books. A fifth grade boy described the Internet in this way: “More of it’s up-to-date because it changes more than books. A book is written in 1993 and it stays that way.” A fifth grade girl added,

> There’s always a last page in a book. The back cover and all. But on the computer, you don’t find that ending because everybody’s on it and adding, and every day, people are working on the Internet to update it.

A third grade boy described the ease with which the Internet is updated by saying, “You can post stuff on the Internet and take pages off and put pages on.”

Internet is Broader - Students demonstrated an understanding of the vastness of the Internet. They believed that they could find any information they needed online, even when the same information is unavailable in books. Furthermore, students described moving from one site to another when looking for information. “If you go on one website it always is linked to another one, so you can just click on something and it gives you to a totally new website and you can get more information off of that.” A third grade boy said, “The computer is the best resource to figure out things because the computer knows everything. It knows everything and has the answer to everything.”

Word processing vs. writing by hand. As students shared their perceptions with me, it became clear that many of them preferred to compose and publish using word processing tools rather than writing by hand with paper and pencil.

Word Processing is Faster and Neater - Some students said that using a computer to write is faster than writing by hand. Furthermore, when students write with a pencil or pen, their hands often get tired, thus typing on a keyboard is easier for many students. A third grade boy explained, "My hand does a lot of work and aches a lot, but on the computer it helps a lot with writing." A fifth grader further explained, "Writing gets my hands tired. My handwriting gets sloppy so I like the computer better." When asked to tell more about the benefits of word processing capabilities, students often described their final drafts as being neater and without pencil or eraser marks.

Word Processing Has a Built-in Editor - Another reason that these third and fifth grade students prefer to compose with computers is because of the word processor's editing and support functions. A third grade girl described, "Whenever you write something that's not correct, you have to right click it and then it says the right words." Students were keenly aware of the dictionary and thesaurus functions as well as spell-check. They described using the products to improve the quality of their written products. "If you type in a word, it can tell you what the word means instead of a dictionary." When asked if using Microsoft Word helps students produce a better written product than composing by hand, many students believed that they did a better job when using a word processing program to compose and edit their work.

Working with partners. These elementary students described computer work as efficient because they often work with partners on technology activities. They reported that partner work is faster than independent work and that each partner can "cover" for the other one in case of absence or when one student needs additional support. The student who needs support has only to ask the partner for some help. One fifth grade girl shared that she was happy to work with a partner when creating a PPT slideshow because her partner was more knowledgeable about Microsoft 2007 than she was. However, students seemed to understand when it was appropriate to ask a classmate for help and when it would not be suitable: "It kind of depends on the situation…Like if it's a test you can't go up to someone and ask, 'Do you know how to get this answer?'"

Technology helps learning. Several students described a specific technological tool that helped them learn or remember information better. For example, several third graders described their use of Inspiration software as helpful for them. The students said that typing the information into Inspiration's graphic organizer would most likely help them remember the information for their test later that week. One third grade boy responded, "When we type it on the computer it stays in our brain so we can remember it." A third grade girl shared, "The computer helps me learn when I type it because I go back through it and go back over it, and it helps me remember."

A third grade boy explained that he thinks using computer games helps him to learn. When asked if he learns things any better through this method he replied, "Yeah. I think you do because it sort of guides you through it so you understand it." Another third grade student described how he felt when working alone with an iPod Touch, "We got to

do it by ourselves and nobody gave us the answers. You can just be proud of yourself." One of his peers added,

> You have an assortment of apps (applications) and all of them are…Depending on what you're struggling with you can choose an app for that…I think it's learning but in a game form. It's just shrinking the technology down into a platform you can play it on.

The elementary students who participated in this study clearly expressed their beliefs that technology is efficient for learning. They provided examples of how technology improves both their products and their learning experiences. Next, I explore the theme of technology's convenience.

Technology is Convenient

It was interesting to hear that students as young as third and fifth grades were aware of technology's conveniences. Students spoke particularly about the ease of access as well as the duality of using computers at home and at school.

Access from many places. Students described a preference for using technology because of its convenience. One student discussed the convenience of accessing the Internet through a cell phone or an iPhone, although the student did not own either tool. A third grader continued, "I like the laptops because they are smaller and you're able to transport them if you're having problems with them, so you can show somebody."

A third grade boy shared his impression of an interactive video web conference, "It's like talking on the cell phone, but you can see the person on the screen. It's like watching an educational program on the TV." Students understood that access for many

technologies could be found in many places, including many students' homes and throughout their elementary school and into middle and high school: "She (the teacher) lets us use it to get experienced. So later in high school and middle school you know what do." Additionally, a large number of students mentioned that one or both parents used computers at home, at work, or in both locations.

These young students understood the prevalence of technology in modern-day life. They additionally expressed frustration with technology's glitches and error messages. I next expand on technology's frustrations for these students.

Technology Can Be Frustrating

I asked students if there was anything they disliked about using technology at school and received a number of specific responses. Table 8 lists students' most frequent frustrations with technology.

Table 8

Technology Can Be Frustrating Sub-Categories

Computer Freezes & Glitches
Doesn't Do What It's Supposed To Do
Too Many Hyperlinks
Search Engines Too Broad

Computer freezes and glitches. When asked if there was anything they disliked about working with technology, an overwhelming number of students described their

frustration when the computers freeze. A third grade boy expressed, "I like the computer, but it's sort of frustrating when it freezes and stuff like that." Students also expressed their experiences with glitches in computer software programs that caused them to lose their work. A fifth grade boy described his feelings about this, "Sometimes your computer gets glitches or it crashes. And when it happens you just want to tear your hair out!"

Computers are not the only technological tool that can experience problems. A fifth grade boy described using the interactive whiteboard for presenting a PowerPoint slideshow: "At first I was nervous and then I felt better. But sometimes the board doesn't really do what it's supposed to do. Like if you touch something, sometimes it goes blank." One of his classmates added, "I think it's exciting to present with it (the IWB), but I think it can mess up, too."

Although students seemed to understand that various problems were part of working with technology, they often expressed their disdain for the trouble. A fifth grade girl shared, "I'm just not good with computers because I think they're going to break and I'll lose everything." Furthermore, several students complained that the computers at school operate slower than their home computers. In particular, students often referred to the delay in logging in when the entire class logs in to the laptop computers simultaneously.

Doesn't do what it's supposed to do. Some students talked about technology that did not function properly. Several focus group members cited instances when computer software accidentally erased their work or recorded an incorrect answer during

a computer game. When asked if the students could have inadvertently caused the errors, most responded, "No." They believed that these problems were directly related to computer error and not to human error.

Too many hyperlinks. Although some students described Internet searches with hyperlinks as an advantage to computer use, some described them as a distinct disadvantage. A fifth grade boy described his dislike for the links that took him away from the topic he was studying. Specifically, he and his partner used the Internet to research about the Pentagon's status as a national symbol: "Like with the Pentagon, we got some stuff about the 9/11 attack, and we weren't really looking for that. It goes away from that. And also shapes…we got a bunch of stuff about shapes and Geometry." Another student added,

> The same thing happened to us. We typed in 'Liberty Bell' and sometimes it would go to 'bell' and say something about a ringing thing. Sometimes it would go to the Statue of Liberty because there's the word 'liberty' in it.

A fifth grader summed up the experience by stating, "Sometimes the Internet doesn't understand what you're saying, and they completely change the subject." One of his peers in the focus group added, "I also hate when you have to click things a lot…too many clicks!"

Although students listed these numerous links as frustrations and negative aspects of using the Internet, many had clearly developed ways to deal with them. When I asked one fifth grader if viewing multiple results from a search engine was confusing, he responded, "Well, no. I just go to whatever actually has to do with the topic."

