BEGINNING PRESERVICE TEACHERS'

PERCEPTIONS OF COMPUTER INTEGRATION

by

CLIF MIMS

(Under the direction of Lloyd P. Rieber)

ABSTRACT

The purpose of this study was to explore the perceptions of beginning preservice teachers about computer integration and how those perceptions have developed. Having an understanding of these students' perceptions about computer integration before they begin their preservice training will help teacher education programs plan developmentally appropriate programs for teachers of tomorrow. This qualitative inquiry was guided by two research questions: 1) What are early preservice teachers' perceptions about computer integration? 2) How did these perceptions develop? A total of five undergraduate students who identified education to be their major, but not yet admitted into a teacher education program, participated in this study. Selection of the participants was also based on criterion sampling strategies designed to reflect the national demographics of undergraduate teacher education programs as reported by the American Association of Colleges for Teacher Education.

The analysis of the data resulted in the emergence of four general themes related to preservice teachers' perceptions about computer integration: 1) the participants' definitions of computer integration; 2) the descriptions of the participants' vision of computer integration into their future classrooms; 3) the

educational value of computer integration; and 4) the requirements that exist to encourage the integration of computers into teaching and learning. All of the participants explained that their perceptions developed as the result of their past experiences with computer integration.

INDEX WORDS: Preservice, Perception, Computers in Education, Technology Integration, Teacher Education

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For Kristi.

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CHAPTER I

INTRODUCTION

One of the current goals of public school education is technology integration. This is witnessed in much of the current educational literature (e.g. Earle, 2002; Tiene & Luft, 2001; Vetter, Sologuk, & Stammen, 2001), by the enormous sums of money schools are spending to purchase equipment (e.g. Barron, Hogarty, Kromrey, & Lenkway, 1999; Earle, 2002; Jones & Paolucci, 1999), and the emphasis to weave technology into the fabric of the educational curriculum (e.g. Norris, Smolka, & Soloway, 2000; Salinas, 2000; Vetter et al., 2001).

The integration of technology into the school curriculum has the potential to improve the quality of teaching and learning. However, this potential will not emerge without educators considering how computer use relates to the process of learning and learning environments in schools (Schank & Cleary, 1995). Having basic computer literacy is not enough. Teachers should understand the connections between technology and learning and use this understanding to bring the two together in such a manner that makes each indispensable to teaching and learning (Lowther, Bassoppo-Moya, & Morrison, 1998).

As new technologies appear in classrooms, a dilemma arises regarding the preparation of future educators. Although most American K-12 schools have now acquired sufficient computer technology resources, K-12 teachers do not

have effective strategies to utilize these resources successfully (Willis & Mehlinger, 1996). Luetkehans and Robinson (2002) accurately described the current landscape facing teachers as they seek to effectively implement technology use into the curriculum:

> Teaching and learning in today's schools is a complex and sometimes stressful activity. Teachers are under pressure to respond to state and national standards, meet specific criteria for state testing, and continue to diversify instruction and appropriately integrate technology experiences. Current state and national technology standards for teachers reflect educational technology research and practice, leading teacher education programs to incorporate educational technology principles, experiences, and practices into their curricula. However, change in higher education institutions is slow and not without obstacles. As more pressure is placed upon teachers…Colleges of Education must respond as well. (p. 13)

In light of the increasing availability of educational technology, one major issue facing schools, colleges and departments of education is equipping preservice teachers to effectively integrate technology into their classrooms (Abdal-Haqq, 1996; Mehlinger, 1996; Willis & Mehlinger, 1996). The Office of Technology Assessment (OTA) reported this to the United States Congress:

> Despite the importance of technology in teacher education, it is not central to the teacher preparation experience in most colleges of education in the United States today. Most new teachers graduate from teacher

preparation institutions with limited knowledge of the ways technology can be used in their professional practice. (1995, p. 2)

Recent studies suggest that there has been little progress towards this goal since the OTA report (Abdal-Haqq, 1996; Stetson & Bagwell, 1999; Strudler, McKinney, & Jones, 1999; The CEO Forum on Education & Technology, 2000). Fewer than half of the schools, colleges and departments of education require students to develop and teach lessons that make use of technology. Even fewer require such practice during the student teaching experience (The CEO Forum on Education & Technology, 2000, p. 1). Although many K-12 schools have computer technologies available, teachers do not have meaningful strategies to effectively integrate this technology into the curriculum (Willis & Mehlinger, 1996). Instead, school systems are having to provide basic training for teachers in a generation that should be the most technologically-ready of any in the history of education (The CEO Forum on Education & Technology, 2000).

The OTA proposed that the best means for educating teachers about technology is through the preservice education that they receive in colleges of education (OTA, 1995). Recent surveys indicate that most education graduates believe that the use of technology in K-12 education is important (Strudler et al., 1999), but more than half of these graduates feel ill-prepared to use technologies in instruction (Abdal-Haqq, 1996; Office of Technology Assessment, 1995; Stetson & Bagwell, 1999; Strudler et al., 1999).

The importance of establishing effective preservice teacher development in technology integration has recently been emphasized by state departments of

education, accreditation boards and professional organizations. In 2000, ISTE published national standards for teacher technology use (ISTE, 2000c) which the National Council for Accreditation of Teacher Education (NCATE) adopted. These standards should greatly encourage schools, colleges and departments of education to redesign programs to emphasize better technological preparation for preservice teachers.

During the first decade of the 21st Century, the demand for qualified teachers will increase. Today's baby-boomer-aged teachers are starting to consider early retirement options while many schools' enrollment numbers are beginning to expand. By 2006, fifty-four million children, nearly three million more children than today, will need to be educated (Office of Postsecondary Education, 1997). American schools will need over 2.2 million new teachers to meet these demands. These new teachers will need to be comfortable with technology as a tool for enhancing both teaching and learning. Teacher education programs must make certain that these new teachers are equipped to implement technology in their classrooms; otherwise their professional education will be incomplete (The CEO Forum on Education & Technology, 2000).

STATEMENT OF THE PROBLEM

As schools, colleges and departments of education seek to better prepare preservice teachers to effectively integrate technology with the processes of teaching and learning, these programs would benefit from knowing what beginning preservice teachers' perceptions are about computer integration

before these students begin their educational training. Little is known about the exact process by which educators (preservice and in-service) learn to integrate technology. Although a variety of “conceptual” models about adoption and diffusion exist (Hooper & Rieber, 1995; Marcinkiewicz, 1995), none is based on research from the perspective of the learner (preservice or in-service teacher). A goal of this research was to gain insight into the perceptions that beginning preservice teachers hold and the process by which these perceptions developed. Understanding how these perceptions have developed will inform teacher educators of the kinds of experiences that have been and could be most influential in providing future teachers with sound instructional models and strategies that best make use of computers. These insights can serve as a beginning frame of reference and assist teacher education programs in designing developmentally appropriate training in technology integration.

PURPOSE AND RESEARCH QUESTIONS

The purpose of this study was to explore the perceptions of beginning preservice teachers about computer integration and how those perceptions have developed. Having an understanding of these preservice teachers’ perceptions about computer integration before they begin their preservice development will help teacher education programs plan developmentally appropriate programs for teachers of tomorrow. This study is guided by two research questions:

1. What are beginning preservice teachers’ perceptions about computer integration?

2. How did these perceptions develop?

Limitations and Delimitations

There are several limitations to this study. First, this is a qualitative study and it should be interpreted from a perspective rooted in the assumptions of qualitative research. The primary goal was to explore beginning preservice teachers' perceptions about computer integration and begin to understand how those perceptions have developed. The participants' knowledge of and experience in the field of education may also be a limitation. The findings reported here represent the perceptions of the participants and are not intended to be generalized.

The participants were all preservice teachers at the University of Georgia who graduated from Georgia high schools. As acceptance into the teacher education program can be very competitive at the University of Georgia, to increase the likelihood that participants in this research would later be accepted into the teacher education program, the participants all held a minimum grade point average of 3.6 on a 4.0 scale.

It should also be noted that this research focused only on computer integration into teaching and learning. Information about other technologies (television, VCR, digital camera, etc.) was not sought in this inquiry.

This inquiry was intended to be a glimpse at a specific point in time. As a result, the data needed to be collected in a very narrow time frame to reduce the chances that the participants' perceptions about computer integration would be

influenced during data collection. All of the data were collected within a three-week time period.

Participants were selected to reflect the national demographics of undergraduate education programs (listed in Tables 1 and 2, on page 41). There were initially seven participants: five females and two males. Three of the females were Caucasian, one was African-American, and one was Asian. The two males, one Caucasian and one African-American, did not participate in the research after being selected. This is discussed in greater detail beginning on page 40. Despite the loss of these two participants, saturation was achieved from the data provided by the remaining five female participants.

SIGNIFICANCE OF THE STUDY

This study has significance to multiple groups. The goal of this research was to understand the initial perceptions of preservice teachers about computer integration before they begin their professional development as teachers. Having an understanding of these preservice teachers' perceptions about computer integration before they begin their preservice development will help teacher education programs plan developmentally appropriate programs for teachers of tomorrow. This inquiry hoped to search for commonalities, differences and themes regarding beginning preservice teachers' perceptions about computer integration and the manner in which their perceptions have evolved. As a preservice educator who teaches courses specifically related to technology integration, this research will not only contribute to the fields of

teacher education and instructional technology, but will also better inform my own classroom instructional practices.

DEFINITIONS

The following definitions inform this study:

Technology. The term *technology* involves using current tools to deliver content and implement practices in an easier, more useful way (Earle, 2002; Hooper & Rieber, 1995). Earle stated that current public opinion suggests that technology simply equals machinery. In response, he argued that "this limited focus on machinery at the expense of process ignores the true sense of technology as the systematic application of scientific and other organized knowledge to practical tasks" (Earle, 2002,p. 6).

Integration. In Latin, integration means "to make whole" (Webster's Revised Unabridged Dictionary, 1998). Robert Earle (2002) best described the characteristics and essence of effective technology integration:

> [Integration] incorporates the need to overcome artificial separations by bringing together all essential elements in the teaching and learning process—including technology…Integration does not just mean placement of hardware in classrooms….it is primarily about content and effective instructional practices. Integration is not defined by the amount or type of technology used, but by *how* and *why* it is used. (2002, p. 7)

Computer Integration. This research is focused specifically on how the computer can be integrated into the processes of teaching and learning.

Therefore, within this research, technology integration refers exclusively to the implementation of computers in teaching and learning.

Developmentally Appropriate Technology Integration Training. This refers to lesson objectives and activities within Teacher Education programs which take into account preservice teachers' perceptions about computer integration in the classroom. Having this understanding would allow preservice educators to design courses and opportunities for preservice teachers to improve their computer integration skills and knowledge.

CHAPTER II

REVIEW OF LITERATURE

This review of literature examines theoretical and empirical sources relevant to a study of the perceptions of beginning preservice teachers about technology integration and how those perceptions have developed. This review of literature is divided into three sections: the first section discusses the theory, research and practice related to technology integration; the second section discusses methods and strategies used by teacher education programs for preparing teachers, focusing primarily on those programs that explicitly use technology as part of their pre-service curricula; and the final section discusses the perceptions, self-efficacy and attitudes of preservice teachers related to technology.

This chapter is based on a thorough review of many sources and databases using the following keywords: computer integration, technology integration, educational technology, preservice, in-service, teacher education, and K-12. The following electronic databases were searched: ERIC, ERIC Instructional Technology, Dissertation Abstracts and the Internet. In addition I looked through publications from the past ten years of key research journals, governmental agencies and research organizations that relate to technology integration and teacher education. The majority of the literature associated with

technology integration consists of anecdotal descriptions offering helpful ideas and strategies for others to use (Windschitl, 1998).

TECHNOLOGY INTEGRATION

The term *technology* involves using current tools to deliver content and implement practices in an easier, more useful way (Earle, 2002; Hooper & Rieber, 1995). Earle (2002) argued that although current public opinion suggests that technology simply equals machinery, this focus on machinery rather than on process ignores the true sense of technology as the application of knowledge to perform practical tasks (Earle, 2002, p. 7).

Just as the term *integration* in Latin means “to make whole” (1998), Earle (2002) suggested that in education, integration brings together all the elements in teaching and learning, including technology. Much more than simply placing hardware into classrooms, effective integration emphasizes *how* and *why* technology is used.

Many parents, educators, politicians and the general public have embraced the belief that computer technology is a powerful educational tool (Johnson, 1999; Morrison, Lowther, & DeMeulle, 1999; Trotter, 1997; Wetzel & Zambo, 1996). In the previous two decades, technology has been both used and misused in classrooms (Leu & Kinzer, 1999). Technologies have been used to provide extra skill practice, to assist in research and to assist with organization and other basic tasks (Becker, Ravitz, & Wong, 1999). Research indicates that most often the technology is used to aid in the acquisition of information outside

of the classroom with little emphasis on a specific curricular goal. According to recent surveys, fewer than half of the teachers use available technology to assist in instruction (DeCorte, 1990; Earle, 2002; Jostens Learning Corporation, 1997). Perhaps this is because effectively integrating technology into the curriculum involves more than simply knowing *how* to use the tools, it also requires that teachers have a sense of how to blend it with the curriculum so that it optimizes the learning process (Moursund, 1997).

With all that is being said and done about technology in education, it is important that parents, educators and lawmakers determine if computer use improves the education of students. One particular study led by Welle-Strand tested whether improvements gained by implementing computers into the classroom can be sustained over time (Welle-Strand, 1991, p. 34). In 2001, ten years after Welle-Strand posed his challenge, Margaret Honey (2001) testified before the U.S. Senate that there is evidence that the use of technology in education is indeed beneficial.

Benefits of Technology Integration

Research substantiates a number of benefits in using technology to support and enhance educational experiences for both students and their teachers.

Benefits to Teachers. The arrival of technology into classrooms has created much interest about its most effective integration into teaching and learning. It is obvious from the research that the level at which the technology has been integrated is less than desirable. A paradigm shift needs to occur as

educators seek more student-centered learning environments where technology integration supports learning; learning does not need to be merely *about* the technology. For now, one positive outcome of integrating technology into the classroom is that this integration has caused many teachers to rethink their instructional practices (Earle, 2002).

Roblyer and Edwards (2000) described several other benefits for teachers in integrating technology into the processes of teaching and learning. They suggested that technology provides educators with unique instructional capabilities such as presentations that utilize hypermedia productions or live video streaming connected with lesson objectives. Roblyer and Edwards (2000) also stated that computers can increase teacher productivity with tools such as electronic grade books which can more quickly calculate students' grades than traditional bookkeeping methods. Similarly, research demonstrates that technology attracts and maintains students' attention, thus allowing teachers to dedicate more classroom time to teaching and learning (Summers, 1991; Whitney, 2000). The use of technology offers teachers a wealth of tools for expanding instructional strategies and increasing productivity. Thus, successful integration of technology improves classroom instruction and management.

Benefits to Students. Roblyer and Edwards (2000) suggested that the integration of technology into teaching and learning can increase student motivation. Research also supports the belief that the use of technology in education not only motivates students (Whitney, 2000), but also provides them

with avenues for higher-level thinking (Carter, 1993; Rieber & Welliver, 1989; Schank & Cleary, 1995).