Search engines too broad. Although some view the vast amount of information one can gather from an Internet search as an advantage, others viewed it as overwhelming. A fifth grade student explained that he sometimes typed a word or phrase into a search engine and that the computer "gives you something totally different…A lot of useless information." Another fifth grader preferred using books instead of the Internet because the Internet provides "tiny descriptions and you have to go to all these websites" whereas books provide the specific information needed. Students understood that the Internet and its search engines allowed access to almost anything: "On the Internet you can go in the whole world."

In the previous section I described students' perceptions of classroom technology use by separating the data into four main themes:

Technology is fun;

Technology is efficient;

Technology is convenient; and

Technology can be frustrating.

Next, I view the data through the lens of the study's research questions.

Research Questions

1) What are these students' perceptions of and experiences with lessons that integrate technology?

Throughout my observations and discussions it was evident that students enjoyed working with technology and had positive perceptions about the tools. Specific comments included:

- “Computers are cool!”

- “It’s really fun.”

- “I really like working with computers.”

- “The computer is the best resource to figure out things because the computer knows everything.”

- “I like it because it’s educational and fun.”

- “You are looking to the world” (on the Internet).

- “I think she (the teacher) uses the Promethean board because it makes everybody else pay attention.”

- “I like it because it’s new and different.”

- “It’s more funner because there are characters and the screen talks to you.”

- “It’s fun because you can interact and fix the problems, so it’s fun.”

- “It helps us learn.”

- “Technology is really just my thing….It’s what I really want to do.”

- “I’m attached to computers!”

- “I learned that the computer helps me learn when I type it because I go back through it.”

A fifth grade girl shared the following during a discussion about creating a PowerPoint slideshow:

> I think on the computer kids can let themselves free because they’re not afraid on the computer. Because there’s spell check, …..and sound effects, backgrounds,

and all the cool fonts. We get to be as creative as we want…The computer is unlimited.

Although most students provided positive responses about interacting with computers, a third grade boy described his preference for teacher-directed lessons: "I like doing it (lessons) better with the teacher because she puts in a fun activity with it. It gets boring on the computer after a while." A fifth grade girl expressed a similar sentiment when she explained that she would choose worksheets instead of a lesson involving the interactive whiteboard, "I'd rather do a worksheet, surprisingly, because I just think it's the same activities…I'm not a huge fan of it (the IWB)."

Students in both third and fifth grade seemed to understand that they would be using computers in their future lives. A third grade boy said he understood it was important to learn "how to use technology better" because "we probably will have to use it a lot when we're older in college and stuff." A fifth grade girl added, "You learn how to use the computers for school and jobs when you grow up. Some people might use technology in middle school and high school. Most teachers are trying to get you ready for the next grade."

a) *What do students like about these lessons?*

After analyzing observation and interview data, four categories emerged to describe what students like about working with technology:

It's what adults do;

Working with images;

Working with the IWB; and

Internet access to the world.

It's What Adults Do

Quite often, students explained their satisfaction for computer work because they see adults working on computers, too. When asked about creating a PowerPoint slide, a third grader explained, "Well, I thought it was going to be really fun because I really like working on computers, just like my Dad. He works with computers at his office." A fifth grade girl responded similarly, "My dad actually works with computers in his job. It makes it more fun because I actually want to work with computers when I'm an adult." I heard many students respond similarly about watching their parents use technology either at work at home. Students believed that technology would be a part of their future working lives.

Several students explained that their teachers have incorporated technology on purpose to help prepare them for life beyond elementary school. A fifth grade girl clarified, "You are going to be using that kind of technology when you're older, and she (the teacher) wants you to get used to it." Another student added, "She lets us use it to get experienced. So later in high school and middle school you know what to do." These students not only believed that technology would have an important role in their future, but they also assumed their teachers intentionally included technology to help prepare them for those future opportunities.

Working with Images

Students almost universally expressed their pleasure at working with and manipulating images. "I like choosing pictures, different pictures, and playing around

with them." Whenever possible, students will add images to their documents and presentations. A fifth grader explained, "It was kind of cool because you could get pictures from other websites and put them on your slideshow, and then when you were presenting, it would show up." A third grader believed that her teacher wanted students to use clipart and other images since many third graders could not draw very well. These third and fifth graders described their pleasure while searching through image files, such as those in Microsoft's Word or PowerPoint programs. One student described an image search as, "looking to the world." Once an appropriate image is found, students spent time placing and resizing the image.

Working with the Interactive Whiteboard

Most students reacted positively when involved in lessons that used the interactive whiteboard. For example the fifth grade class works on their Daily Writing Assignment (DWA) each morning. During DWA students correct grammar and syntax in various sample sentences. Several students described a preference for completing DWA with the interactive whiteboard versus the overhead projector: "It's more fun on the Promethean board…It's really cool." When asked why the Promethean board was more fun, the student responded that he and his peers are able to make corrections instead of merely watching the teacher do so. Said one fifth grade girl, "It's fun moving the tools around." Another student added, "I like to use the little pen 'stick thing' to write on it." A third student said, "It's fun to be writing on it."

Students seemed to be attracted to the presentation style of interactive whiteboards. A fifth grader described an activity that helped teach about making singular nouns into plural nouns:

> When we were learning about nouns, we came in here (Technology Lab) and we used the Promethean board. There was this magic hat and it had a word like 'cat,' and you just moved the word through the magic hat and it came out 'cats' – plural!

When asked about the difference between using a traditional whiteboard or overhead projector versus using an IWB, students overwhelmingly chose the interactive technology. "The lesson is different with the Promethean board because you can play games. And in the classroom it's kind of boring because she (the teacher) just writes on the board." A fifth grade boy believed that his teacher was aware of students' increased interest with the IWB, "I think she uses the Promethean board because it makes everybody else pay attention."

Internet Access to the World

A continuous theme when discussing technology use was that of the Internet offering access to almost anything. A fifth grade boy said, "On the Internet you can go into the whole world." Students were motivated and excited about the possibilities of what they could explore via the Internet. These elementary students also understood that websites contain hyperlinks that connect to different sites with different information. A fifth grader explained:

> Say I searched about the dollar bill. If you go on one website it always is linked to another one, so you can just click on something and it gives you to a total new website, and you can get more information off of that.

Most students also believed that the Internet was a better place to do research than looking through books. Some preferred the Internet because they were more comfortable with search engines than they were with books. "The Internet is easier than books. I get confused with the numbers and the Table of Content and everything. I always go to the wrong page. But on the Internet you can just type it in." Another student agreed, "It's easier to look at a website (than a book) because you don't have to turn a bunch of pages. You don't have to search through pages."

Several students explained that information on the Internet was constantly changing and was often more up-to-date than books. "Well, sometimes in 2009 it (the Internet) could have different information than in 2010." Another student elaborated,

> …because the computer is unlimited. Books have an ending. The computer, not really…There's always a last page in a book. The back cover and all. But in the computer, you don't find that ending because everybody's on it and adding. And everyday people are working on the Internet to update it.

Although students overwhelmingly described technologies positively, there were several negative aspects that I heard consistently.

b) What do students dislike about these lessons?

Most students liked taking part in lessons and activities that use technology. However, one third grader preferred to have his teacher conduct lessons rather than using

computers. "I like doing it (lessons) better with the teacher because she puts in a fun activity with it. It gets boring on the computer after a while." Out of 44 students involved in focus group interviews, he was the only student who expressed a preference for teacher-directed lessons.

Students liked using technology, but there were specific aspects of it that they disliked. One student expressed that he did not like to use the Internet for research. The third grader described "clicking on something that brings you to another page. Then you click on something else and it brings you to another page. It's boring because you're just moving the mouse and clicking." This student preferred to search through books to gather information rather than navigate through websites with embedded hyperlinks. Other students disliked the non-linear way that hyperlinks moved them from one site to another. A fifth grader explained, "A lot of times you get links that get away from the topic you're trying to go." Another student said that "sometimes the Internet doesn't understand what you're saying and they completely change the subject."