Research also indicates that the use computers in education can improve student achievement. Sivin-Kachala and Bialo (1994) conducted a meta-analysis of 133 research reviews and reports on original research projects conducted between 1990 and 1994. Sivin-Kachala (1997) extended this work with a meta-analysis of 219 research studies that were conducted between 1990 and 1997. The aim of this research in both instances was to assess the effect of computers on achievement for all ages of learners across all domains. The meta-analysis indicated that students in technology-rich environments experienced increases in achievement in all subject areas with evidence of these positive findings being the strongest in math, science and language arts (Sivin-Kachala, 1997). Sivin-Kachala's (1997) review reported that students felt more successful in school and had increased self-confidence and self-esteem when computers were integrated with teaching and learning. Additionally, these students' attitudes towards learning consistently improved when computers were used in instruction. The findings were true for both regular and special-needs students (Sivin-Kachala, 1997).

Additionally, research reveals that students learning with computers make specific gains in mathematics. A research study focused on the integration of *The Adventures of Jasper-Woodbury* mathematical problem-solving series studied nineteen fifth-grade classrooms in one school district with very different socio-economic populations (Hickey, Moore, & Pellegrino, 2001). Over the

course of this five-month study, teachers integrated the use of this technology in varying ways and to different extents. The one significant finding was that math achievement was the most pronounced in the low-socioeconomic populated classrooms. Perhaps implementing such programs in more low-socioeconomic schools facing consistently poor student achievement would be beneficial.

Another middle school mathematics study looked at multiple aspects related to the learning environment in classrooms which integrated technology (Waxman & Huang, 1996). The primary finding was that when classrooms were more student-centered in general they were more likely to utilize technology than the more traditional classrooms. Faison (1996) reported that when teachers incorporate technology into student-centered instructional practices they find that their students display greater enthusiasm and self-esteem and they are more receptive to taking risks while problem solving in mathematics. Although other studies boasted similar results, there were also many instances of technology being poorly integrated, seldom integrated or never integrated at all (DeCorte, 1990; Earle, 2002; Jostens Learning Corporation, 1997).

Driving Forces

Public school education is currently involved in an effort to bring about technology integration. There is an emphasis to weave technology into the fabric of the educational curriculum (e.g. Norris et al., 2000; Salinas, 2000; Vetter et al., 2001). Much of the current educational literature is related to the topic of technology integration (e.g. Earle, 2002; Tiene & Luft, 2001; Vetter et al., 2001), particularly because of the enormous sums of money schools spend to purchase

technological equipment (e.g. Barron et al., 1999; Earle, 2002; Jones & Paolucci, 1999) and because of the emphasis on improved preservice teacher preparation in integrating technology with teaching and learning.

Spending. The benefits of technology in education remain unclear. Despite this uncertainty, enormous amounts of money are being spent to put computers and other technologies into schools. Recent figures suggest that spending to place computers in our nation's schools increased to nearly $1 billion in just one school year (Barron et al., 1999; Bronner, 1997; Brush, 1999; Jones & Paolucci, 1999). In 1997, President Clinton's administration, convinced that there was "no greater good America [could] offer schoolchildren than computers," made technology integration one of its two primary educational goals. As a result, $5.2 billion was spent on technology for schools in 1997-1998, $900 million more than the previous year, and an increase that outpaced inflation (Bronner, 1997, p. 4).

A 1999 survey by the National Center for Educational Statistics revealed that 99% of teachers reported having access to a computer somewhere in their school building (Rowand, 1999). That same year The North Central Regional Educational Laboratory found that 90% of American schools and 33% of the classrooms had Internet access (2000). In 1998 it was estimated that teachers' access to computers at school and at home had increased to the point that 93% of America's teachers were making use of a computer (Becker et al., 1999).

Although teacher-access to technology is valuable, some schools seem to be purchasing the hardware simply for the sake of having it. Little or no thought

or planning goes into its implementation or utilization (Zehavi, 1995). It has been assumed--incorrectly at times--that the money is being spent in ways that truly support student learning (Whitney, 2000).

Further research into the benefits of technology in teaching and learning (Berson, 1996; Bober, 2002; Jones & Paolucci, 1999; Schacter & Fagnano, 1999; Trotter, 1997) seeks to clarify and better understand this relationship. In response to the public and media backlash of school overspending on technology without evidence of its benefit, Judah L. Schwartz, professor of Education at Harvard University, stated that “at the moment, the most mindless use of computers is at the elementary school level. I hope that the introduction of computers will produce a rethinking of the structure and content of the curriculum…if putting computers in the schools produces only that, it will make it worth it” (quoted by Bronner, 1997, p. 4). Pool (1997) concurred by stating that "such a backlash will be productive if it makes us re-examine how we use technology in the classroom" (p. 6).

Obviously, technology is not the “silver bullet” that will revolutionize education and correct many of the challenges we currently face. Schools are wasting money if the technology does not become integrated into the processes of teaching and learning (Schacter & Fagnano, 1999; Viadero, 1997).

Teacher Education. State departments of education, accreditation boards and professional organizations have recently emphasized the importance of establishing effective preservice teacher development in technology integration. In 2000 the International Society for Technology in education (ISTE) published

national standards for teacher technology use (ISTE, 2000c) which the National Council for Accreditation of Teacher Education (NCATE) adopted. The implementation of these standards should greatly encourage teacher education programs to assess the technology preparation they are providing preservice students.

Two recent studies provided a view of the status of technology in teacher education programs nationwide. Research conducted by both the International Society for Technology Education (ISTE) in conjunction with the Milken Exchange on Education Technology (1999) and the American Association of Colleges of Teacher Education (2000) revealed that the biggest challenge facing schools, colleges and departments of education is in the area of training preservice teachers to effectively integrate technology with teaching and learning. The integration of technology into school curriculum has the potential to improve the quality of teaching and learning; however, this potential will not emerge without educators considering how computer use relates to the processes of teaching and learning in school settings (Schank & Cleary, 1995). Having basic computer literacy is not enough. Teachers should understand the connections between technology and learning and use this understanding to merge the two together in such a manner that makes each indispensable to the teaching and learning process (Lowther et al., 1998). If this new mindset were adopted and technology were effectively utilized, the nature of the learning environment would necessarily change for the better (Rieber & Welliver, 1989; Schank & Cleary, 1995).

Barriers

It should not be assumed that by simply obtaining the resources and placing them in the schools that integration will naturally occur (Earle, 2002). There are a number of barriers that hinder the integration of technology. Examples of barriers include disparities in students' exposure to and use of computers and teachers feeling inadequately prepared to integrate computers.

Researchers have reported a variety of disparities related to technology uses and access (Cuban, 2001; Tyack & Cuban, 1995). One barrier is having to address a wide range of students' technological skill levels due to a great disparity in technology use. Cuban and Tyack (Cuban, 2001; Tyack & Cuban, 1995) reported factors that lead to a wide range of student technological skill levels: low-income families were found to have less exposure to computers than high-income families; males were found to use computers more than females; native English-speaking children were found to use computers more than non-native English-speaking children; and Caucasian students were found to use computers more than African-American students. Considering these disparities, one barrier to integrating technology into instruction is addressing students' different skill levels based on their previous exposure to computers (Tyack & Cuban, 1995). Teachers must address multiple skill levels in every lesson they teach, drawing from strategies with which they feel comfortable.

More disparities are related to several other barriers to technology integration. Many teachers do not feel comfortable with computers and feel inadequately prepared to use them in their teaching (Fabry & Higgs, 1997).

Teachers need training in order to feel more comfortable using the equipment in tandem with technology integration strategies and models. Teachers also need more time to attend training as well as time for planning and preparing integrated instruction (Jackson, Bourdeau, Sampson, & Hagen, 1997; Maddux, 1997; Norum, Grabinger, & Duffield, 1999). As teachers struggle to reconcile these issues, many become fearful towards teaching with technology. Such anxieties can affect attitudes and cause teachers to become resistant to change (Fabry & Higgs, 1997; Norum et al., 1999; Proctor & Burnett, 1996). Ideally, with proper training, teachers will understand the connections between technology and learning and use this understanding to weave the two together in a manner beneficial to teaching and learning (Lowther et al., 1998).

By simply focusing on how to use technology, the technology has actually become a distraction from what is of primary concern – providing better instruction to students. Although the goal is for teachers to know how to teach content more effectively with the support of the technology, education's quick-fix mentality has caused schools to train teachers to use specific types of technology rather than equip these teachers to use technology to solve problems when needed and appropriate (Kearsley, 1998, p. 50). The result is that the use of technology has not been integrated in a manner that makes it indispensable. In fact, many teachers would not miss the technology if it were removed from their classrooms (DeCorte, 1990; Johnson, 1999; Rieber & Welliver, 1989). It seems that placing computers in schools does not automatically indicate their implementation into teaching and learning (Proctor & Burnett, 1996).

Conclusion

To successfully integrate technology, educators need to take into account the benefits that research suggests it offers both teachers and students. Educators need also to be aware of the discrepancies that exist in access to and use of technology. Preservice and in-service educators also need to consider that many teachers do not feel comfortable with computers and may feel inadequately prepared to use them in their teaching.

PREPARING TO USE TECHNOLOGY

The successful integration of technology into classroom instruction is dependent on the abilities of our educators to effectively use new pedagogical tools and methods. Recently, there has been a great deal of concern about the ability of our teacher preparation programs to train future teachers to meet the challenges of the new cyber-world (Mehlinger, 1996; Uhlig, 1983; Willis & Mehlinger, 1996). There is also concern that teacher education faculties are not ready to meet the formidable task of infusing technology into their teaching practices.

Former President Bill Clinton campaigned for “a bridge to the twenty-first century…where computers are as much a part of the classroom as blackboards” (Oppenheimer, 1997, p. 1). Yet America’s existing educational system is based on pedagogical methods from a century ago. We are using yesterday’s techniques to prepare students for a world already dependent on computer technology in almost every respect. As one educator eloquently stated, “We

have allowed our schools to remain in the past, while our children have been born to the future" (Strommen & Lincoln, 1993, p. 1).

The arrival of new technologies in K-12 classrooms has created a dilemma regarding the preparation of future educators. American K-12 schools now have computer technology resources available, but many K-12 teachers do not have strategies to make effective use of these resources (Willis & Mehlinger, 1996). Numerous studies have confirmed that teachers are unprepared to meet the technological challenges that are an integral part of the reform that is occurring in our classrooms and schools (Abdal-Haqq, 1996; OTA, 1995; Stetson & Bagwell, 1999; Strudler et al., 1999; 2000). According to Luetkehans and Robinson (2002), teaching and learning in today's schools is becoming more complex. As teachers try to meet state and national standards and prepare students to meet specific criteria for state testing, they must also diversify instruction and provide integrated experiences with technology. Colleges of education must respond to these increased pressures by better preparing teachers to meet these demands (Luetkehans & Robinson, 2002).

If teachers do not feel comfortable using technology in actual teaching strategies, they will abandon it. Therefore, teacher preparation programs must equip preservice teachers with practical methods of technology integration (Abdal-Haqq, 1996; Mehlinger, 1996; Willis & Mehlinger, 1996). Unfortunately, since the Office of Technology Assessment (OTA) reported to the United States Congress that technology integration was not a central component in the preservice training of most colleges of education and that most new teachers had

limited knowledge of how to utilize technology (OTA, 1995), little progress has been made (Abdal-Haqq, 1996; Stetson & Bagwell, 1999; Strudler et al., 1999; 2000).

With fewer than half of teacher education programs requiring students to develop lessons that integrate technology and even fewer of these programs requiring preservice teachers to use this technology in their student teaching experience (The CEO Forum on Education & Technology, 2000), teachers are walking into fully-stocked classrooms without the strategies to use this technology. Most feel that their preservice education -- the place the OTA said was to instruct them in using technology -- left them unprepared (Abdal-Haqq, 1996; Stetson & Bagwell, 1999; Strudler et al., 1999; The CEO Forum on Education & Technology, 2000).

Standards

Despite the attention given to technology's benefits, the U.S. Department of Education (USDE) found that only about 20% of teachers reported feeling well prepared to effectively integrate technology into classroom instruction (USDE, 2000). A Milken Foundation report (1999) claimed these feelings were justified after studying the limited technology experiences provided by teacher-education programs. Because of this lack of training, the USDE suggested that teachers have been trained to use a model of instruction that is inadequate to prepare American students for the challenges that face them in the future (USDE, 2001).

The importance of establishing effective preservice teacher training in technology integration has recently been emphasized by state departments of

education, accreditation boards and professional organizations. After the International Society for Technology in Education (ISTE) published national standards for teacher technology use (ISTE, 2000c) which the National Council for Accreditation of Teacher Education (NCATE) adopted, institutions everywhere have been forced to take a second look at their treatment of technology. The initial edition of these standards debuted in 1993, with subsequent revisions following in 1997 and 2000. The most recent edition, National Educational Technology Standards (NETS), provides technology standards for both students and teachers (ISTE, 2000b). These standards are essentially guidelines that can be used to illustrate what teachers should know and be able to do. They also serve as a guide for evaluating the technology preparation of teacher education programs.

These technology standards (NETS) are intended to "be introduced, reinforced, and finally mastered, and thus, integrated into an individual's personal learning and social framework" (ISTE, 2000a, par. 13). They also demonstrate key ideas, applications, and attitudes needed for using technology in the classroom (ISTE, 2000b). ISTE requirements are based on content standards from curriculum organizations, emphasizing the belief that the most effective technology integration occurs in a content/subject-rich context (ISTE, 2000a). Despite the increased emphasis on technological innovations, teachers remain the most important component because they are the ones who can blend traditional strategies with newer technological approaches in order to address context specific knowledge as well as individual learning styles (ISTE, 2000b).

Teacher education programs can use the ISTE standards to develop curriculum requirements that encourage both teachers and students to use technology in the classroom (ISTE, 2000b). The NCATE guidelines serve to evaluate teacher education programs' use of technology. To meet NCATE standards, a teacher education department must have a unified, underlying framework that is "knowledge-based, articulated, shared, coherent" as well as have incorporated other standards for regulatory organizations into their curriculum requirements (NCATE, 2000, par. 1). Additionally, the department's framework must address ways in which educational technology is used to foster integrated learning in all stages of preservice education (NCATE, 2000).

Exemplary Models

Effective integration of technology must be a priority in preservice teacher preparation programs. Constructive critiques of teacher training programs will help researchers identify goals for program improvement and selection of exemplary models. According to Abdal-Haqq (1996), there are three main criticisms of teacher education programs' preparing of teachers. First, many teachers of educational courses fail to model technology in their instruction or field experiences. Second, technology is rarely integrated into the curriculum. Third, when technology is implemented, the instruction often focuses primarily on the older and simpler applications (e.g. word processing) and not the newer more advanced tools (e.g., multimedia, problem solving applications).

Recent research (Duckett, 1994) in the area of technology literacy skills for preservice and in-service teachers concluded that technology should be

integrated into the teachers' curriculum whenever possible and that instructors should encourage preservice teachers to develop appropriate utilization skills. In addition, computer literacy should be a part of the teacher certification process and the preservice course work, both in theory and methods courses.

It has been stated that the goals of teacher education programs are to produce teachers who must *know* their messages, audiences, media, tools, and processes. As Nichols and Owens (1995, p. 47) cited, "Empowered teachers are those teachers with the knowledge, attitudes, and skills needed to make appropriate decisions upon reflection on their messages, audiences, media, tools, and process." The remainder of this section presents and discusses some exemplary teacher preparation and support programs where this goal has been realized.

Although preservice preparation in technology integration typically occurs in a single course (Hargrave & Hsu, 2000), King's College has developed a program that integrates classroom computer use throughout the curriculum (Drazdowski, Holodick, & Scappaticci, 1999). The faculty implemented a three-year plan consisting of components in hardware and software acquisition, faculty training, curriculum development and assessment. Initially two computer labs were created and items such as laptops and video cameras were made available to be checked out by students and faculty. Faculty members were also encouraged by the administration to design classroom instruction in ways that modeled the integration of technology into teaching and learning in a more student-centered manner. Those members of the faculty with expertise in the

use of technology mentored other colleagues who were less skilled in this area. This plan was implemented because the teacher educators at King's College believed that both the availability of technology and the modeling of its use in instruction would assist preservice teachers to further develop their understanding of how technology can be effectively integrated into teaching and learning in K-12 classrooms (Drazdowski et al., 1999).

To test another method of technology instruction, Stuhlmann (1999) investigated the technology preparation of preservice teachers in a small teacher preparation program consisting of a three-course sequence. To provide preservice teachers with models and experiences for integrating technology into their teaching, the preservice teachers worked on technology-based projects with elementary students so that these preservice teachers could see that technology is a normal part of instruction (Stuhlmann, 1999). Examining the impact of the three-course technology plan, Stuhlmann (1999) studied ten preservice teachers; five were involved in the three-course program and five were not. Data were collected through interviews, surveys, observations and journal entries. The results indicated that the five preservice teachers who completed the three-course sequence changed their beliefs about both teaching and technology integration. Stuhlmann also concluded that these preservice teachers grew to adopt a more student-centered approach to teaching. They described feeling more confident in their teaching capabilities and were more comfortable with technology integration than those students not completing the three-course sequence (Stuhlmann, 1999).

The University of Virginia's Curry School of Education's Technology Infusion Project has used an integrative project-based model to work with preservice teachers. The education students team with a classroom teacher in the local school district. The preservice students work with their mentor teacher to develop technology-rich classroom instruction (Kovalchick, 1997).

In another study, Duffield (1997) described a teacher preparation program at the University of Colorado that emphasizes a foundation in technology. Beginning with the tenants that technology is *not* a subject but a tool that is integrated in all classes, and that all teachers make media selection decisions--whether intentional or otherwise--they insist that student-centered learning must be modeled in all classes. They expect their pre-service teacher educators to be explicit about *their* expectations and require all preservice teachers to participate in clinical situations where technology is available and utilized.

Project KITES (Kids Interacting with Technology and Education Students) at Louisiana State University has also been an innovative project. Project KITES is a collaborative technology initiative designed to provide preservice teachers with models and experiences for integrating technology into teaching during valuable field experiences (Stuhlmann, Taylor, & LaHaye, 1995, p. 1).

Fourth-graders were paired with beginning elementary preservice teachers to work on technology-based language arts projects. Because of their experience, preservice teachers better recognized the role of technology in the classroom, reduced their anxiety about interacting with students and technology and developed a strong belief about the place that technology should take in their

own preservice training and future classrooms. Perhaps best of all, Project KITES changed how they perceive the role of the teacher (Stuhlmann et al., 1995).

Finally, the Apple *Classrooms of Tomorrow* research project determined that positive changes occur when technology is integrated into a constructivist classroom environment. As teachers transformed from dispensers of knowledge into true facilitators, team teaching, interdisciplinary project-based instruction and individually-paced instruction became more and more common in their classrooms (Mehlinger, 1996, p. 11).

PT3 Grants

As the integration of technology into K-12 education has become one of the major issues concerning teacher candidates in the United States, many initiatives have been developed to provide educators a clearer vision of how to better prepare teachers to integrate technology with teaching and learning. The Preparing Tomorrow's Teachers to Use Technology (PT3) grants, funded by the U.S. Department of Education, provide universities, colleges and other higher education institutions aid to “support organizational change in teacher education so that future teachers are able to use interactive information and communication technologies for improved learning and achievement” (U.S. Department of Education, 2002, p. 3).

Others

A 1998 report revealed that thirty-eight states described having a technology requirement for preservice teachers prior to graduation (Zehr, 1997).

North Carolina and Vermont even require that all student teachers submit a technology portfolio during the last semester of classes. To deal with the need for technologically competent teachers, the Virginia General Assembly (1999) passed House Bill 2263 which, as of July 1, 2003, requires that teachers demonstrate proficiency in the use of educational technology for instruction in order to receive a state teaching license or to renew one's existing teaching license. Connecticut, New Hampshire and North Carolina already have similar requirements (Zehr, 1997).

PRESERVICE TEACHERS

Obviously, preservice teachers need opportunities to acquire basic technical skills so they can effectively integrate technology. However, the perceptions that these future teachers develop about teaching and learning with technology is equally important (Wang, 2002). Preservice teachers' perceptions, self-efficacy and attitudes play an important role in the development of their future teaching behaviors. Understanding these factors is essential to teacher education as teacher educators seek to better enhance the preservice teachers' professional preparation (Pajares, 1992; Wang, 2002). Teacher education should help preservice teachers clearly define their vision of integrating technology into the processes of teaching and learning.

Preservice teachers naturally enter teacher education courses possessing their own beliefs about teaching and learning. Since these perceptions are generally based on their experiences as students, they tend to be teacher-

centered and behaviorist: most new teachers see their primary purpose as transmitting knowledge to their students. The current shift of the teacher's role moving towards a less teacher-centered paradigm contrasts with the education that they encountered during their K-12 education, so it is especially important for preservice teachers to hold a clearly defined view of their position in instruction (Norum et al., 1999). Without careful preservice instruction, teachers will often resort to the instructional methods they encountered in their own schooling, as Becker (1991) suggested.

McDiarmid, Ball and Anderson (1989) agreed that typically preservice teachers begin their professional training believing that teaching means telling and that learning is the acquisition of information. When preservice teachers enroll in teacher education courses, they rely on these beliefs to understand pedagogy. These perceptions serve as the foundation on which they often continue to build their ideas and beliefs about teaching and learning (Niederhauser, Salem, & Fields, 1999; Tillema & Knol, 2001).

Perceptions

Based on their pre-college learning experiences, preservice teachers often enter college-level instructional technology courses with personal theories about the role of computers in education. As students in K-12 classrooms, preservice teachers typically have experienced didactic instruction and as a result, they believe that teaching is a process of delivering information to students and learning is memorizing information (Niederhauser et al., 1999). As preservice teachers progress through their teacher preparation program, they judge what

they learn about pedagogy to be consistent or inconsistent with what they already believe about teaching and learning (Niederhauser et al., 1999). Posner et al. (1982) described these existing beliefs as preconceptions, asserting that preconceptions can be inaccurate, incomplete and resistant to change.

Posner et al. (1982) argued that, for students to change their existing conceptions, they must progress through a cognitive process whereby they become dissatisfied with their existing perception and find or develop a new conception that solves the current problems and also solves other related problems that the original perception could not solve. Thus, the perceptual change process stems from epistemology and theories that describe how people develop knowledge.

In a case-based qualitative research study Persichitte, Caffarella and Tharp (1999) explored how three teacher education programs used and integrated educational technology. One purpose of this inquiry was to identify concerns, barriers and supports to improved implementation of technology throughout the program. When participants were asked to define *educational technologies,* the majority of these preservice teachers provided rather narrow definitions concentrating on computer-based products (Persichitte et al., 1999, p. 4). Students' responses tended to be linked to electronic equipment, hardware or software. There was very little, if any, perceived correlation between the technology and the teacher and/or students.

During their two-year study, Beyerback, Walsh and Vannatta (2001) discovered changes in preservice teachers' perceptions about technology and its

integrated use into the processes of teaching and learning. In the first-year findings, students reported an increase in proficiency with various computer applications but indicated a need for more methods for integrating technology. Participants expressed that they understood the concept of integration, but had difficulty envisioning its effective implementation in their future classrooms. One participant explained by stating, “We learned about it but never got to apply it” (Beyerback et al., 2001, p. 6). At this point in their development, the majority of the students envisioned technology-rich classrooms as ones with “lots of computers for students to spend lots of time on, playing games and tutorials” (Beyerback et al., 2001, p. 6), with technology viewed as an extra add-on to classes.

In year two, Beyerback et. al. (2001) reported an even further increase in preservice teachers’ technical proficiencies, particularly in methods for effective technology integration. Preservice teachers’ vision of technology integration also evolved as evidenced by their changing notions of the role of the teacher. Students reflected that these changes possibly occurred because their technology exploration gave them a greater awareness of available resources and how these resources could support curricular objectives (Beyerback et al., 2001). Preservice teachers recommended that technology integration courses be placed earlier in their academic preparation and that the use of technology should be infused in all of their other courses (Beyerback et al., 2001).

The goal of another research study, involving 101 preservice teachers enrolled in an educational psychology class at the University of Idaho, was to

provide a comprehensive view of what preservice teachers thought the role of computers was in their future classrooms and of their related attitudes (Mowrer-Popiel & Pollard, 1994). The descriptive survey data indicated that seventy-five of the participants maintained *positive* or *very positive* attitudes towards their computer experiences while only nine students indicated *negative* or *very negative* attitudes. Participants were asked to rate their support for a variety of computer instruction areas within teacher education programs. The results showed that nearly 100% of the students wanted to learn about ways to integrate computer technology within the classroom and ways to use the computer as a teaching tool. A large number wanted to learn software applications and methods to use the computer as an administrative tool, and most were interested in programming. (Mowrer-Popiel & Pollard, 1994, p. 135): Most preservice teachers in Mower-Popeil and Pollard's study envisioned technology integration in terms of their own specialized field; many saw word processing and administrative tasks as the primary methods of use (Mowrer-Popiel & Pollard, 1994).

Wang (2002) examined preservice teachers' perceptions about the role of the teacher in classrooms with computers, measuring it in terms of teacher-centeredness versus student-centeredness. There were significant differences between preservice teachers' perceptions of teacher-centered roles and their perceptions of student-centered roles in classrooms where computers were used. The preservice teachers indicated that they would equally engage in both student-centered and teacher-centered activities while teaching in classrooms

with computers. The majority did not endorse the belief that such classrooms should heavily incorporate a student-centered environment. However, the results demonstrated that, when tested, the preservice teachers ventured towards teacher-centered activities.

Poole and Simonson (1996) suggested that, since the use of computers in the classroom is still relatively new, preservice teachers do not have many models on which to base their ideas about effective technology integration. As a result, their beliefs about instruction are often firmly entrenched, closely related to their own classroom experiences as students and resistant to change (Niederhauser et al., 1999).

Self-Efficacy

Self-efficacy, the belief an individual holds about his or her capability to perform actions at designated levels, has been repeatedly reported to be a major influence in the success with which educators use technology (Eachus & Cassidy, 1999). Since self-efficacy is based on judgments about what can be done with current skills (Bandura, 1997) and since it largely determines one's behavior, even the best ideas about technology use may remain unused if preservice teachers believe that they are unable to implement them.

Not surprisingly, self-efficacy can be used as a predictor of behavior. Olivier and Shapiro (1993) stated that "individuals with a low sense of self-efficacy will, more often than not, shy away from the best alternative, and, instead, choose an alternative that they believe they can handle" (p. 84). Some preservice teachers may possess positive attitudes about computers but lack

confidence in their ability to utilize them. This lack of confidence has been demonstrated to influence preservice teachers' use of technologies in the classroom (Handler, 1993).

Attitudes

Research indicates a strong correlation between preservice teachers' attitudes toward computer use and their future level of technology implementation. Positive attitudes can be fostered through computer courses and field experiences in teacher education that provide preservice teachers the opportunity to use the technology (Abbott & Faris, 2000; Marra & Carr-Chellman, 1999).

A research study by Abbott and Faris (2000) demonstrated that preservice teachers fostered positive attitudes toward computer use when they were required to use the technology in conjunction with assignments and/or activities. Their conclusion was that teacher education should implement the use of technology throughout the program in order to encourage positive attitudes.

Preservice teachers' prior experience with technology is another key factor and predictor of their attitude toward the use of computers as supported in several research studies (Hunt & Bohlin, 1993; Koohang, 1989; Rosen & Weil, 1995). Research also indicates that preservice teachers with less computer experience, less computer availability and less computer use will be more likely to develop negative attitudes toward using computers that lead to computer anxiety (McInerney, McInerney, & Sinclair, 1994; Rosen & Weil, 1995).

Naturally, the less anxious preservice teachers are about computers, the more likely they are to implement them in their classroom instruction.

CHAPTER SUMMARY

If teacher educators ignore the impact of computers and fail to adequately prepare preservice teachers, then our programs will once again be accused of failing to serve the real needs of classroom teachers (Anderson, 1983). Our future teachers must be prepared in today's world to meet tomorrow's challenges. Those who teach today's children are equipping the Cyberspace citizens of tomorrow (Wakabayashi, 1997, p. 47). Mehlinger predicts that technology of the future will be more integrated, interactive and intelligent; that integration will continue to escalate through the development of advanced multimedia systems; that interactivity will occur with increased distance-learning and Internet interaction; and that an individualized knowledge base will address the learning styles of each student (1996). When we speak of technology, it is important to remember that the term encompasses more than just the computer.

Through worldwide access to other resources and connections with fellow learners, we are learning that knowledge is no longer finite. Teachers can no longer have all of the answers, and instruction may also become more individualized to adapt to various student learning styles (Mueller & Mueller, 1997).

The impact of teacher education programs preparing preservice teachers to effectively integrate technology with teaching and learning can not be ignored.

Seymour Papert saw this impact in terms of evolution, not revolution brought about by a reform. He believed that students have not only attained a new kind of sophistication about technology but also about ways to learn and new methods of research (Papert, 1993).

CHAPTER III

METHODOLOGY

The purpose of this study was to explore the perceptions of beginning preservice teachers about computer integration and how those perceptions have developed. Having an understanding of these students' perceptions about computer integration before they begin their preservice training will help teacher education programs plan developmentally appropriate programs for teachers of tomorrow. This study was guided by two research questions:

1. What are beginning preservice teachers' perceptions about computer integration?
2. How did these perceptions develop?

RESEARCH DESIGN

This was a descriptive study about beginning preservice teachers' perceptions of computer integration using qualitative research methods. Merriam (1998) noted that "the key philosophical assumption…upon which all types of qualitative research are based is the view that reality is constructed by individuals interacting with their social worlds" (p. 6).

Several characteristics distinguish qualitative research from other research methodologies (Merriam, 1998):

- Qualitative researchers seek to better understand the meaning people have constructed.
- The researcher is the primary instrument for data collection and analysis.
- Qualitative research primarily uses an inductive research strategy.
- Qualitative research yields a richly descriptive product.

The intent of this research study was to describe and understand the perceptions that beginning preservice teachers have about computer integration. Focusing on the perceptions of individual preservice teachers is important, but very little research currently exists that informs teacher educators about preservice teachers' perceptions of computer integration. At this juncture of research in this area it seems more prudent and beneficial that a broad view of preservice teachers' perceptions be developed. Merriam characterized research that "simply seeks to discover and understand a phenomenon, a process, or the perspectives and worldviews of the people involved" as a "basic qualitative study" (1998, p. 18). Cross-case analysis was used in this inquiry. Yin (1994) states that cross-case analysis is useful when trying to build a general understanding that fits all the cases in an inquiry although there will be some variance in the details of individual cases. The benefit in the researcher identifying processes and outcomes that occur across many cases is the development of "more sophisticated descriptions and more powerful explanations" (Miles & Huberman, 1994, p. 172).