Students often talked about their disdain for technology that did not work properly. They enjoyed working with computers, but felt frustrated when log in time was slow or if their machine froze and lost all their work. In addition, several elementary students described instances when computers made "mistakes" and responded as if they had entered an incorrect response. However, all students who described these occasions felt confident that the computer had made the error and that they had not. Despite various technology glitches, students' overall impression of working with the tools was a positive one.

c) *How do students interact with others during these lessons?*

As I observed students using technology, it was clear that they interacted with others, even when completing individual assignments. Students often asked their peers technology questions instead of asking the teacher. They asked other students because their peers were seated close by and were involved in similar activities, such as creating PowerPoint slides or researching on the Internet. It seemed natural and convenient for students to solve their technology questions this way.

Oftentimes, students did not need to ask others for help, because peers offered their assistance so quickly. For example, I observed two fifth graders having difficulty navigating a website during a research assignment. Both students were sharing a laptop computer while discussing where they should "click" to find the information they needed. Within a few moments I observed two students from another group approach the confused partners and guide them towards finding the appropriate information. Peer to peer assistance was commonplace throughout the duration of my observations.

When observing third graders work on PowerPoint slides, one boy asked another, "How do you put the title on?" The student told him precisely how to place the title, after which the boy with the question returned to his seat and inserted the title on his slide. During another third grade observation, I noticed one third grade boy helping another one. I asked what kind of help he was providing. The student replied, "Sometimes when he's doing something wrong, I notice it and I help him."

This chapter has described, in detail, the findings from my classroom observations and focus group interviews. I have included numerous quotes to explain and support my

findings. I next turn to a discussion of these findings and conclusions that one may draw from them.

5. Discussion

The purpose of this study was to examine elementary students' perceptions of educational technology. Although technology has increasingly become part of the education process, there is little known about young students' perceptions of technology. I observed 16 technology-integrated lessons in two classes at the same Northern Virginia elementary school. Following my observations, I met with students in three member focus groups to discuss their perceptions and experiences with technology. I met with most students on more than one occasion.

Throughout this qualitative study I was cognizant of my "intellectual puzzle and…the questions [I] am attempting to address with [my] research" (Mason, 2002, p. 159). Those research questions were:

1) What are these students' perceptions of and experiences with lessons that integrate technology?

a) What do students like about these lessons?

b) What do students dislike about these lessons?

c) How do students interact with others during these lessons?

In this final chapter of the study, I discuss my findings and then further examine those findings using three major organizational areas taken from my conceptual framework: students' experienced perceptions of technology, technology and its

affordances, and teachers as designers. Next, I discuss the implications of this study on classroom practice. Finally, I provide recommendations for future research.

Findings

- These elementary students had thoughts about and abilities to express their perceptions about educational technology.
- Most elementary students in the present study liked to use technology in their classrooms.
- Most of these elementary students preferred to use technology rather than traditional paper and pencil, overhead projectors, or whiteboards.
- These students believed that using technology helped them work more efficiently, such as accessing spell-check capabilities in a word processing program.
- Students in this study believed that using technology improved the quality of their work.
- These elementary students understood the affordances that various technologies offered. For example, most students believed the Internet provided more comprehensive and current information than books.
- Students in the present study accepted technologies as tools in their learning process.
- In this study, elementary students became frustrated when technology did not work appropriately, in much the same way as adults become frustrated with similar problems.

- These students' frustration with technology's glitches did not have a negative impact on their desire to use technology.
- In this study, students transitioned easily between "teacher" and "learner" roles during technology use, as seen when students helped each other with "how to" technology questions.

The Conceptual Framework Revisited

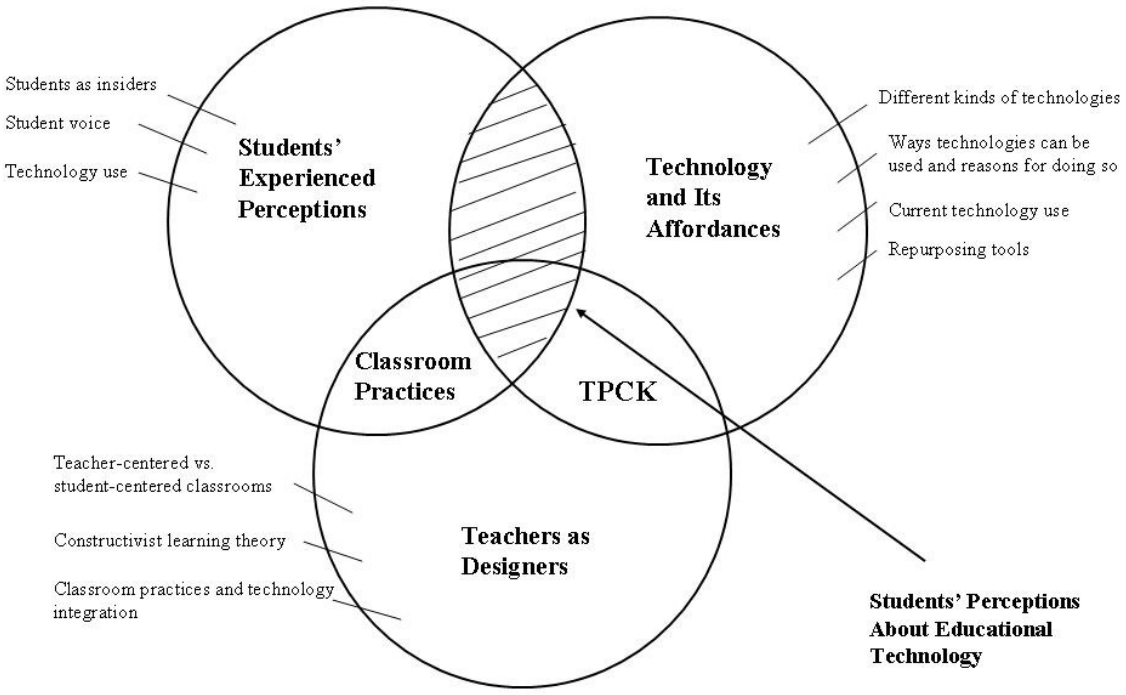

Figure 5. The conceptual framework.

Students' experienced perceptions.

Students' perceptions of technology use were at the center of this study. Because students are experts about their own experiences (Levin & Wadmany, 2006), I conducted 24 focus group interviews with a total of 44 students. Both third and fifth grade students communicated clearly about their technology perceptions and experiences. Although most students were only 8 or 11 years old, they were aware of their technology experiences and able to express their assessments about learning (Cook-Sather, 2002). Students often told me that they "enjoyed" or "had fun" talking with me about their perceptions, providing support for the value of student voice. In fact, as I moved throughout the classroom or Computer Lab, students often asked me when they would have a turn to talk with me in a focus group or they engaged me in conversation.

Student voice. Numerous studies have been conducted about various aspects of educational technology, but the notion of "student voice" in educational technology has been given little attention. Since educators are using computers with the goal of improving student learning, it is time to take the student population into account when making decisions about educational technology. Adults make decisions for students based on their own attitudes and perceptions (Kay, 1993). However, this study demonstrates that elementary students are able to adequately express their perceptions about technology integration activities when asked specific questions about their experiences**.**

Three dimensions to students' perceptions. Levin and Wadmany (2006) described three dimensions to students' perceptions of technology's role in learning.

Those dimensions were 1) technology as a technical instrument, 2) technology as an instrument that supports learning, and 3) technology as an intellectual partner (p. 291). When classroom teachers understand students' perceptions of technology, they may be better able to design learning opportunities that take advantage of the tools. The student participants in this study seemed to appreciate all 3 dimensions of technology's role in learning (Levin & Wadmany). Because these students had an understanding of technology and its position as part of the educational process, they were able to learn with and from the tools. When we understand students' attitudes and perceptions about technology, we can better predict behavior toward computers (Kay, 1993). Subsequently, teachers may be better able to perform their role as curriculum designers.

Technology acceptance. Successful technology use is dependent upon students' acceptance of that technology (Njagi, Smith, & Isbell, 2003). Njagi et al. further explained that acceptance is based on students' perceptions of technology. If students trust and feel confident in a specific technological tool such as a computer, they are likely to view it positively (Njagi et al). Furthermore, Cotterall (1995) expanded the notion and cited that students' lack of trust in technology could inhibit their use of the tool. Cotterall further explained that students may not use a tool to its fullest potential if they harbor a fear of failure.

During the time I conducted this study, I did not observe or hear students express a lack of trust in technology. Students expressed frustrations about specific problems with technology, but those challenges did not seem to inhibit their interactions with technology. In fact, the students seemed fearless when they encountered a new software

program or tried to solve a technological problem. For instance, during a fifth grade Computer Lab activity, one student asked another, "How do you put a header?" Before the peer could offer advice, the questioning student solved the problem on her own and inserted a header to her document. She clapped and then turned to me and exclaimed, "I figured it out by myself!" This example supports Cook-Sather's (2002) notion of technology as a tool of empowerment. The third grade girl in the previous example was probably proud of herself for successfully teaching herself something new.

Students' direct involvement. Findings of this research study supported Hall and Higgins' (2005) findings about the use of interactive whiteboards in British elementary schools. Hall and Higgins found that students wanted to be directly involved in using IWBs and were motivated by the promise of doing so. Students in this study also described their anticipation of lessons that used an interactive whiteboard. A fifth grade boy explained, "I like using it [the interactive whiteboard] because you can write with different colors. And I like to write on it, too." His classmate added, "I like to write on it more [than the teacher] because it's fun to be writing on it."

A fifth grade girl expressed her desire for direct involvement in activities through her negative description of the interactive whiteboard:

> The Promethean board (IWB) …it's OK, but I think I'd rather do a worksheet, surprisingly, because I just think it's the same activities. I'm not a huge fan of it. It's just the Promethean board. I think it slows us down because we have to call on everybody to have a turn. It has the same activities over and over again…So

> I'd rather do a worksheet with a front and back and have different activities and lessons you can learn.

While Hall and Higgins (2005) as well as the students in this study expressed their favor for IWBs and the tool's interactive nature, the student quoted above shared her frustration with that specific attribute. The fifth grade girl wanted to be directly involved in activities and learning opportunities and believed that time spent for everyone to interact with the IWB was, for her, inert.

Most students look forward to lessons that involve interactive whiteboards because they like to use the tool, and they enjoy watching others use it, too. A fifth grader explained, "The lesson is different with the Promethean board because you can play games, and in the classroom it's kind of boring because she [the teacher] just writes on the board." When asked if students like when their teacher uses the IWB, one girl responded, "I like writing on it more. It's fun to be writing on it." Another member of the focus group continued, "It's bigger than the overhead and you can actually interact with it."

Technology frustrations. Although students expressed confidence in technology and what it could offer ("On the Internet you can go into the whole world"), they almost universally expressed frustration with technology's glitches. Students wanted the computer log on process to proceed quickly, and they frequently described delays that take place when an entire class logs on simultaneously. In addition, students were disturbed by various anomalies in software programs or keystroke errors that resulted in losing entire documents instead of saving them to digital files. These elementary students

wanted technology to work appropriately and had little patience for malfunctions or errors. Nevertheless, students did not express a desire to avoid technology despite viruses, bugs, and glitches.

Positive impact. Students involved in this study seemed keenly aware of their technology use and, for the most part, described technology use in a positive manner. These findings support Knezek and Christensen's (2002) conclusion that elementary students can realize the positive impact of computers in a short time. Students frequently told me that their work was better with computers than it would have been without access to the tools. They often described how word processing software made their products visually appealing, "Some people, like if you are left-handed, it's hard for other people to read your handwriting, so it's neat and clean on the computer." Furthermore, students believed that the quality of their work was improved when they used word processing software or the Internet. Several third graders explained that computer use helped them review and prepare for tests. These students believed in and trusted the technological tools.

The section above explored students' perceptions of technology use. Predominantly, most of these students expressed positive experiences with technology and viewed it optimistically. Next, I discuss another part of my conceptual framework, technology and its affordances.

Technology and Its Affordances

In Chapter 2, I discussed the term "technology" and its various meanings. By reviewing observation and interview data, it is evident that this study's definition of

technology referred primarily to computers (desktop and laptop), the Internet, computer software, and interactive whiteboards in conjunction with a projector. From my discussions with students and teachers, I was aware that both classes used additional technologies during the months this study took place. Additional technologies used in the third grade class included interactive video web conferences, Brain Pop videos, various software programs, and the iPod Touch. Additional technologies used in the fifth grade class included a personal response system, Brain Pop videos, and read-aloud software called "Read, Write, Gold." Although students discussed these additional technologies with me, I did not observe all of them during my selected observations. For those technologies I did directly observe, I saw some tools used more often than others. However, my observations represented only a sampling of these teachers' technology integration activities.

Koehler and Mishra (2008) explained that technologies have various uses and meanings for different people. In the context of the third and fifth grade classrooms under study, I used the data to determine that students referred primarily to computers when I asked them about technology. However, when students discussed their use of computers during focus group interviews, it was actually computers in conjunction with their software capabilities that students were describing. Additionally, these elementary students often discussed using the Internet as a venue for research or to play games. The final technology commonly discussed and used was an interactive whiteboard in combination with a projector.

Affordances. This study referred to the notion of technology and its affordances which Hammond (2009) described as "an emergent property of an object. The affordance is there, it has always been there, but it needs to be perceived to be realized" (p. 2). Mishra and Koehler (2009) elaborated when they expressed that technologies have "affordances and constraints, potentials and problems that we as educators need to understand before we can start using them for pedagogical purposes" (p. 15). However, it was apparent that students in both classrooms had an intuitive sense of technologies' affordances. They understood that they used a word processing program to compose and edit an essay but that they would use Microsoft PowerPoint to create a presentation. Furthermore, students held distinct perceptions about the differences between researching online versus researching with books. Many students clearly articulated their understanding that books are static whereas the Internet is dynamic and current. They often explained the process of using hyperlinks whereby websites can lead readers from one topic to another. It was unclear whether students developed their understandings about technologies' affordances at home, school, or through some combination of the two environments.

I next describe technologies I observed being used in both classrooms under study, and the affordances they offered these students:

1. Computers – Both classrooms used computers routinely. Each classroom was equipped with four student computers but also accessed additional computers within the school. The teachers took their classes to the school's computer lab at least once each week for a 45 minute period. In addition, teachers borrowed wireless laptop carts that

provided enough computers so that each student could use one individually. The computers offered various affordances, based on the software being used or their Internet applications.

2. Internet – This tool was important and was used often in both classrooms. On several occasions, teachers designed activities that required students to access the Internet either during a weekly computer lab session or from the classroom with the aid of a wireless laptop cart and individual computers. Classes used the Internet as a research tool and to access specific websites. For example, fifth graders accessed the Internet and simultaneously used library books as they researched various national symbols. In another activity, third graders used teacher-chosen websites during a Math online shopping activity. In all instances, students' access was structured as the teachers provided appropriate sites for students to access. During this study, the Internet's primary affordance was to access information.

3. Computer software – All classrooms at Winding Creek Elementary School were provided access to various software programs. I often observed students using the Math software SuccessMaker Enterprise (SMe). Students accessed SMe from their classrooms as well as from the Computer Lab. The primary affordance of SMe was that it provided students with Math activities appropriate for individual students' abilities.