Participants

This study was designed to provide insight into beginning preservice teachers' perceptions about computer integration. It was therefore appropriate to use purposeful and criterion sampling strategies. Rossman and Rallis (1998) contended that when a study focuses on a particular population, the researcher should select representatives from that population. As Patton (1990) pointed out: "The logic and power of purposeful sampling lies in selecting information rich cases" that allow one to "learn a great deal about the issues of central importance to the purpose of the research" (p. 169). Creswell recommended that when conducting a study which analyzes a particular phenomenon, a researcher should use criterion sampling, a specific type of purposeful sampling (Creswell, 1998). Miles and Huberman (1994) have identified sixteen strategies for purposeful sampling. This inquiry used their criterion sampling strategy. The participants were selected to reflect the national demographics of undergraduate teacher education programs as reported by the American Association of Colleges for Teacher Education (see Tables 1 and 2) (American Association of Colleges for Teacher Education, 2000). The College of Education's Student Services assisted in the process of selecting participants to reflect these demographics.

The study began with seven participants, all of which were undergraduate students at the University of Georgia who identified education as their major and expressed the intention to teach in grades K-12. There were initially five females and two males. However, after initially agreeing to participate in the study over the phone, one male participant did not show up for the first interview as

scheduled and follow-up phone calls and emails proved to be unsuccessful. The second male participant was a student-athlete and agreed to participate in the study, but due to a busy team schedule requested that his interviews occur several weeks after the other interviews had been completed. These arrangements were agreed upon. However, once the interviews with all the other participants (five females) had been completed, it became clear that participant responses had reached saturation, and the student-athlete participant was contacted and informed that his cooperation was appreciated but his participation was no longer necessary.

Table 1. National racial/Ethnic demographics for undergraduate teacher education programs

Race/Ethnicity	Percentage
White	82.5
Black/African American	8.8
Hispanic	4.9
Asian/Pacific American	1.4
Native American/American Indian	0.8
Alaskan Native	--
International or Nonresident	0.3
Other	1.3

Table 2. National gender demographics for undergraduate teacher education programs

Gender	Percentage
Female	65.4
Male	34.6

Therefore, the pool of participants was comprised of five female University of Georgia students between 18 to 19 years of age. All graduated from Georgia high schools. Three graduated from public schools and two from parochial. Three of these participants intend to teach high school, and two plan to teach elementary school. Of the participants, one was Asian, one was African-American, and three were Caucasians. Table 3 provides individual profiles of each of the five participants.

These preservice students had not yet been accepted into a Teacher Education program and had not taken any courses related to teaching and learning with technology. Once the participants were selected, their transcripts were reviewed by the College of Education's Student Services to ensure they had not taken any courses influential in technology integration. Given these purposeful sampling guidelines, it is not likely that the participants' ideas and beliefs about teaching, learning and technology integration had been influenced by educational methods, theory and technology courses offered at the undergraduate level in the College of Education. Table 3 provides a biographical profile of each of the participants.

It should be noted that the acceptance into the Early Childhood Teacher Education Program at the University of Georgia is extremely competitive. As a result, preservice students must meet and maintain high academic standards throughout their coursework. With this in mind, the College of Education's Student Services suggested that all participants should have a minimum of a 3.6 grade point average so that the pool of participants would be likely candidates for

acceptance into the Teacher Education Program. This also increased the likelihood that the same participants could contribute to follow-up research should a longitudinal study be conducted.

Prior to the beginning of the first interview, the research goals, procedures, participants' rights and confidentiality were explained to the participants. The Participant Consent Form is provided in Appendix A.

Table 3: Individual participant profiles

Age	19	19	18	18	18
Gender	Female	Female	Female	Female	Female
Race	Caucasian	African American	Asian	Caucasian	Caucasian
Classification	1st year	1st year	1st year	1st year	1st year
Major	Early Childhood Ed.	Secondary Ed.	English Ed.	English Ed.	Early Childhood Ed.
Career Goals	K-1 Teacher	H.S. Science Teacher	H.S. English Teacher	H.S. English Teacher	Teach Grades 1-2
***GA Schools**	13	13	13	7	13
****Comfort**	4	3	3.5	4	3
*****Schools**	Very	Important	Very	Very	Very

*Denotes the number of years that the participant spent in Georgia schools during her K-12 education.

**The participants were asked to rate their comfort level with computers from 0-5 with 5 representing being completely at ease with computers.

***The participants were asked if they believed computer integration was NOT important, SOMEWHAT important, IMPORTANT, or VERY important.

PILOT STUDIES

Two pilot studies were conducted during the 2001-2002 school year. In both of these studies, participants were students who had recently completed the introductory-level course in teaching with technology. Interviews and artifacts were used for data collection in both instances. Both pilot studies focused on students' perceptions as they reflected on their experiences. They were both guided by my interest in discovering what students considered to be the most important outcomes after completing an introductory computer education course designed for pre-service teachers (EDIT 2000). These two pilot studies were my initial efforts at trying to understand the process by which preservice students' perceptions about technology integration evolves.

Pilot Study A

This pilot study was conducted during Fall 2001 and compared two groups of students' perceptions about what they considered to be the major outcome of their EDIT 2000 experience. Group one was comprised of two students from the Spring 2001 course that did not involve a project-based learning experience. At that time the class was also a bit more focused on computer tools and technical skills. Group two consisted of two students from the Maymester 2001 course that concluded with a project-based learning project. During Maymester the course began to put greater emphasis on making connections between technical skills and their relevance to teaching and learning.

This pilot study was guided by the research question: In what way does a culminating Project Based Learning activity influence the technology integration of EDIT 2000 students? One-hour interviews with each participant were conducted and class artifacts were collected. Both the interview and artifact data indicated that while both groups greatly improved their computer abilities during the course, the Spring students showed little evidence of transferring these skills into integrated instruction.

Pilot Study B

Conducted in Spring 2002, the participants of this research project were three undergraduate students from the Fall 2001 course who continued to further emphasize technology integration through a variety of strategies. During their one-hour interviews the participants were asked to share their perceptions about what they believed to be the most important outcomes of the course. Ad hoc analysis strategies involving common themes (Miles & Huberman, 1994), meaning condensation (Coffey & Atkinson, 1996) and poetic analysis (Glesne, 1997) were used. The analysis indicated that all participants agreed that the most important outcome of the course was the fact that the projects were all situated in such a way that they were able to see the connections to their future classrooms.

As a result of these pilot studies, I realized that interviewing students after they had just completed a formal educational activity on the topic of technology integration may have had a great influence on their perceptions. It would possibly be more beneficial to understand the perspectives of people who have

made the decision to become teachers, but have not yet completed any significant teacher education coursework. The present study was designed to do just that.

DATA COLLECTION

Many sources of data were used to inform the results of this study. Figure 1 demonstrates how the data sources inform the research questions.

Data Sources

The purpose of this study was to understand the perceptions of beginning preservice teachers about computer integration and how these perceptions have been developed. Since this study attempted to elicit the participants' perceptions, it was important that their words were used. Interviews were the most appropriate means for collecting these data since the information could only be obtained through the participants' knowledge.

Interviews were the source of data for this study. The use of interviews as a technique for data collection has many advantages. The most significant benefit is the opportunity to gather data from participants in their own words in a face-to-face setting. This enables the interviewer to establish rapport with the respondents and makes it possible for the interviewer to observe as well as listen. Unlike many other data collection techniques, during an interview the interviewer can probe for more information on certain topics when necessary, allowing more complex questions to be asked. Interviews also give researchers

the opportunity to correct misconceptions and misunderstandings and to clarify inadequate, vague responses (Bogdan & Biklen, 1992; Kvale, 1996).

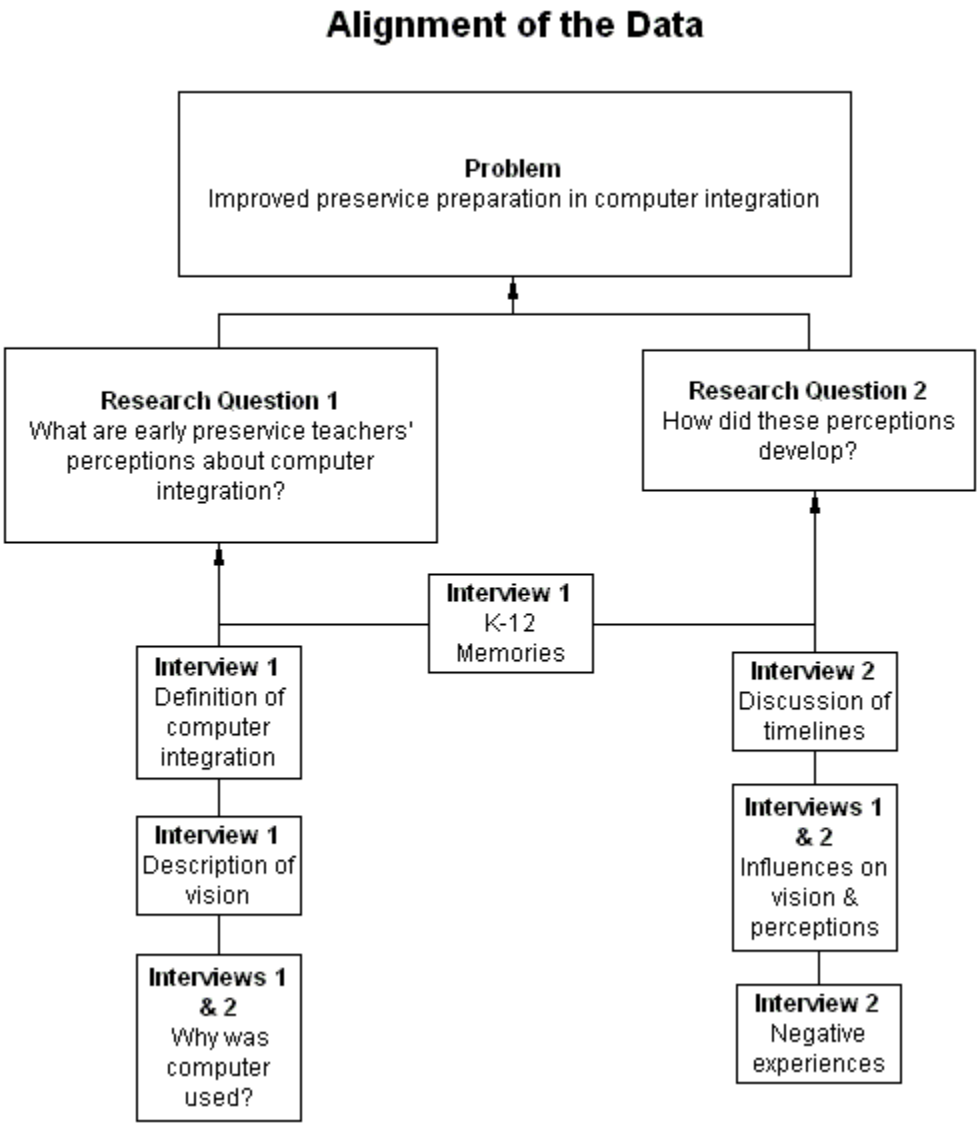

Figure 1. Research questions and data collection.

Interviews carry with them a special set of issues which must be addressed to reach maximum potential. There is always the possibility that the

researcher or the interviewee could misunderstand or misperceive information. Possibly, the interviewee(s) may not have stored all of what they perceived into memory. Also, it is possible that participants may no longer be conscious of what they originally remembered (Dick, 2000; Kvale, 1996). Finally, it is possible for the interviewer to accidentally influence answers by giving verbal and physical clues that suggest an answer or indicate the interviewer's own opinions. The major disadvantage of using interviews is that the conclusions and implications can be incorrect (Dick, 2000; Kvale, 1996).

During the research period, each participant was interviewed individually two times. As this research was intended to be a "slice in time," all the interviews were collected within a three week time period. This brief data collection period was used to reduce the opportunity for the participants' perceptions to change or be influenced. The purpose of this inquiry was not to address the process of change of the participants' perceptions about computer integration, but rather to gain insight into what their perceptions are at this beginning stage of the preservice development.

Interview 1: Baseline. Each participant was interviewed once for an hour. The primary purpose of this initial interview was for the participants to share their perceptions about computer integration through two means: First, by having them recall instances in which they believe a computer was integrated in an educational setting; and second, by having them describe the manner in which they envision integrating technology in their future classroom. The protocol for the initial interview is available in Appendix B.

Interview 2: Technology Timelines. Each participant was interviewed for an hour. The primary tasks of the second interview were to conduct any follow-up discussion from the first interview (as needed) and to create the participant's Technology Timeline (Appendix C). The follow-up questions from the first interview concentrated on gaining further understanding of each individual's perceptions about computer integration. The focus of this meeting was to explore more deeply how the participant's perceptions about computer integration had developed.

During the second interview each participant constructed a technology timeline (Appendix D). This timeline indicated events from her life related to technology in educational settings that she deemed important. The participant was initially given up to twenty minutes to make notes and organize her thoughts. The timeline simply served as a graphic organizer to assist her. As the interview resumed, the participant was asked to share her timeline and to explain the milestones she consider to be of major importance. The discussion continued by focusing on how the events on the timeline have influenced the development of her perceptions about computer integration (Appendix C).

The interview discussions ran smoothly and the participants seemed at ease and talked comfortably. However, once the participants answered the initial interview questions they had difficulty in answering any follow-up questions that were used to probe for further details. All of the participants exhibited a finite knowledge of computer integration with limited experiences to different strategies for teaching and learning with computers. With only one exception, all of the

interviews were conducted in less than 45 minutes. The data collected from the five participants was not as rich and thick as hoped. One must keep in mind, however, that the participants were all 18 and 19 years of age, with no or minimal teacher training, and no experience in computer integration. In fact, the responses were sometimes naïve in that the participants occasionally contradicted themselves when answering different interview questions. This all resulted in the initial coding of the data initially yielding over 200 codes (Appendix E), but these codes were condensed into approximately 70 codes upon further analysis of the data because participants' answers were frequently redundant (Appendix F). This was especially true when participants described their experiences with computer integration during their K-12 education, then described their vision for integrating computers into teaching and learning in their future classrooms with very similar strategies. Saturation in participant responses was reached.

Table 4 summarizes how the data collected relates to the research questions. Table 5 demonstrates the responsibilities for the researcher and the participants throughout the process of data collection.

DATA ANALYSIS

Data analysis is the process of drawing meaning from the data. According to Merriam (1998), data analysis is an ongoing process that is woven throughout the collection of the data. While collecting data, the researcher is beginning to

become involved in analyzing it, making note of items needing follow-up in subsequent data collections.

After each interview was completed, the tapes were reviewed multiple times and I made notes of themes and topics needing further clarification in planning for the follow-up interview. Transcribing occurred as necessary, but the bulk of the transcription was not completed until all the interviews were conducted due to the more pressing need to complete all data collection within the one month time frame. This time frame served to capture students' perceptions about computer integration at this early stage in their preservice development.