Microsoft Word was used throughout this study. Students used Word in two ways: 1) to compose a written document, and/or 2) to type the final copy of a document. During focus group discussions, it became evident that students did not separate the composing process from the typing process. However, I was able to separate the two

processes when reviewing the observation and transcript data. Thus, the primary affordance of Microsoft Word was to enhance the writing and publishing processes.

Hammond (2009) described students' support for word processing software as a tool to improve the look of text. Hammond did not find that students chose Word for its editing possibilities. Nevertheless, in this study I discovered that students were aware of both uses of the software and described its advantages for creating clean, clear documents as well as its use as a composing aide. Students discussed the ease with which a reader could review a word processed document versus a hand-written one. One third grader shared, "Maybe my teacher couldn't read my handwriting if it was sloppy!" Not only could Word improve the look of text, but students also described the appeal of searching for and adding graphics to word processed documents to make them more visually pleasing.

While students positively described the appearance of word processed documents, they also referred to the software's various editing functions. A third grade girl explained, "Using the computer might help us with our writing. Whenever you write something that's not correct, you have to right click it and then it says the right words." Another student in the focus group agreed and added that, "You would have to look in the dictionary to see how the word's pronounced" if students did not have digital access to Word's built-in dictionary. Students believed that composing and editing with Word helped them create better products than they would have written using pencil and paper.

Microsoft PowerPoint was also used in both classrooms. Students in the fifth grade class used the software to create presentations to share with their peers while third

graders created individual slides for their interactive notebooks. Thus, the primary affordance of PowerPoint was to create presentations or to present information in a particular way.

Third graders used Inspiration software to create graphic organizers, such as the one they created for the 3 branches of government. Students explained that the software helped them learn the material "because we had to really think about what information we had to type up. And, the computer had images that could help you." Thus, the primary affordance of Inspiration was to represent information graphically.

4. Interactive whiteboard (IWB) and projector – I observed the fifth grade class using a Promethean interactive whiteboard on several occasions. The fifth grade teachers rotated a mobile IWB among the classes for two weeks at a time. In addition, the fifth grade teacher scheduled time for the class in the school's Technology Lab that maintained an interactive whiteboard for whole-class activities. A projector was always used in conjunction with the IWB in order to display information on the board.

I observed two distinct uses of the interactive whiteboard. On one occasion, students controlled the IWB's functions as they presented PowerPoint slideshows they had researched and created with partners. The other IWB use I observed was as a teacher-led demonstration tool. During teacher-led use, students may or may not be called to the interactive whiteboard to write on it or to perform a function. Thus, the primary affordance of the interactive whiteboard was to present whole class information and to provide the option of making presentations interactive.

Affordances and prior experiences. Wijekumar, Meyer, Wagoner, & Ferguson (2006) stated that technology affordances may be affected by students' prior experiences with that technology. Thus, if students primarily used computers to play games, students may expect all computer usage to involve game playing, not learning experiences. Nevertheless, this study's data did not support Wijekumar et al.'s claims. Many students in the present study discussed their enjoyment of playing computer games both at home and in school, but seemed to understand that computers can also be used to provide and support learning opportunities. When asked specifically about using computers for games versus using the tools for learning, one student responded, "I think it's learning but in a game form. It's just shrinking the technology down into a platform you can play it on."

If Wijekumar, Meyer, Wagoner, & Ferguson (2006) are correct about students' experiences with technology having an impact on those technologies' affordances, then perhaps the elementary students involved in this study have developed a new understanding about computer use. Perhaps the teachers' frequent and varied technology uses have expanded students' prior definition of various technologies' affordances. A fifth grader commented, "Learning with the computer is a little better (than lessons without the computer) because if you get questions wrong the program can review it for you." It is unclear whether students had an understanding about technologies and their affordances prior to the beginning of the school year or where they learned about the affordances. However, it is evident that students have developed an understanding of several technologies and the affordances they offer.

Partner computer use. Beers, Paquette, and Warren (2000) studied computer use from kindergarten through high school and separated the results according to grade levels. The researchers found that students in grades 3 through 5 most often used computers either alone or with a partner (Beers et al.). This research study confirmed those results as I observed and was aware of individual and partner activities. Sometimes students were seated individually at computers while they worked independently on assignments, such as completing a graphic organizer with Inspiration software or composing an essay about a family tradition. However, other activities involved partner or group work, such as third graders' composing and typing a letter in support of a Math activity or fifth graders creating a PowerPoint slideshow about a national symbol.

Oftentimes, it was difficult to determine whether students were directed to work independently or with others on technology assignments because they consistently interacted with others during all technology lessons I observed. However, upon closer examination, the nature of their interactions was different depending on the lesson's instructions. When students worked independently at computer terminals, they asked each other "how to" questions such as, "How do I navigate this website?" or "How do I insert a heading at the top of this page?" When students worked with partners or in groups, they asked the same kinds of "how to" questions, but also expanded their discussions to include the content and topic at hand. Thus, despite the constant interplay between and among students during technology activities, students demonstrated an understanding about which kinds of questions were appropriate in each situation. A fifth

grade girl explained, “It kind of depends on the situation…Like if it’s a test you can’t go up to someone and ask, ‘Do you know how to get this answer?’”

Video and internet use. Beers, Paquette, and Warren (2000) found that students between the third and fifth grades only occasionally watched videos and accessed the Internet. This study expanded those findings because students often viewed videos from the website Brain Pop and frequently accessed the Internet. In fact, students at both grade levels had developed a level of comfort with their Internet use, as seen when third grade students took part in a virtual, online shopping activity where they accessed specific websites to “buy” items. A third grade boy explained that online shopping was “easier than if you were going to the store because there you have to look around and find all the things you want to buy.” Another student added, “Yeah. I liked it because we didn’t really have to move around to search.” Perhaps the difference between Internet use in this study and the Beers et al. study can be attributed to the date of the original study. Beers et al. published their findings 10 years ago. Since that time, many schools have made technological improvements, including an increase in Internet access.

Word processing use. Hadley and Sheingold (1993) found that students in grades 4 through 12 used word processing tools more often than any other technology. During my fifth grade observations, I observed students frequently using word processing technology to compose and edit essays. They used word processing tools as often as they used PowerPoint presentation software. As mentioned in the previous section, perhaps the difference between Hadley and Sheingold’s study and this one can be attributed to the

many years between studies. There are now more software programs available than there were 17 years ago when Hadley and Sheingold completed their study.

This section of the Discussion chapter has described specific technology use found during the study. I also explained the affordances that each technology offered students and their understanding that technology can be used for learning opportunities as well as for games. In the next section, I discuss the design of lessons I observed.

Teachers as Designers

Both teachers who participated in this study are enrolled in a Master's degree program in technology integration and, as such, incorporate considerable technology use when designing curricular activities. The state of Virginia mandates the content they must teach through the Standards of Learning (SOLs). However, within the SOL framework, each educator makes decisions about when and how to provide learning opportunities for specific content. Each teacher demonstrated an understanding of the technology used in class and often provided students with sample products that were previously prepared prior to students' technology use. Given that the study's conceptual framework took into account the role of teacher as designers, I next examine students' technology perceptions in light of the lessons' design.

Technology for demonstrations. Studies show that technology is most commonly used for demonstration purposes in didactic, teacher-centered classrooms (Hall & Higgins, 2005; Morrison & Lowther, 2010; National Center for Educational Statistics, 2000). During 16 classroom observations, I saw teachers using technology for demonstration purposes on 6 occasions. During 5 out of those 6 demonstrations, teachers

used either a television or an interactive whiteboard to provide the entire class with an example and instructions. Immediately after teachers had shared the necessary information with students, they discontinued using the TV or IWB and subsequently sent students to complete their assignments. On 5 occasions, students' subsequent assignments involved technology use. I observed only one complete didactic lesson that involved an interactive whiteboard. During my observations, it became clear that these classrooms did not operate in a traditional manner, rather they were student-centered classrooms.

Student-centered lessons. During my classroom observations, both teachers conducted primarily student-centered lessons. Teachers took on facilitator roles as they provided instructions or guidance about how to complete an activity and then sent students to work on the activity either alone or with a partner. For example, fifth graders worked in pairs on wireless laptop computers as they researched a specific, national symbol using the Internet and books. Then, students used PowerPoint to create a presentation about their chosen national symbol. Finally, the fifth grade partners presented their completed slideshow to their peers. During the research phase of this activity, most students chose to gather their information using the Internet, although several groups preferred to use books. In this example, the fifth grade teacher designed the lesson with students at its center. Instead of providing students with the information they needed for testing, the teacher structured a research activity whereby students could gather information themselves.

Throughout my observations, students used technology in a variety of ways. Most lessons demonstrated focus on a constructivist learning perspective as students generated meaning through active experiences (Brooks & Brooks, 1999). One example involved third graders working with partners to conduct an online shopping activity. Students were provided with "$100" and access to several websites for online shopping. Student shoppers needed to work in tandem to make purchases that totaled as close to $100 as possible by purchasing at least 5 items but no more than 8 items. The lesson's design encouraged students to discover ideas for themselves (Burdette, McGraw, & Ross, 2001; Franklin, 2007; Jonassen, 1996; Riedl, 1995) as illustrated by a third grader's explanation: "You're not supposed to round. You had to either get exactly $100 or a little bit less." Her partner added, "It's really hard to spend exactly that amount because the prices are really different." This lesson included higher order thinking activities that promote student engagement and reflection in order to resolve internal questions or conflict (Cornelius-White & Harbaugh, 2010).

Students' shifting roles. In 1985's Apple Classrooms of Tomorrow Project (ACOT), it became evident that students' roles shifted between student and learner as they used classroom technology (Alessi & Trollip, 2001; Hall & Higgins, 2005; Sandholtz, Ringstaff, & Dwyer, 1997). This study supported the ACOT findings as students asked each other for technology guidance and often provided similar direction to others as appropriate. Students working with a partner often tried to solve technology questions between the two of them by discussing their problem and its possible solutions. However, if partners could not discover a solution, one of two scenarios often took place.

Either the pair who needed guidance asked another pair of students for help or another pair of students offered help without being asked. These findings are supported by Sandholtz, Ringstaff, and Dwyer (1997) who further elaborated that students often volunteered technology information to peers without being asked. I continually observed students helping other students throughout the duration of the study, shifting between teacher and learner as needs arose.

When students worked independently on computer activities, the same dynamic took place where students moved fluidly between teacher and student roles (Alessi & Trollip, 2001; Hall & Higgins, 2005; Sandholtz, Ringstaff, & Dwyer, 1997). Students often asked a nearby peer or a student known to be a "computer expert" for guidance. Although students were assigned independent activities, they were not providing each other with answers or "cheating;" rather they helped classmates solve technology challenges. Once a classmate understood how to move forward with technology, it was possible to focus on completing the assignment appropriately. Researchers cite these interactive conversations as helping students to create meaning and to further process their understanding of the tool (Cornelius-White & Harbaugh, 2010; Gould, 2005; Hung, Tan, & Koh, 2006; Vygotsky, 1978).

An Expanded Conceptual Framework

It is important to view the results of this study through an expanded conceptual framework. At the beginning of this study, I believed that three areas intersected and influenced students' technology perceptions. Those three areas included technology and its affordances, teachers as designers, and students' experienced perceptions. While each

aspect of the framework has an impact on students' technology perceptions, I have learned that teachers' design choices can not be separated from students' perceptions.

This study focused on two elementary classrooms where teachers support constructivist learning theory through their lesson design. The technology lessons I observed did not support a traditional, didactic classroom structure. Instead, these lessons focused on students actively using various technological tools, providing opportunities to question, to search for answers, and to fully explore technology. As a result, these students demonstrated that active learning can help learners create meaning and to develop an understanding about various technologies and their affordances.

In classrooms where teachers make design decisions that do not support constructivist learning theory, students' perceptions may be different from those found in this study. Perhaps students would express different attitudes about specific technologies if their teachers were the technology users, and the students were observers. Thus, any conceptual framework for future research must include the teacher's technology design as an integral and interactive component of students' experienced perceptions and technology affordances.

During the previous section of the Discussion chapter, I explained teachers' roles as designers of curricula including technology integration activities. I next take the results of this study and apply them to elementary classrooms.

Implications for Professional Practice

Rudestam and Newton (2007) describe the function of the discussion chapter to be "draw[ing] implications from the results of the study to the world of theory and

practice" (p. 199). I now provide recommendations for teachers to enhance professional practice.

- Teachers can and should talk to students about their "likes" and "dislikes" of educational technology. By doing so, teachers can begin to understand why students feel the way they do about specific technologies.
- Teachers can and should take students' technology preferences into account when designing lessons and activities. "By articulating how they learn best, students also can help teachers do a better job of meeting student needs" (Mitra, p. 652).
- Teachers can and should design learning opportunities that take advantage of students' positive perceptions of technology. They can offer students the option of using technology when it is available and appropriate.
- Teachers can and should allow students to alternate between teacher and learner roles when using educational technology.
- Teachers can and should provide explicit instruction about technologies' various affordances.
- Teachers can and should instruct students about basic troubleshooting so students can solve routine technology problems.
- Teachers can and should be cognizant that most students like to interact with technology; however some students do not like it.

Future Research

"Any research project hopes to make something known that was previously uncertain: to answer a specific question…or to illuminate an area…" (Weiss, 1994, p. 15). This study's goal was to explore elementary students' technology perceptions. Nevertheless, I recommend additional research to be conducted in several areas:

- This study can be replicated and extended to include additional elementary grade levels. By including additional grade level students and/or a larger sample size, researchers may be able to learn when and how students' technology perceptions develop.
- Researchers can explore how and where students learn about technologies' affordances. Do students blend together ideas about technology used at home and technology used at school?
- Another study could focus on two specific areas: students' perceptions of technology and teachers' design decisions. Are students using technology the way teachers intended when they designed the lesson? Are students learning outcomes similar to teachers' intended outcomes?
- This study can be replicated in other elementary school settings. Are students provided with similar technology activities in other schools? How does the setting have an impact on students' technology activities and abilities?

APPENDIX A

Information for Teacher Participants

Initial Meeting with Cooperating Teachers
September 9, 2009, 3:00pm, Mason's Loudoun Campus

Proposed Research:
I want to study how students perceive technology use in the elementary classroom. Sometimes students use technology and other times the teacher uses technology to promote instruction. Other times there is a combination of uses within a single lesson. I want to learn about students' interest in and understanding as technology is used in a variety of different ways and formats.

Proposed Plan:
I would like to contact each teacher once a week by telephone or email to identify the upcoming week's lessons that will incorporate technology. Once I have identified the lessons that will support my research, I will request that each teacher hand out a brief survey immediately after teaching the lesson. The teachers will save the surveys for my review. Research will take place between October 1, 2009 and February 1, 2010.