Table 4. Research questions and data source

Research Question 1: What are beginning preservice teachers' perceptions about computer integration?

Data	Source
Personal definition of computer integration	Interview 1
Experience/story with computer integration	Interview 1
Why was the computer used? Educational value?	Interview 1 & 2
Vision of future classroom computer integration	Interview 1
Needs for bringing about vision	Interview 1

Research Question 2: How did these perceptions develop?

Data	Source
Experience/story with computer integration	Interview 1
Discussion of how one's vision of classroom computer integration has developed	Interview 1
Timeline	Interview 2
Discussion about timeline	Interview 2
Influences on vision of future classroom computer integration (from timeline)	Interview 2

Table 5. Data collection roles and responsibilities

	Preliminary Work	**Interview 1**	**Interview 2**
Participant's Role	• Not applicable	• Complete consent form • Baseline interview	• Create Timeline • Second interview
Researcher's Role	• Select participants • Review eligibility • Accept participants	• Obtain consent forms • Conduct baseline interviews	• Review baseline interviews and prepare follow-up questions • Conduct second interview

Modified Inductive Analysis

As previously mentioned, the qualitative research approach is exploratory and focuses on discovery. In this study, data were collected through interviews, and then modified inductive analysis was used to identify important categories, patterns and trends, relationships and phenomenon (Bogdan & Biklen, 1992).

Preliminary Analysis. In the days immediately following each interview I would listen to the recordings multiple times to become more familiar with each participant's responses. Not only did this help me prepare follow-up questions for the second interview, but it also served as a time of preliminary coding. I began making notes in my research journal about responses that were common among several or more of the participants, identifying kinds of information that I wanted to get from all of the participants during the second interviews, and

developing possible hypotheses, findings and ideas for future research in this area. The following is an excerpt from an entry into my research journal:

> ***Monday, April 14, 2003***
> *I reviewed [two participants'] interview tapes four times each in preparation for their 2nd Interviews. I prepared follow-up questions and also made modifications to the protocol for Interview 2.*
>
> *I spent several hours in the evening reviewing my files on each individual participant. I reread through all of my notes and questions to make sure that I hadn't overlooked anything. I also made sure all the cassette tapes were carefully labeled and stored for protection. I also took this opportunity to recheck all the consent forms.*

Phase I. Once the interviews were transcribed, the technique *meaning condensation* was used to analyze the data. According to Coffey and Atkinson (1996), the primary task while using meaning condensation is labeling passages of the transcripts and categorizing topics of discussion into central themes. This is achieved by reviewing the data and searching for patterns.

The qualitative research software *N-6* was used to help code all of the interview data. The interviews were coded multiple times. During the first pass, known as free coding, I used the codes (or nodes as the *N-6* software calls them) that emerged from the passages of the transcript. The following passage of a discussion between the researcher (R) and the participant (P) serves as an example of this stage of coding:

> *R: Could you give some characteristics of computer integration?*
>
> *P: I guess you could call them integrated if you require your students to turn in a typed paper or to use a word processor or to use a computer in any way. If you are requiring some assignment that that makes you use the computer, makes the students use the computer, then that could be considered integration, or if you take your students to the computer lab.*

During this first coding pass, this passage was labeled as: *second interview*, *Q2-define technology integration*, *keyboarding*, *typed work*, *projects*, *technology requirement* and *lab*. After the first round of coding was completed, I began to organize codes into groups and categories (or trees as *N-6* refers to it) according to common themes. I also took the time to define each code more specifically to clarify what the code term represented. For instance, it became important to define the code *strategies* as teaching practices that the participants envisioned themselves using and not as the teaching techniques that they had experienced as students. Had I not clarified this code, the vast majority of the interview data could have been described by it.

In the second round of coding, the same procedure was basically repeated, making sure all the data had been coded with *all* the resulting codes that had emerged during the first round of coding as well as with the newly organized themes. It was during this stage that I found my research journal to be especially helpful. It held notes and thoughts that I had previously entered, allowing me to test some of my theories and predictions. I also continued to make entries detailing ways I could improve or extend this research in the future while I continued to sketch out some of my preliminary ideas about the data and the results. Another excerpt from my research journal follows:

> ***Monday, April 28, 2003***
> *I completed transcribing a participant's first interview and began working on the second interview.*
>
> *While working on this participant's transcripts I noticed in the opening of the second interview, when asked about HOW computers should be used in education, she indicated that it should be used to support the existing curriculum and goals or as* ***I might say****, it should be* ***seamless****. However,*

> *when she described her vision of computer use in the first interview she did not show signs of really being able to or really even wanting to integrate it. This participant, like the others, seemed to lack strategies for how to integrate computers.*

Phase II. During subsequent rounds of coding I continued reviewing the audio recordings while coding the data to catch nuances that could be heard but did not translate into the written transcripts. In the later rounds of coding over 200 different codes had resulted from the data analysis and it became helpful to begin organizing the codes, themes and my own ideas using *Inspiration* (Appendix E). This software made it possible for me to create an outline for organizing the more than 200 codes. Further analysis of this outline revealed a great deal of redundancy among different interview questions (Appendix F). I first realized that many of the codes under the theme of *Vision for Future Classroom* were repeated under the theme of *K-12 Memories*. Codes that were repeated under both themes were marked by an asterisk.

As I continued to review the list of codes I also realized that there was also a great deal of repetition in the codes describing *K-12 Memories* from elementary, middle, and high school. After comparing and labeling all the codes in these sections (see Appendix F, p. 4-8) I realized that nearly all of these codes appeared in all three levels of school. This suggested that the participants' experiences with computer integration, for the most part, remained consistent throughout their K-12 education. This allowed the bulk of the more than 100 codes under this theme to be greatly condensed.

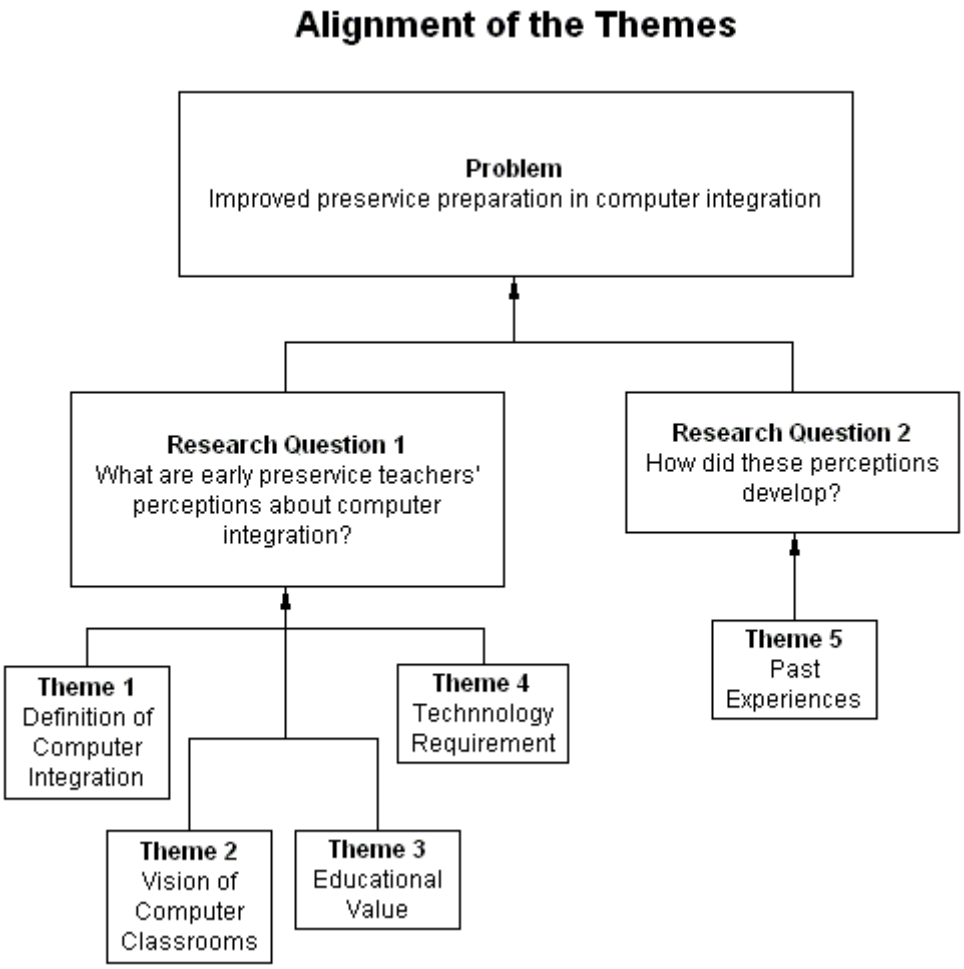

Figure 2. Alignment of the themes with the research questions.

Phase III. I next began aligning the codes that resulted from the data analysis with their corresponding research questions and again began looking for common themes. Five distinct themes eventually emerged (Figure 2): 1) the participants' definition(s) of computer integration; 2) descriptions of the participants' vision of computer integration in their future classrooms; 3) the participants' view of the educational value of computer integration; 4) the participants' perception of the requirements that exist to encourage the

integration of computers into teaching and learning; and 5) the past experiences that have been influential in the development of the participants' perceptions of computer integration. These five overarching themes became the outline for writing Chapter 4 of this document and encompass the codes and themes I had been working with in N-6 as well as the ideas I had captured in my research journal.

To increase accuracy, each of the participants was sent a copy of the analysis via email and asked to submit comments and corrections (Appendix G). The accompanying directions explained that no action was necessary if the participants had no suggestions or corrections. No responses were received from the participants.

Table 6 summarizes the tasks performed during each phase of data analysis.

TRUSTWORTHINESS

Quantitative researchers use a variety of methods to establish reliability and validity. While qualitative methods rest upon a different philosophical foundation and collect different types of data, rigor must also be established with methods consistent with a qualitative design. Guba and Lincoln (1994) suggest the term trustworthiness as a qualitative equivalent to the term rigor. This research used a number of strategies to ensure trustworthiness.

Member checking was used during data collection and analysis to ensure credibility (Guba & Lincoln, 1994; Krefting, 1991). During the interviews I asked

probing questions, summarized my understanding of the participants' responses, and asked for clarification, as needed, to ensure credibility. Before conducting each participant's second interview I repeatedly listened to the respective recording of the first interview and made notes of individualized questions and items on which I needed to follow-up for better understanding of the participants' meaning. These notes were made on the protocol for the second interview for easy access (Appendix C).

Table 6: Process of data analysis

Preliminary Phase
• Listened to recordings of interviews numerous times • Made preliminary notes of codes and themes • Prepared follow-up questions for second interview • Made notes in research journal about the data and the research process • Transcribed only as needed • Made notes
Phase I
• Transcribed all of the interviews • Free coding during first pass using *N-6* • Defined codes • Second pass over transcripts • Made notes in research journal about the data and the research process
Phase II
• Numerous passes over the data • Listened to recordings of interviews will coding data • Began organizing data into themes using *Inspiration* • Condensed data by alleviating repetition and redundancy • Made notes in research journal about the data and the research process
Phase III
• Aligned data with Research Questions • Identified overarching themes from data • Prepared and emailed member checks to participants

An additional means of member checking was also used. After the data had been coded using QSR's *N-6* software, the themes had emerged, and chapters four and five were being developed, I emailed to the participants copies of the findings and discussion and asked to respond if they had any comments and corrections (Appendix G). No email responses were received.

I kept a research journal, including an audit trail of the researcher's decisions and activities during data collection and analysis, to increase trustworthiness (Merriam, 1995, 1998; Yin, 1994). I also used this research journal to organize personal reflections, hypotheses and emerging ideas. Creswell (1997) refers to tracking one's thoughts over the course of the study as reflexivity and describes it as a strategy for increasing dependability and confirmability. Consistent with an emergent design, the research journal allowed me to re-examine my thoughts and ideas and determine if they were still relevant (Lincoln & Guba, 1985).

Creswell (1997) described a statement of the researcher's biases as a strategy for increasing trustworthiness. A report of the researcher's perspectives and biases follows.

RESEARCHER'S PERSPECTIVES AND BIASES

The combination of a number of experiences sparked this inquiry. A long and sometimes tiresome personal journey towards computer integration into my own elementary classroom made me aware that I had not had the opportunity to develop these abilities during my preservice training. As I began conducting in-

service training I found that the vast majority of my peers believed that they also had no or very little preparation to integrate computers during their preservice training.

During the last three years I have taught four preservice undergraduate courses designed to introduce teachers to basic computer skills while simultaneously preparing them to integrate the computer into instruction. These classes are comprised of students from all undergraduate classifications. The majority of these students reported that the use and discussion of technology in their other education courses was sparse. On course evaluations, it was common for students to suggest that additional practice with computer integration was needed throughout their preservice training.

Regarding the questions asked in this research, I had some preconceived answers and reasons for those answers. My preconceived ideas are based on my experiences as a preservice educator. From my experiences I have noted that preservice teachers often envision using similar teaching strategies that they experienced as K-12 students. It was my prediction that the participants' visions of their future classrooms would be a reflection of their K-12 experiences.

As a teacher, I am accustomed to always evaluating learning (or other situations) and assessing the instruction and the students' learning. As a researcher, I knew I was not to play those roles. It was important that I remain neutral and allow my participants to share their views and opinions. Instead, I was to look at things through their eyes and not mine.

I have been a preservice education student. As I recalled my experiences earning my degree and teaching certificate as an undergraduate, it was important not to allow my beliefs and biases to color the way I interpreted the interviewees' recollections of their experiences.

As a teacher with ten years of experience, I have my own biases and beliefs about learning and instruction. I believe that hands-on, active learning is more beneficial than more traditional learning experiences. During my research, I strove not to allow my own beliefs as a teacher to cause me to make false inferences or judgments about the students' answers.

ETHICAL CONSIDERATIONS

There are some important ethical considerations that were carefully considered during this investigation:

1. Care was taken to make sure that all relevant persons (participants, authorities, etc.) were consulted in advance and that they each agreed to the guiding principles of this study. It was important that participants were entirely aware that their participation in the research in no way influenced their standing in the College of Education.
2. Participants' right at any time to choose not to participate or to completely withdraw their participation was respected.
3. Throughout the research process, all data remained open to participants. The students were kept "in the loop" as much as they desired (at least as far as could reasonably be expected).

4. Participants' confidentiality was maintained.

CHAPTER SUMMARY

This chapter presented the research methodology used for the investigation of beginning preservice teachers' perceptions about computer integration. A basic qualitative research design was used, implementing qualitative research software to help code all of the interview data. An ongoing research journal was particularly helpful in the research, serving as a catalyst for future questions. In interviewing the students, great care was taken to prevent any personal biases or perceptions from interfering with true understanding of the participants' opinions and beliefs. Ethical considerations were followed appropriately.

CHAPTER IV

REPORT OF THE FINDINGS

The purpose of this study was to explore the perceptions of beginning preservice teachers about computer integration and how those perceptions have developed. The data yielded from the interviews are presented as themes organized under the research questions to which they relate. The goal here is to present the findings in the participants' own words with actual excerpts from the interview transcripts. Interpretation and discussion of these results can be found in chapter five.