I would like to conduct post-lesson focus groups with the students either the same day as the lesson or the day following the lesson. The focus group sessions will be audio-taped and will therefore need to be conducted in a location away from the classroom. The interviews will last no longer than 15 minutes. I will choose the students from a predetermined, rotating schedule, such as the following:

Focus Group Rotation

1st	2nd	3rd	4th	5th	6th	7th
A	C	E	G	B	H	A
B	D	F	H	D	C	D
C	E	G	A	F	E	G

Cooperating Teachers' Roles:
- Distribute Recruitment Letter to classroom parents
- Distribute and collect consent forms from parents and assent forms from students
- Talk with me once a week to help determine appropriate lessons for study
- Help secure a location in the school for interview sessions
- Distribute and collect surveys following designated research lessons

APPENDIX B

Informed Consent Form

ELEMENTARY STUDENTS' PERCEPTIONS OF TECHNOLOGY USE

RESEARCH PROCEDURES
This research is being conducted to study how technology is being utilized in elementary classrooms. If you agree to let your child participate, you will be giving me permission to talk with your child after selected classroom technology lessons that I have observed. I will be interviewing your child for 20 minutes or less in a three-student focus group. I will interview your child on two separate occasions. All lessons and focus group interviews will take place between November 1, 2009 and March 30, 2010, and will be audio taped. If permission to participate is not given, students will continue with their classroom teacher on in-class activities.

RISKS
There are no foreseeable risks or discomforts from participation in this study.

BENEFITS
There are no benefits to you or your child as participants other than to further research in elementary technology integration.

CONFIDENTIALITY
The data in this study will be confidential. I will be the only individual with access to interview tapes and transcripts. Further, your child will be provided with an alias that will be used throughout the data-gathering and research report. Only the researcher will know the students' real names.

PARTICIPATION
Your participation and your child's participation is voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate or if you withdraw from the study, there is no penalty or loss of benefits to which you are otherwise entitled. There are no costs to you or any other party

CONTACT
This research is being conducted by Amie Weinberg at George Mason University. She may be reached at 703-993-4535 for questions or to report a research-related problem. You may contact the George Mason University Office of Research Subject Protections at 703-993-4121 if you have questions or comments regarding your rights as a participant in the research.

This research has been reviewed according to George Mason University procedures governing your participation in this research.

CONSENT
I have read this form and agree to let my child participate in this study.

_____
Name

_____
Date of Signature

APPENDIX C

Informed Assent Form

ELEMENTARY STUDENTS' PERCEPTIONS OF TECHNOLOGY USE

RESEARCH PROCEDURES
The reason I want to talk to you is to find out what you think about technology in school. If you agree to help me, you will answer some questions for me in a small group after several technology lessons. Your parents (or legal guardians) need to sign a permission form, too.

RISKS AND BENEFITS
You do not get anything special for helping me, but I will use the information to help other teachers plan better technology lessons.

CONFIDENTIALITY
I will tape record the small group talks, but I will be keep the tape in a very safe place. Everything that we say on the tape will be written out on paper. But I will give each of you a pretend name so nobody will know what you said. I may use some of your words when I write my report.

PARTICIPTION
You do not have to answer the questions or talk with me if you don't want to do so. If you change your mind after we start talking and want to stop, that is OK. I will not get mad and nothing will happen to you.

CONTACT
My name is Amie Weinberg and I am studying to get a PhD in Education at George Mason University. You can call me at this phone number (703-993-4535) if you have any questions about this study. You can also call my teacher, Dr. Priscilla Norton, a professor at George Mason University, at this phone number (703-993-2015).

The George Mason University Office of Research Subject Protections knows all about my research and said that it was OK for me to do it. You can call them at 703-993-4121 if you have any questions about being a part of this research.

CONSENT
I have read this form and I agree to be part of this study.

_____ _____
Name Date

APPENDIX D

Interview Guide

Thank you for agreeing to help me with my research. I could not do this without your help!

I'd like to ask you a few questions about the technology activity you just completed. There are no right or wrong answers. I just want to learn more about what you thought about the lesson.

1. Tell me what you did in the activity I just observed.

2. What do you think you learned from the activity?

3. How do you feel about the activity?

4. Why do you think your teacher had you complete the assignment/activity?

5. How would the assignment have been different without using (PPT or Word or technology)?

6. What do you like dislike about using technology in class? Why?

7. What do you like about using technology in class? Why?

8. Do you like when your teacher uses technology in class? Why? Why not?

9. Do you think you learn more when you use technology? Why?

REFERENCES

REFERENCES

Alessi, S. M., & Trollip, S. R. (2001). *Multimedia for learning: Methods and development.* Needham Heights, MA: Allyn & Bacon.

Becker, H. J. (2000). How exemplary computer-using teachers differ from other teachers: Implications for realizing the potential of computers in schools. *Contemporary Issues in Technology and Teacher Education*, *1,* 274-293.

Beers, M. I., Paquette, K., & Warren, J. M. (2000). Student view of classroom technology use. In D. Willis et al. (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2000* (pp. 1534-1538). Chesapeake, VA: AACE.

Brooks, J. G., & Brooks, M. G. (1999). *In search of understanding: The case for constructivist classrooms.* Alexandria, VA: Association for Supervision and Curriculum Development.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-44.

Burdette, K., McGraw, T., & Ross, J. (2001). *Toward an effective use of technology in education: A summary of research.* Charleston, WV: AEL.

Clancey, W. J. (2009). Scientific antecedents of situated cognition. In P. Robbins & M. Aydede (Eds.), *The Cambridge handbook of situated cognition* (pp. 11-34). Cambridge: Cambridge University Press.

Coffey, A., & Atkinson, P. (1996). *Making sense of qualitative data: Complimentary research strategies.* Thousand Oaks, CA: Sage Publications.

Cook-Sather, A. (2002). Authorizing students' perspectives: Toward trust, dialogue, and change in education. *Educational Researcher, 31*(4), 3-14. doi:10.3102/0013189X031004003

Cornelius-White, J. H. D., & Harbaugh, A. P. (2010). *Learner-centered instruction: Building relationships for student success.* Thousand Oaks, CA: Sage Publications.

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

Cuban, L. (2003). *Oversold & underused: Computers in the classroom.* Cambridge, MA: Harvard University Press.

Editorial Projects in Education. (2009). *National Technology Report.* Bethesda, MD.

Edmunds, H. (1999). *The focus group research handbook.* Chicago: NTC Business Books.

Falbel, A. (1991). The computer as a convivial tool. In I. Harel & S. Papert (Eds.), *Constructionism* (pp. 29-37). Norwood, NJ: Ablex Publishing Corporation.

Farrell, E., Peguero, G., Lindsey, R., & White, R. (1988). Giving voice to high school students: "Pressure and boredom, ya know what I'm sayin"? *American Educational Research Journal, 25,* 489-502.

Franklin, C. (2007). Factors that influence elementary teachers' use of computers. *Journal of Technology and Teacher Education, 15,* 267-294.

Gaver, W. W. (1991). Technology affordances. In S. P. Robertson, G. M. Olson, & J. S. Olson (Eds.), *Proceedings of the ACM CHI 91 Human Factors in Computing Systems Conference* (pp. 79-84). New Orleans, LA.

Glasgow, N. A. (1997). *New curriculum for new times: A guide to student-centered, problem-based learning.* Thousand Oaks, CA: Corwin Press.

Glesne, C. (2006). *Becoming qualitative researchers: An introduction.* Boston: Pearson Education.

Gould, J. S. (2005). A constructivist perspective on teaching and learning in the language arts. In Fosnot (Ed.), *Constructivism: Theory, perspectives, and practice* (pp. 99-109). NY: Teachers College Press.

Hadley, M. & Sheingold, K. (1993). Commonalities and distinctive patterns in teachers' integration of computers. *American Journal of Education, 101*(3), 261-315. doi:10.1086/444044

Hall, I. & Higgins, S. (2005). Primary school students' perceptions of interactive whiteboards. *Journal of Computer Assisted Learning, 21*, 102-117. doi:10.1111/j.1365-2729.2005.00118.x

Hammond, M. (2009). What is an affordance and can it help us understand the use of ICT in education? [Electronic version]. *Education and Information Technologies,* 1-13.