It is important to note that the goal of this qualitative study, in accordance with Merriam (1998, p. 18), is to discover and understand the perceptions about computer integration that this particular group of participants holds. This study does not focus on the perceptions of individual participants nor does it seek to describe the perceptions of *all* preservice teachers. Therefore, data will not be identified as corresponding to specific participants. Five themes emerged from the analysis of the data: 1) the participants' definition(s) of computer integration; 2) descriptions of the participants' vision of computer integration in their future classrooms; 3) the participants' view of the educational value of computer integration; 4) the participants' perception of the requirements that exist to encourage the integration of computers into teaching and learning; and 5) the past experiences that have been influential in the development of the

participants' perceptions of computer integration. Data representing each of these themes are presented in this chapter. The first four themes correlate to the first research question, and the fifth theme relates to the second research question. As is often true with qualitative research, there is some overlapping of data between themes.

PARTICIPANTS' PERCEPTIONS

Research Question 1: What are beginning preservice teachers' perceptions of computer integration?

Theme 1: Definition of Computer Integration

The first theme emerged directly from the interview protocol. The participants were all asked to describe computer integration in their own words and to define or describe computer integration in educational settings. All the participants stressed that the use of the computer should be directly connected with the teaching and learning of educational objectives within the given content area. The following statements from participants represent well the views expressed by all of the participants:

> *I guess for it to be integrated it has to correlate with what you're doing in class. It is not going to help if…you were in science and learning about something and then you have to do something else on the computer that would not really go along with the science lesson. That really wouldn't be integrating the computer into the class work. It has to correlate and enhance teaching. It has to go along with what you are learning to be beneficial. If it is totally unrelated then it is probably not going to help the students remember what they are learning. So, it needs to go along with the lesson.*

> *Just using the computer for games or the Internet doesn't mean that it's actually integrating the computer. The reason for using the computer needs to be directly tied with what is going on in class – what is being studied. The students might be learning to use the computer better but it's not integrated with the topics they are studying. You're just using, like, science class to teach computers if you do that.*
>
> *If you are going to INTEGRATE the computer with teaching then it should be tied to what is being taught. You [the teacher] can't just let the students use the computers to do whatever – you need to have stuff that they can do on the computers that goes with the topics you're studying in class.*

The participants were all clear that computers are only integrated with the processes of teaching and learning when their implementation is directly connected with course content. As will be presented later in this chapter, the participants believed allowing students to play educational games or freely browse the Internet was *not* an example of integrating the computer with teaching and learning even though they believed such activities offered opportunities for students to improve some of their computer skills.

It is helpful to keep this common definition of integration in mind while viewing the data and findings. The shared definition indicates that all of the participants were operating under similar ideas about what it means to integrate computers into teaching and learning. This definition also serves as the standard the participants used to form their perceptions about computer integration, their visions of how they will integrate computers in their future classrooms, and their recollection of past experiences with computer integration. As will be presented later, there are times when the participants' comments are in conflict with this definition. This could be an indication of their lack of teacher training and/or the evolving nature of their perceptions of computer integration.

Theme 2: Vision of Future Classroom

The second theme also emerged directly from a question in the interview protocol. Each of the participants was asked to describe the way she envisions integrating computers into her future classroom. A variety of sub-themes emerged during the descriptions. The following excerpt from one of the interview transcripts between the researcher (R) and the participant (P) is a good example:

> *R: What do you think the computer use in your future classroom will look like?*
>
> *P: I think it will be used a lot for researching. You can use the Internet to get a lot of information about the topic or whatever you are studying to help you learn more about it. Then that information can be used to help them type papers or build projects. I know I'll want my students to type their papers for me instead of handing them in handwritten. That just makes it easier for everyone to read. And I could take them to the lab to work on it some…I hope that my students can use the computer everyday. I don't really know how I would do that, but I hope I can learn how to do it.*

The participants' descriptions of how they envision the computer being integrated into their future classrooms generated several common sub-themes: 1) the computer as a research tool; 2) the computer as a typewriter; 3) frequency of use; and 4) evolving strategies. Each of these sub-themes is presented next.

Computer as a Research Tool. One of the most prevalent ways that the participants envision integrating the computer into teaching and learning is as a research tool. Regardless of the grade level or subject area they intend to teach, all the participants mentioned that they would have their future students use computer CD-ROMs and/or the Internet to conduct research related to the material covered in class. When asked to describe how they would integrate the

computer into education all of the participants gave responses similar to the following:

> *Well, I think [I'd use it] for research a lot. I know, personally, when I need to write papers I need to know a lot of information about the work I'm studying. I use the Internet or CD encyclopedia to read different interpretations of the play or story or book or whatever I'm reading. I think it would be good for them to do that, to have more knowledge about their subject matter. I use it to find criticisms and stuff to include. But you can research anything, not just literature.*
>
> *I'll have my students research topics that we are studying in class. Research is a good way to integrate the use of the computer with whatever topic is being studied at that point.*

All the participants described the use of the computer for research as an effective means of integrating it with curriculum. Elements of this theme are strongly connected with the fifth theme (discussed later in this chapter). One of the most common experiences these participants had with computers during their own K-12 education was to gather research information. When asked to explain why research would be used as a strategy for integrating the computer into instruction, one participant stated:

> *A lot of papers in school involve current things and if you're trying to keep up with current ideas, a lot of times the library at school won't have the most up-to-date information, so you have to go the Internet to look, so a lot of times I think a lot of kids did choose electronic sources rather than books and articles and stuff.*

Three of the participants pointed out that they believed the Internet was the most effective means for acquiring the most up-to-date information on almost any topic. Their argument was that if you are having your students gather information, you would want them to have access to the most current information

possible. Using the Internet, they believed, was the most appropriate means of accomplishing this.

Because all the participants repeatedly mentioned using research as a means of integrating the computer into classroom teaching and learning, I developed a sense that the participants believed that the computer had some inherent value or role in conducting research. This is evident in one conversation between the researcher (R) and the participant (P):

> *R: You've mentioned A LOT that your students will use computers to do research…*
>
> *P: [Interrupting] I find that to be the most beneficial aspect of computer--is research.*
>
> *R: Why is it so beneficial?*
>
> *P: With the Internet and stuff it gives you so much information that you couldn't necessarily get just by going to the library, because a library can only hold so many books, but you can find like SO MUCH stuff online – through that aspect of the computer. I guess it's just because that's what I've used it most for, so that's just what I think of when I think of computers.*

Similar points of view were expressed by all the other participants as well. There was a unanimously held belief that research was an effective means of integrating the computer with teaching and learning. The computer provides students with the opportunity to enhance their computer skills while simultaneously learning from the information they are gathering on the chosen topic being studied in class. The participants' visions of integrating the computer with class research holds true with their previously described definition of computer integration.

Computer as a Word Processor. Having students type assignments is another common means of integrating computers with teaching and learning given by the participants. The participants expressed the perception that having their future students type their assignments was an effective strategy for computer integration:

> *With paper writing, because a lot of people's handwriting is really messy or unreadable, I wouldn't want them to suffer because I couldn't read it, so it would be easier if they could just type the papers.*
>
> *They'll definitely HAVE to use it to type their papers; and I'll want it in correct format.*
>
> *The reason that papers will be required to be typed is basically so they look neater and for the ease of the teacher.*

The following statements elaborate on the participants' perception of the educational value of requiring work to be typed:

> *You learn how to use the keys really fast. 'Cause you, if you don't know how to use the keys fast, then it takes forever to type a paper, so nobody wants that, like, to finish writing out the paper and be like, "Oh, now I have to go type it for two hours." It kind of forces you to learn how to type faster which you're going to need in school and in life.*
>
> *I'll sometimes have my students type some assignments so they can learn to type better. In this day and age you just need to know how to type kind of quick because computer use is just so prevalent. They'll need to know how to type for school, for work, and for email and instant messaging and stuff like that. Making them type some assignments gives them a chance to practice typing while working on school work.*

The participants, regardless of the subject or grade they anticipate teaching, all explained that they will have students type assignments because it makes the work appear neater while also providing the opportunity for the students to learn or improve their typing skills. The participants held the perception that typing assignments that were related to class content was an effective means of

integrating the computer with the curriculum. This, again, supports the participants' previously described definitions of computer integration. Elements of this theme are also strongly connected with the fifth theme that discusses the process by which the participants' perceptions about computer integration developed.

Frequency of Computer Use. While describing the way they envision integrating computers into their future classrooms most of the participants discussed how often the computer would actually be used. There was a full range of responses as participants did not all envision using computers with the same frequency. Elements of this sub-theme are strongly connected with the participants' previous experiences which will be discussed later in this chapter.

Two of the participants envision integrating the computer on a daily basis. Here is how one of these two participants described her projected use:

> *I'm actually hopeful that the students will use it a lot more than I did in school. I think it would have been a lot more beneficial if I had been able to spend more time on the computer and either research something or to reinforce concepts I had learned…I'd say every day. Maybe not all the children will use them every day, but some of them will probably. There will be someone using the computer in the classroom everyday for like centers and reading comprehension practice.*

These two participants believe that it is worthwhile to provide daily opportunities for students to learn while using computers, and that such daily use is central to the idea of technology integration.

Interestingly, one of the participants, though not opposed to students using the computer often on their own, does not intend for the computer to be used frequently in her classroom:

> *I think they'll have to use it OUT of the classroom, too, but that's more on them when they decide that they should do it, if it's a big deal or if they like using the computer they might use it a lot, if not they might not use it at all. But in the classroom, I will probably show them the things they can probably find on a computer related to the lesson. So, I would think outside of the classroom it would be more dependent on them. Inside of the classroom it would only be a little bit, maybe like when we have papers coming up it would be more than when we are just getting into a new unit and I'm trying to lay the background for things and they're just reading things. If they decide to use it outside of the classroom that's just awesome, but I probably won't take them to the computer lab then. It would probably be for more like, "Okay, we're doing a project. If the computer lab is what you need to complete your project, then here's a pass."*

An example of an opposing point of view on how frequently computers should be used in the classroom comes from this participant:

> *R: How frequently do you envision your students using the computer in your classroom?*
>
> *P: Probably once a semester – to meet the [technology] requirement. I'd like to do it more, but that's probably the truth. I just don't know how I would do it. I'm not that good with computers.*

As is evident, the participants did not hold a unanimous opinion about this sub-theme. As will be discussed later in this chapter, all the participants indicated that they held the perception that integrating computers with teaching and learning was very important in modern society and doing so held educational value. However, as presented here, participants offered a variety of descriptions about the frequency with which they envision themselves as future teachers using the computer as part of teaching and learning.

Evolving Perceptions of Computer Integration. While analyzing the data related to the participants' descriptions of their visions of future classroom computer integration, it became apparent to me that their perceptions and visions

about computer integration were tentative and evolving. Consequently, a sub-theme emerged related to the evolving nature of their perceptions and visions. Elements of this sub-theme are connected with most of the other findings.

For instance, while describing their vision of computer integration in their future classrooms, three of the participants indicated that their ideas were not "set in stone," as typified by their comments:

> *I'm not really sure if my ideas would work, like it could change so easily. I might not teach like I think. Or unless technology stopped advancing, which I don't see happening, or like it could make such great jumps like I don't even know how to use the next computer, so I guess I would need like another training course or something. But I'm just not sure because things could change so easily – the computers and me.*
>
> *You know, I say that's what I'll do, but I really don't know for sure at this point how I'll use computers in my classroom. It's kind of early for me – I haven't really been a teacher, so I don't know if my plans will really work. I guess that's kind of the way my teachers used the computers, so that's kind of all I can see me doing. I'm sure my ideas will change as I get further in my major and get more experience.*
>
> *It's hard to know for sure how I'll use the computers when I'm teaching. It's all just a guess because I don't know what – because I've never been a teacher. Plus I don't know what kind of computers or how many computers will be in my classroom. I can say this is what I'm going to do, but it will have to change to fit the situation.*

Evidence of this evolving process is indicated in conflicting responses provided by the participants. The participants were unanimous in defining computer integration as the use of the computer in connection with content being studied in class. However, the participants occasionally would describe integrating the computer in ways that conflicted with this definition:

> *If a student finishes their classwork early I could let them go do whatever on the computer until everyone finishes or I'm ready to move on to the next lesson or activity.*

The students would be required to type some of their assignments so they can get better at using the keyboard and type faster.

On Fridays, if the class has been good all week, I could take them to the lab and let them play on the computers as a reward.

These statements do not show any connection between the use of the computer and the curriculum. These may be strategies for using the computer but, according to the participants' own definitions, these are not examples of computer integration.

The data indicate that these participants' perceptions about computer integration and their visions of its use in their future classrooms are in a state of evolution. Participants sometimes expressed this outright by showing self-doubt and other times implied it by their conflicting responses.

Theme 3: Educational Value

A third theme emerged from the data as all the participants described their perceptions of the benefits of and justification for integrating computers into teaching and learning. When each of the participants was asked if computers should be used in schools, all of them expressed that they believed they should. When asked to describe the educational value of using computers in teaching and learning, the participants explained these perceptions: that the use of computers was a modern necessity, that the use of computers would be motivational to students, and that computers made it possible for students to interact with information through multiple modalities. Each of these ideas is described next.

Computer as a Modern Necessity. Each of the students expressed the perception that the ability to use a computer is now an expectation in today's society. This sub-theme emerged as the participants explained that their future students will need to be able to use a computer for school, work, communication and personal use. The following statements exemplify these ideas:

> *But I just think that the more you use it - it's just becoming more abundant in society - I just think they need to know how to use it and know how to use it the best that they can.*
>
> *In the majority of jobs, now, you will probably have to use a computer. Even in fast food restaurants or at the [grocery] store computers are used. These kids are going to have to be able to use a computer.*
>
> *It's just another type of way to incorporate it. And you know not just doing the same old math worksheets, you can just get on the computer and it just makes it a little different for the kids. It's incorporating education with something that - you'll have to later use the computer for other things and it's kind of incorporating two things at once. I think it's a variety thing, too, just giving the variety to the kids.*

All of the participants hold the perception that it is necessary for all people to be able to use a computer given the current technological state of our society. As future teachers, they intend to prepare their students to do so by integrating the use of the computer with the processes of teaching and learning.

Computer as a Motivator. The preceding quote also describes the perception that computers can add variety to teaching and learning. This sub-theme emerged as the majority of the participants indicated the perception that the use of a computer, in and of itself, would be motivational to students. The participants believed that students would find using the computer to be fun. Participants also thought that using a computer in education was one way to add variety in the classroom, which in turn they felt would increase motivation:

You can take a topic that may not be a lot of fun to learn about, like division, and then use a good computer game to help the students practice and they'll get excited about it. Using the computer can get the kids excited and ready to try division.

Using the computer sometimes just adds variety which can catch your attention. Using the board or overhead all the time can get boring and students zone out.

I think that because to me it's a good variability to have different ways of learning so that I'm not just up there telling them everything so that they can do some self-discovery through their own research on the Internet or different resources on the computer.

One participant recalled a personal school experience to support the contention that computers can motivate students in their learning:

R: What made it a great experience for the students?

P: I think that we learned a lot and that we enjoyed learning while we were using it, because it was a different - like it wasn't someone talking to us or writing things on a dry-erase board. It just worked well.

R: Why do you think it "worked," as you put it?

P: Just because we were really focused on it because it was something different, out of the ordinary. Our minds couldn't be ten miles away while we were doing it like it is sometimes in a classroom because it's asking you [a question] right there and you have to give an immediate answer, so your mind has to stay on it, and we enjoyed it because it's something different.

These excerpts are evidence that the majority of the participants hold the perception that the use of computers in the classroom can both add variety to instruction and increase student motivation.

Computer as a Tool for Multiple Modes. An additional sub-theme emerged as the participants described their perception that the computer allows students to interact with information in multiple modalities, providing yet another example of its educational value in teaching and learning. For example, three of

the participants described the ability to work with audio and visual information, educational games, word processing, PowerPoint and other hypermedia tools as different, yet equally important, educational uses of computers.

R: You have repeatedly mentioned the idea of providing multiple modes…

P: Like, you see it in the classroom, you read it in a book, you work on it on the computer. I think that students will find that it's helpful.

R: Why do you think that is so valuable?

P: Well, if, like, one kid doesn't, can't, like, grasp something in one way, like if you just present it one way to them, and it just goes right over their heads, then they're not going to remember it. It's not going to affect them. But, if somehow, you can figure out something - maybe not for all the kids in general, because like I said all of them probably learn in a different way - but if you can present it in a couple different ways then maybe all of them have a better chance of catching on to it than if you're just going to talk about it in front of the class and you miss like half of them. But if you could, even if you go to the computer lab and only two more understand it because of the program or whatever, that's like two more than you had, and it's not like it hurt the rest of the class to practice it, too. So, I mean, just some kids learn better visually, some have to hear it, some have to see it, other stuff, like, feel it. So, that's like - since kids are different then the more ways you can present something the better chance they have of remembering it.

With the computers students might could work with information in the way they like. If a kid is visual then they may draw their ideas on the computer, and if another one likes to write then they could type their ideas – maybe even in a journal or something.

I just found that with PowerPoint you can include lots of different kinds of stuff: pictures, typing, even sound or video. That would be great for different learning styles.

Another participant had this to say about the importance of giving students opportunities to receive information in various modes:

From what I can remember, it only adds to the educational experience, it doesn't take anything away from it. It just makes it more complete, more memorable. It just like brought different - more variety in learning and more ways to get across the material and stuff like that.

As the data suggest, these three participants held the perception that the use of the computer can enable students to access and use information through a variety of modes. Various computer hardware and software components make it possible to experience information through audio, video, images and text while allowing the students to physically and actively operate the computer. These three participants affirmed the educational value of using the computer to interact with information through a variety of modes.

Inappropriate Uses of Computers. The participants all agreed that simply using a computer at school did not necessarily ensure that any educational value would result. This belief is consistent with their definition of computer integration. This sub-theme emerged as they described the educational value of integrating the computer into the processes of teaching and learning. This is best explained by the following discussion:

> *R: Do you think that just because you are using the computer it makes everything you do educational?*
>
> *P: No, not necessarily.*
>
> *R: How do you differentiate between when it is and when it isn't used for educational purposes?*
>
> *P: I guess even playing games on a computer could be educational if they were helping you, like reinforcing things you've already learned and stuff as opposed to just surfing the Internet. Like even when it's used in conjunction with teaching, like PowerPoint, I think that would be more of a learning setting as opposed to just being entertainment, like web surfing.*

Other participants had the following to say about this sub-theme:

> *You have to make sure that the reason you're using the computer is integrated with what is going on in class – what you're studying. Otherwise, you're not really integrating the computer. You're just using it.*

> *It might not be bad to just let children play whatever games they want on the computer, but that might not be a lot of learning. It's better for them if they can learn about the class lesson with the computer.*

The data show that participants held perceptions that integrating the computer with teaching and learning has educational value. However, they stressed that simply using the computer does not ensure that there is educational value. The computer must be integrated within classroom teaching and learning activities.

Theme 4: Computer Requirement

This fourth theme emerged as the participants described their perception that the integration of the computer into teaching and learning was a requirement for them as K-12 students and will be a requirement for them as teachers. The participants described the ways computer use was required of them when they were K-12 students and the specific requirements they believe their students will need to meet. Closely related to these are their perceptions about the technology requirements that their teachers were required to fulfill and what they believe will be required of them as future teachers. Unlike the other themes presented and discussed so far, this theme is not the result of a specific interview question. Instead, this theme emerged from across all the data of the participant interviews.

Computer as a Required Class. This sub-theme emerged as four of the participants referred to the requirement of a computer class in middle school and/or high school:

> *I took a word processing class my freshman year, I think to satisfy a technical requirement to graduate and I believe that really, really helped me learn how to type well for the rest of high school. That was REALLY beneficial. And I learned how to do different types of documents and stuff like that, so I think that class was really great. It wound up helping me with other projects in other classes in high school.*

Another participant described the experience of the required computer class in more detail and also provided an explanation of her perception for why the course was required:

> *P: I took a basic computer and typing class in high school, and that just taught me how to, like, cut and paste and how to change the font, that kind of stuff. You'd look at the screen and it'd be like "a" - it would light up the letter you were supposed to type – it was kind of basic. And then it would get harder, it taught you how to move your fingers and which finger to move to get to which letter, so it was the actual keyboard letters that were taught. It was a half semester class that was required of all freshmen to take.*
>
> *R: Why do you think it was required?*
>
> *P: Probably because they knew it would be very handy. And, it turned out to be - except that I forgot it all.*

As the data suggest, all these participants were required to take a basic computer course in middle and/or high school. This sub-theme is strongly connected to the final theme describing the participants' past experiences and will be presented later in this chapter.

Computer Projects. This sub-theme emerged as all of the participants discussed their own experiences in which school assignments had required the use of a computer. All of the examples given were from middle and high school. Four out of the five participants mentioned projects in which the teacher had required the students to use PowerPoint. Two examples follow:

> *For research…I never really used any encyclopedias [on CD ROM] on the computer, but we used the Internet for research and I used it for class projects or papers – just to research topics. PowerPoint I used several times to do presentations for class rather than putting it on a poster board - just talking about whatever. To present, we could just use PowerPoint.*
>
> *My psychology teacher put us in groups of like four and we had to research a certain topic. I don't remember if we picked them or if he gave them to us. After we had done the research and found the information, we had to present it in a PowerPoint. We went to the library and the library had several computers that you could use. After we used the library for research, we went back in there for two or three more days to do the PowerPoints, so that was strictly in-class because it was a group thing, so he didn't want to make us get together outside of class.*

After describing required introductory computer classes, two of the participants went on to describe how these classes had been beneficial in completing projects and/or assignments in which the use of the computer was required:

> *And ever since then in at least one class every semester there has been a teacher… [that required that] we had to use the computer to make our OWN presentations to her or the class,…or to type papers, or to research a topic. Knowing how to use the computer has helped me with lots of my school projects that the teachers had us to do.*
>
> *This forced us to do it on the computer and one of the teachers was like, "Most likely later on in life you're going to need to know how to do this." It just gave us an opportunity to learn it.*

The data show that all participants had experiences in which they were required to use a computer to complete specific class assignments. This sub-theme is strongly connected to the final theme describing the participants' past experiences and will be presented later in this chapter.

Typed Work. All of the participants made reference to the perception that they as students were required to use computers, and that their future students will face the same requirements. One example of this perception is the

requirement that school work must be typed (this perception was discussed previously in this chapter).

Requirements for Teachers. Three of the five participants indicated that they perceived their previous teachers were required to use computers during the school year. In the same way, they felt they would be required to use computers when they become teachers. The following is a discussion about their view of this perceived requirement:

> *R: I'd like to hear more about the technology requirement that you said your high school teachers had to satisfy.*
>
> *P: Coming [from the school district that] I come from it became a BIG deal, probably my junior year. I remember the teachers talking about it. They – I don't know if it was like county level or the school was just trying to do this – they were trying to involve the technology into classrooms so you could see technology went in with education and how you could actually learn stuff on the computer and use the computer to learn…I think most teachers and most classes had to [do this]. I don't know exactly how the school checked up on it, but somehow the teacher had to incorporate some sort of computer program or computer time, probably more than just going to the computer lab to type a paper or something.*
>
> *R: Do you know what this technology requirement was? Were teachers to use the computer once a week, a semester, etc.?*
>
> *P: No, I'm not sure. It might have just been AT LEAST ONCE while you were in that class…just so they [teachers] weren't just doing all lecture or chalkboard or dry-erase board. They were trying to draw in the variety, maybe.*

The participants expressed the perception that there was and will be a requirement for K-12 teachers to integrate computers into teaching and learning. Although they were not all clear on specifically what this requirement had been or will be, they all believed that it did and will exist and thus has an influence on the way that teachers carry out instruction.

Appropriate Computer Use. This sub-theme emerged as three of the participants stressed, again, that although the use of the computer may be required it is important that it be integrated appropriately. One put it this way:

> *I think that you should not compromise learning in general just because you have to fit a certain technology requirement in or something – as I felt sometimes like some of my teachers were doing in high school, because they HAD to use, um…the technology requirement. But at the same time I think it should be used as an extra resource, you know, being able to know that THIS IS available and you CAN learn stuff and you can use it as a tool to receive more information, practice on different things on the computer through different programs, so I definitely think that it should be used in addition to normal education.*

This sub-theme is closely connected with another sub-theme described earlier in this chapter (i.e. "inappropriate uses of computers"). As the data suggest, participants reiterated that for the computer to be integrated into teaching and learning, it must be connected with the curriculum.

DEVELOPMENT OF PARTICIPANTS' PERCEPTIONS

Research Question 2: How do beginning preservice teachers' Perceptions of computer integration develop?

This final theme emerged from the participants' descriptions of the major influences on their perceptions of computer integration into teaching and learning. When asked about this, all of the participants gave the same answer: *past experiences*. To highlight the repetitiveness of this answer, multiple participants' responses are given:

> *Well, since I plan on teaching, probably all the experiences that I had in school. I remember these, like, specific things and I even remember, like,*

> *some of the visuals of, like, the Carmen San Diego game when you'd fly to the different part of the world - just little things that stuck with me. So that's probably where I get my vision. I would say that, like, just my experiences in school, would shape what I would want in my classroom.*
>
> *I guess it could go back to my experiences in school with using our - doing our computer lab math and reading games*.
>
> *My experiences with computers in school - probably the technology requirement that my high school or county put forth, and seeing how my teachers had to deal with it, because my teachers were not very much into technology in the classroom - they were frustrated because they had to change lesson plans and had to figure out how to use it. But, I'm sure it was very good for them because now they know something new to do - seeing different ways that they did it. I think, as a student, it added variety to me. I can imagine as a teacher it's also just more variety…I guess it gave me ideas for my own – when I AM a teacher. I saw how teachers used it, which may or may not be helpful to me.*

The participants all expressed that their perceptions about computer integration were strongly influenced by their past experiences. No other influences were given by these participants. Further description of their responses is described below.

The bulk of these responses came during the second interview. The participants created a timeline of their experiences with computer integration during the beginning of the second interview. This timeline served as an organizational tool that could be referenced during the interview. The timeline itself was not used for data analysis because the participants thoroughly discussed each detail of their individual timeline during the second interview. I was methodical and careful to make sure that the participants fully described every element mentioned on each of their timelines. The timeline descriptions provided richer data than did the timelines, thus, the timeline interviews were

used for data analysis rather than the timelines. However, the timelines have been included in Appendix D.

Theme 5: Past Experiences

The above participant comments about past experiences that influenced their perception about computer integration all lead to the question, "What was the *nature* of these past experiences?" In an effort to understand how the participants' perceptions of computer integration have developed, this section presents how the participants described their previous experiences with computers in educational settings. Not surprisingly, all of the following sub-themes are closely connected with the participants' perceptions and vision of computer integration presented earlier in this chapter.

Computer as a Research Tool. This sub-theme emerged as the participants described a variety of past experiences in which they had used the computer to research information about a specific topic. The sub-theme is strongly connected with the sub-theme presented earlier in this chapter in which the participants described their vision of using research in their future classrooms as a means of computer integration. Examples of this sub-theme include gathering information for science projects, speeches, presentations, essays and term papers:

> *Starting in sixth grade we started using the encyclopedias that were on computer - like Grolier's and all those ones that you just put in the CD and all this stuff comes up - to do research for the essays. The essays were not so in depth so you just needed like basic facts about stuff, and that's where we would go to get it.*
>
> *We did science projects. It [the computer] was mostly used for research. In fact, it was used throughout school for research for different projects.*

For eleventh grade I had a speech and debate class and I would go on the Internet to look up stuff to help me with my speeches. We also had a term paper that was joint between our history and English classes. They combined it, so that way we wouldn't have to do two separate ones. It was a history topic but the English teacher was grading it, too, so she could check our English. I definitely used the computer to help me research that.

We'd go to the library and I remember using it in just about every subject, like math, or social studies even where we would have to do research on the Civil War or different historical figures. And I remember geography; we'd have to look up like different continents or countries, statistics about them. In English, if I was doing like a history of Robert Browning, I could use the computer to research that. Of course, sometimes I would do the research at home, too – not just at school – so I could work faster.

In high school is where the Internet came into play [at our school], first time ever. And mostly, I'd say I used it for research, like we had our first research paper and, um, that required, I think we had ten sources and five of them had to be electronic sources, so you couldn't even have ten books, 'cause they wanted it kind of half and half. That was only for that paper and not any other paper--there was no specifications.

Just as far as like my papers and speeches I've made in class and different projects where you can find a website that's specifically geared towards your topic as opposed to a book that may cover a broad range of topics and you don't have time to search through the whole book to find THE THREE GOOD POINTS that you can use on your topic.

In my government class, we had to get current articles on amendments and stuff and the only place you can get that is the Internet for the most part.

The participants described a variety of past experiences in which the computer was used to gather research information. All of the participants highlighted these past experiences as having a strong influence on the development of their perceptions about computer integration.

Computer as a Word Processor. This sub-theme emerged as the participants repeatedly described past experiences in which the computer was used for typing and word processing. One participant even ranked her

experiences with typing as the most influential experience on her perceptions of computer integration:

> *R: Looking at your timeline what experiences most influenced this vision?*
>
> *P: Past experiences. Especially high school - writing papers, because I mostly used [computers] for writing papers*

This participant expressed that the majority of her experience with computers was related to typing papers and as a result these are her most influential experiences shaping her perceptions of computer integration.

Other participants also described their experiences with typing assignments as influencing their perceptions; however, the influence on them may not be quite as strong as it was for the previous participant. The following are descriptions of these participants' experiences with using a computer to type their schoolwork:

> *In sixth grade I remember having to write like my first essays. And so I used obviously Microsoft Word and Microsoft Works to like start typing those, 'cause they required typing at my school, they would no longer let you handwrite.*
>
> *The essays, all throughout sixth through eighth grade, were required to be typed. My high school required it, too, so it was probably, like, a good stepping stone for that. I always like to type it first and then go back and check it, and just check what I've already written. Because it's just like having it on a screen, and like kind of neat and clear, makes it a lot easier to like change around.*
>
> *I remember writing reports and they had to be typed and so some people probably didn't have computers at home so they had to give us at least a day or two in the computer lab to type it.*
>
> *Since, probably, my freshman year when I learned how to type and it became MUCH faster for me to type things than write. When I had the option of doing things at home I probably would almost always type it, like papers – well, papers normally have to be typed, but even like simple things that you could just write out, I just prefer to type them. Also, my*

> *A.P. English teacher, for every big work of literature we did, we had to do a whole three or four page, front and back, stapled packet of information on it, but she already had it done up, like on a computer and had made copies, but I just thought with my handwriting, I have pretty big handwriting, it got really sloppy. She let a friend and I get on her computer one day and we worked with the computer to do the layout on our computer so that we could type into the layout and it's all typed up and it looks so much neater.*

All of the participants described past experiences with typing school assignments as having influenced their perceptions about computer integration. One of the participants even considered these experiences to be the most influential because they comprised the majority of her experiences with computers.