Harel, I., & Papert, S. (Eds.). (1991). *Constructionism*, Norwood, NJ: Ablex Publishing Corporation.

Healy, J. M. (1998). *Failure to connect: How computers affect our children's minds for better and worse.* NY: Simon & Schuster.

Hughes, J. E., & Scharber, C. M. (2008). Leveraging the development of English TPCK. In AACTE Committee on Innovation and Technology (Ed.), *Handbook of technological pedagogical content knowledge (TPCK) for educators* (pp. 87-106). New York: Routledge.

Hung, D., Tan, S.C., & Koh, T. S. (2006). Engaged learning: Making learning an authentic experience. In Hung & Khine (Eds.), *Engaged Learning with Emerging Technologies* (pp. 1-27). The Netherlands: Springer.

International Society for Technology in Education (ISTE) (1998). National educational technology standards for students.

International Society for Technology in Education (ISTE) (2007). National educational technology standards for students.

Jonassen, D. H. (1996). *Computers as mindtools for schools: Engaging critical thinking.* Columbus, OH: Merrill.

Jonassen, D. H., & Strobel, J. (2006). Modeling for meaningful learning. In Hung & Khine (Eds.), *Engaged Learning with Emerging Technologies* (pp. 1-27). The Netherlands: Springer.

Kay, R. H. (1993). An exploration of theoretical and practical foundations for assessing attitudes toward computers: The computer attitude measure (CAM). *Computers in Human Behavior, 9,* 371-386. doi:10.1016/0747-5632(93)90029-R

Knezek, G., & Christensen, R. (2002). Impact of new information on teachers and students. *Education and Information Technologies. 7*, 369-376. doi:10.1023/A:1020921807131

Koehler, M. J., & Mishra, P. (2008). Introducing TPCK. In AACTE Committee on Innovation and Technology (Ed.), *Handbook of technological pedagogical content knowledge (TPCK) for educators* (pp. 3-29). New York: Routledge.

Levin, T., and Wadmany, R. (2006). Listening to students' voices on learning with information technologies in a rich technology-based classroom. *Journal of Educational Computing Research, 34*, 281-317. doi:10.2190/CT6Q-0WDG-CDDP-U6TJ

Lortie, D. C. (1975). *Schoolteacher: A sociological study.* London: University of Chicago Press.

Marshall, C., & Rossman, G.G. (1999). *Designing qualitative research.* Thousand Oaks, CA: SAGE Publications.

Mason, J. (2002). *Qualitative researching. London:* SAGE Publications.

Maxwell, J. A. (2005). *Qualitative research design: An interactive approach.* Thousand Oaks, CA: SAGE Publications.

Miles, M. B., and Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook.* Thousand Oaks, CA: SAGE Publications.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A new framework for teacher knowledge. *Teachers College Record, 108*, 1017-1054. doi:10.1111/j.1467-9620.2006.00684.x

Mishra, P. & Koehler, M. J. (2009). Too cool for school? No way! *Learning & Leading With Technology, 36*(7), 14-18.

Mitra. D., L. (2004). The significance of students: Can increasing "student voice" in schools lead to gains in youth development? *Teachers College Record, 106*, 651-688.

Morrison, G. R., & Lowther, D. L. (2010). *Integrating computer technology into the classroom: Skills for the 21st century.* Boston: Pearson Education.

National Center for Educational Statistics (2000). *Teachers' tools for the 21st century.* (NCES2000-102). Washington, DC: U.S. Department of Education.

Newmann, F. M., Bryk, A. S., & Nagaoka, J. K. (2001). *Authentic intellectual work and standardized tests: Conflict or coexistence?* Chicago, IL: Consortium on Chicago School Research.

Niederhauser, D. S., and Lindstron, D. L. (2006). Addressing the nets for students through constructivist technology use in K-12 classrooms. *Journal of Educational Computing Research, 34*, 91-128. doi:10.2190/E0X3-9CH0-EE2B-PLXG

Njagi, K., Smith, R., & Isbell, C. (2003). Assessing students' attitudes toward web-based learning resources. Retrieved January 26, 2010, from http://www.unb.ca/naweb/proceedings/2003/PosterNjagiIsbel.html

Norton, P., & Wiburg, K. M. (2003). *Teaching with technology.* Belmont, CA: Wadsworth/Thomson Learning.

Palak, D., & Walls, R. T. (2009). Teachers' beliefs and technology practices: A mixed-methods approach. *Journal of Research on Technology in Education, 41*, 417-441.

Papert, S. (1993). *The children's machine: Rethinking school in the age of the computer.* NY: BasicBooks.

Partnership for 21st Century Skills (2009). Framework for 21st century learning. Retrieved October 2, 2009, from http://www.21stcenturyskills.org/

Penrod, D. (2007). *Using blogs to enhance literacy: The next powerful step in 21st-century learning.* Lanham, MD: Rowman & Littlefield Education.

Piaget, J., and Inhelder, B. (1969). *The psychology of the child*. NY: Basic Books.

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon, 9*, 1-2. doi:10.1108/10748120110424816

Riedl, J. (1995). *The integrated technology classroom: Building self-reliant learners.* Needham Heights, MA: Allyn & Bacon.

Rudestam, K.E., & Newton, R. R. (2007). *Surviving your dissertation: A comprehensive guide to content and process.* Los Angeles: SAGE Publications, Inc.

Sandholtz, J. H., Ringstaff, C., & Dwyer, D.C. (1997). *Teaching with technology: Creating student-centered classrooms.* NY: Teachers College Press.

Scaife, M., & Rogers, Y. (1999). Kids as informants: Telling us what we didn't know or confirming what we knew already? In A. Druin (Ed.), *The design of children's technology* (pp. 1-26). Brighton, England: Morgan Kaufmann Publishers.

Schwartz, J. E., & Beichner, R. J. (1999). *Essentials of educational technology.* Needham Heights, MA: Allyn & Bacon.

Shuell, T. J. (1986). Cognitive conceptions of learning. *Review of Educational Research, 56*, 411-436.

Shuell, T. J. (1996). Teaching and learning in a classroom context. In D. C. Berliner & R. C. Calfee (Eds), *Handbook of educational psychology* (pp. 726-764). NY: Macmillan.

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review, 57*, 1-22.

Vaughn, S., Schumm, J. S., & Sinagub, J. (1996). *Focus group interviews in education and psychology.* Thousand Oaks, CA: SAGE Publications.

Virginia Department of Education (2009). Standards of learning currently in effect for Virginia Public Schools. Retrieved October 1, 2009, from http://www.doe.virginia.gov/

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Weiss, R. S. (1994). *Learning from strangers: The art and method of qualitative interview studies.* NY: The Free Press.

Wenglinsky, H. (2005). *Using technology wisely: The keys to success in schools.* New York: Teachers College Press.

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

Wijekumar, K. J., Meyer, B. J. F., Wagoner, D., & Ferguson, L. (2006). Technology affordances: The "real story" in research with K-12 and undergraduate learners. *British Journal of Educational Technology, 37*, 191-109. doi:10.1111/j.1467-8535.2005.00528.x

Wolcott, H. (1994). *Transforming qualitative data: Description, analysis, and interpretation.* Thousand Oaks, CA: Sage Publications.

CURRICULUM VITAE

Amie Weinberg graduated from Wheaton College in Norton, Massachusetts in 1982. As a History and Political Science major, Amie spent one year researching the American government's decision to intern Japanese-Americans during World War II. She received departmental honors for her thesis, "An American Disgrace: The Japanese Relocation Episode." Amie graduated from Rhode Island College with a Master of Education degree in 1994 and taught in the elementary classroom for twelve years. She has also taught preschool, U.S. Army soldiers, and currently teaches several classes at George Mason University in the Graduate School of Education.