Computer as a Modern Necessity. This sub-theme emerged as the participants also expressed a general impression that the computer has become a necessity for living and working. This impression was formed on the basis of the extensive presence of computers in classrooms and in society as a whole, and on the requirement that students and teachers take technology-related classes. This, in turn, has influenced their perception about computer integration in the schools. Below are two excerpts from participants' descriptions about their experiences related to this issue:

> *I guess it's mostly based on the fact that I see computers being used so much more in society in general pretty much. Like work, I mean, every single job usually has computers involved in it somewhere, unless it's hands on, like construction. But I'm sure the men have to use it to keep records or something else. I just think that the more you use it, the more you will be able to integrate into real-life areas. Like, I used it to type papers and another student then used it for her calculus tutorial. I just think with technology and the advances you'll be really left in the dust if you don't know how. You'll be sitting there clueless while other people are just plugging away.*

> *In my experience with computers and my knowledge that they're going to be – or that they ALREADY ARE, they HAVE BEEN SUCH an INTEGRAL part of life and that they're gonna HAVE TO HAVE computer skills.*

This sub-theme describing the participants' past experiences is closely connected with the previously described theme describing their visions of their future classroom computer integration. The participants expressed that as K-12 students they developed the perception that it would be necessary for them to be able to use computers throughout their education and in their professional careers.

Computers as a Motivator. This sub-theme emerged as the participants described experiences in which the integration of the computer into teaching and learning increased their motivation as students. The following are examples given by the participants of experiences in which the use of the computer increased their motivation:

> *I can recall not liking multiplication that much. Then one day we went to the computer lab and played Math Munchers. I wasn't great at it at first, but after a couple of times to play it I began to enjoy the game – and I started learning my multiplication facts. After that, I didn't dislike math so much.*

> *We used the computer in, like, math – to play games, or solve word problems, or maybe draw geometric shapes on the computer. It was just another way to learn and not do the same old math worksheets. Using the computer just makes it a little different for the kids. Um, it's incorporating education with something that - you'll have to later use the computer for other things and it's kind of incorporating two things at once. I think it was more fun, too, just giving us some variety.*

> *We wrote journal entries on the computer. It was something different than just sitting down and writing. I think that we learned a lot and enjoyed learning while using the computer because it was different. I was always more motivated to write in my journal than I was to just write on paper.*

As previously presented, the participants hold the perception that integrating the computer into teaching and learning can increase student motivation. They explained that their own experiences have been influential in the development of this perception.

Computer Requirement. Another sub-theme that emerged from the participants' discussions of influential experiences regarding computer integration in classrooms is the requirement by school administration that teachers integrate the computer into teaching and learning. The following is a discussion between the researcher and the participant:

> *R: Which of the past experiences do you think have been the most influential on how you think computers will be used in your classroom?*
>
> *P: …probably the technology requirement that my high school or county put forth, and seeing how my teachers had to deal with it, because my teachers were not very much into technology in the classroom - they were frustrated because they had to change lesson plans and had to figure out how to use it. But, I'm sure it was very good for them because now they know something new to do - seeing different ways that they did it. I think, as a student, it added variety to me. I can imagine as a teacher it's also just more variety…I guess it gave me ideas for my own – when I AM a teacher. I saw how teachers used it, which may or may not be helpful to me.*

The participants believed that they had more and varied experiences with computers because their teachers had to meet technology integration requirements. As a result, they now envision a variety of strategies for computer integration using these past experiences as models. Thus, past experiences have been very influential in the development of their perceptions and vision.

Additional Influences

In addition to the influential experiences discussed above, all of the participants described a number of other experiences while middle- or high-school students that relate to computer integration. Although not specifically stated as being part of the participants' visions for their future classrooms or directly stated as being an influential factor, these experiences are presented here because they were described as important memories by the participants and shaped the way they presented and discussed their timelines.

PowerPoint. All of the participants described having used PowerPoint to create presentations in several of their high school classes. These PowerPoint projects were always completed in conjunction with research on a topic being discussed in class:

> *We had PowerPoint lessons every once in a while. I remember doing one in our economics class. There were like four different markets or something that people could research and present on. We had to get our information that we were putting on the PowerPoint by doing research. Then we had two class days to put the PowerPoint together in the computer lab – she had reserved it for her class during that period of the day. Then we looked at one PowerPoint for each of the four topics [different markets], because there wasn't time for all the groups to show their PowerPoint – plus it would have been repetitive. I think she [the teacher] did it so we'd learn more details about the markets and to spice up how the class was going – just add some variety.*
>
> *My history teacher put us in small groups. Each group had to research a certain person or event…after we found our information in the library, we would spend a few days in the computer lab…we had to put [the information] in a PowerPoint show to present to the class.*

These descriptions are indicative of the comments made by all of the participants related to how they were required to use PowerPoint to complete school assignments. The participants all described experiences as students in

which they had to first gather research on a topic related to what was being studied in class and then organize that information into PowerPoint.

Labs. Another high school experience with computers common to the participants was the use of computer labs. In addition to leaving their classrooms to use the computer labs to gather research, type papers and create PowerPoint projects, all participants reflected on occasions when the computers were used to reinforce their learning of content introduced back in the classroom. The following is one example describing the computer lab being used in conjunction with a math class:

> *P: We would basically go in. Everyone would have a computer at that point. And we would have to open up a certain file and we would either have to start off where we left off before, when we had like coordinates or we had to draw a picture with the coordinates and then print it out to show the teacher, or we would have to talk about angles. Like we would be shown an angle and we would have to tell whether it was obtuse or acute, and we would choose it, like yes or no, and everything would be printed out and given to the teacher again.*
>
> *R: Were the activities you were doing in the computer lab connected with what you were doing in the classroom?*
>
> *P: It would reinforce the concepts we learned in the classroom that week. It was kind of summation of everything. There wasn't just a random – like, we're studying trigonometric functions one day and then go back to angles. They were connected somehow.*
>
> *R: Why do you think they took you to the lab?*
>
> *P: Probably just to reinforce concepts and every now and then we would get bored sitting in the same classroom day after day. It was always a way to mix-up the schedule. But, I think it was just to reinforce concepts instead of just learning it for the tests and forgetting it right away.*

Other participants described similar experiences with computer labs during their K-12 education but pointed out that the activities were not always connected with what was being studied in class:

> *We would go to the computer lab and play different games. Sometimes we would just be allowed to basically do whatever we want on the computers – play games, draw or use like Encarta. Sometimes we would go in there and the teacher would have the whole time planned so that we would be doing things on the computer that went along with what we were studying. I remember when we were studying about the states and capitals we went and researched like what the state bird and state flower was and what the state capital is called for each state. Then we would play this map game where you had to name the state and give the capital by looking at it on the map.*

> *Every week we'd go to the computer lab at least once…sometimes it would be KIND OF connected to class. Like, if the math teacher took us to the lab we would play like math games where you could practice your multiplication facts. But we might really be studying percentages in class – so we'd be doing math in the lab, but it might not be the same thing were studying right then.*

The participants all recalled making frequent visits to the computer lab in their classes when they were students. All of the participants expressed the perception that their teachers often tried to connect the computer lab activities with the actual content being studied in the classroom; however, the participants admitted there was not always a strong connection. In fact, as the first excerpt described, the participants also had experiences in which they were merely taken to the computer lab for free time.

Negative Experiences

It is important to note that not all of the participants' experiences with computers as students were positive. Three of the participants explained that they had negative experiences with computers related to teaching and learning.

Two samples from these discussions follow. The first describes frustration with a teacher with poor computer skills:

> *R: Have you had any negative experiences with computers in conjunction with teaching and learning?*
>
> *P: Only when the teacher is using the computer and they don't know exactly - or if they are really unsure of how to use the computer and they're attempting to use it, um, it can turn out bad because it wastes a lot of time.*
>
> *C: How have these kinds of negative experiences influenced your perceptions of computer integration?*
>
> *P: Um….I'm not…I don't…I'm not really sure that they have. I'll just always make sure that I'm prepared to use the equipment before I teach.*

The second description relates to the lack of the computer being appropriately connected with classroom teaching and learning:

> *R: Have all of those educational experiences with a computer been good experiences?*
>
> *P: NO! Sometimes I didn't see the point of it.*
>
> *R: Can you give me some examples?*
>
> *P: In math we had to go find the times for sunrise and sunset in different time zones. I didn't really see how that was relating to the rest of the math class. We WERE plotting information and doing graphs in class, but when we collected this information using the Internet, we didn't actually graph it or anything. This is like the teacher that always said, "Math is applicable in real life." Even if we had plotted it still just seemed like a slight stretch of trying to MAKE it be applicable in our lives, because I don't see myself on a regular basis going to plot that. [Laughs]*
>
> *R: How has this influenced your vision as a teacher?*
>
> *P: I won't just make up something to do on the computer so we can use it [the computer]. I'll try to make sure whatever we do on the computer goes with what we are doing in class and that the kids can see the purpose for it.*

Most of the participants described at least some negative experiences with computers as students. The participants explained that as a result they will try to avoid giving their students similar negative experiences.

CHAPTER SUMMARY

The purpose of this study was to explore the perceptions of beginning preservice teachers about computer integration and how those perceptions have developed. In this chapter, five major themes and associated sub-themes were presented that emerged from the analysis of the data. The themes and sub-themes were described in the participants' own words using excerpts from the interview transcripts.

The first four themes related to the first research question (What are beginning preservice teachers' perceptions about computer integration?): 1) the participants' definitions of computer integration; 2) the descriptions of the participants' vision of computer integration in their future classrooms; 3) the participants' view of the educational value of computer integration; and 4) the participants' perception of the requirements that exist to encourage the integration of computers into teaching and learning. The fifth theme related to the second research question (How did these perceptions develop?): past experiences have been influential in the development of the participants' perceptions of computer integration.

CHAPTER V

DISCUSSION AND CONCLUSION

The purpose of this study was to explore the perceptions of beginning preservice teachers about computer integration and how those perceptions have developed. Chapter Four reported the themes that emerged from the data analysis. These themes were presented primarily in the participants' own words with careful attention to avoid researcher bias.

In contrast, this chapter focuses on the interpretation and analysis of the data. This chapter is divided into two sections. The first section provides a summary and analysis of the findings and the second section is a discussion of recommendations for future research.

SUMMARY AND ANALYSIS OF FINDINGS

The analysis of the data resulted in the emergence of five general themes: 1) the participants' definitions of computer integration; 2) the descriptions of the participants' vision of computer integration in their future classrooms; 3) the participants' view of the educational value of computer integration; 4) the participants' perception of the requirements that exist to encourage the integration of computers into teaching and learning; and 5) the past experiences that have been influential in the development of the participants' perceptions of

computer integration. A summary and analysis of each of these themes is presented, and *Figure 3* demonstrates how the themes inform the research questions.

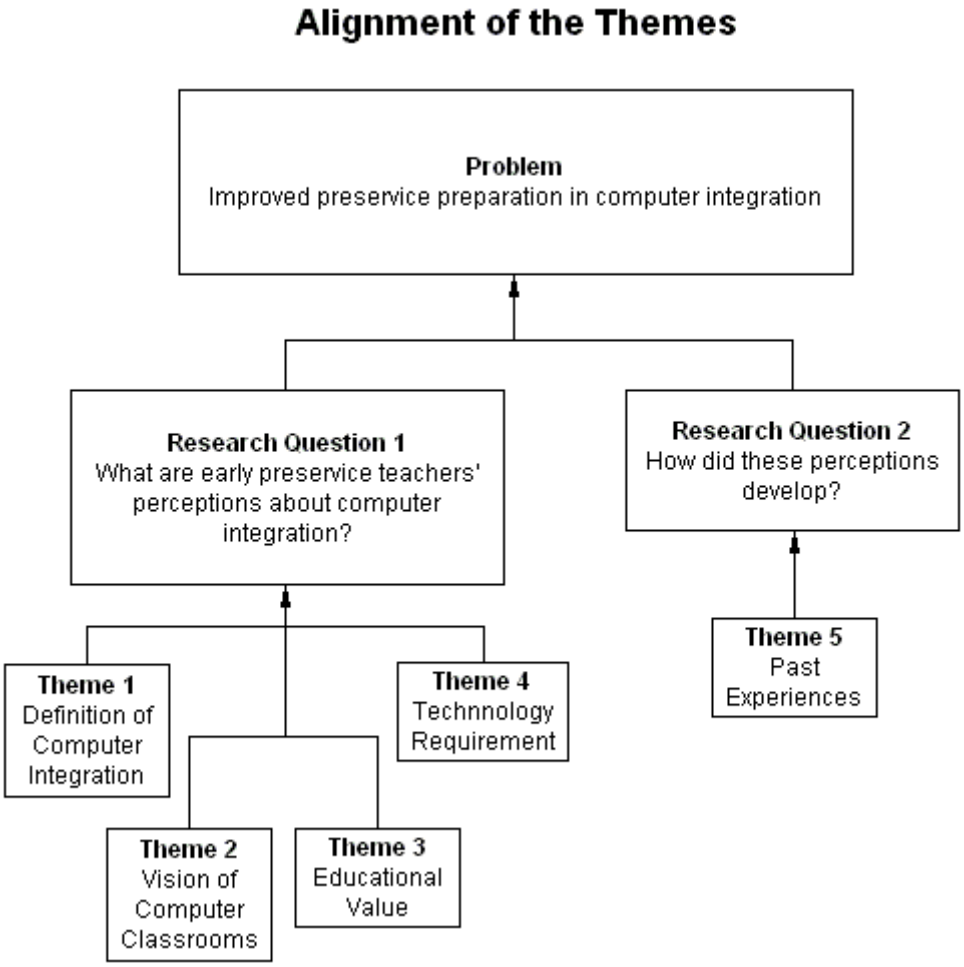

Figure 3. Research questions and themes.

Definition of Computer Integration

The first theme relates to the definition of computer integration as described by the participants of this inquiry. Rather than simply being defined as the use of a computer, there was full agreement among the participants that computer use is only truly integrated when it connects with existing curricular goals. In other words, it is important to determine *how* and *why* the computer is used in teaching and learning (Earle, 2002). The perception reigned that using a computer simply for *the sake of using a computer* was not a justifiable means of integrating it into the processes of teaching and learning.

Although all the participants in this study stressed that the use of the computer should correlate with classroom teaching and learning when directly asked to define computer integration, the participants did not necessarily demonstrate this when asked about it indirectly. For instance, when asked to describe their vision of how the computer will be integrated into their future classrooms, the participants sometimes gave examples that did not relate class content to computer use. One participant said, "I'll integrate the computer to keep grades on there, and probably like keeping records and stuff." Obviously, there was sometimes a disconnect between the participants' definition of computer integration and the description of computer integration in their classroom. One participant stated the following:

> *I guess you could call them integrated if you require your students to turn in a typed paper or to use a word processor or to use a computer in any way if you are requiring some assignment that that makes the students use the computer…then that could be considered integration…or if you take your students to the computer lab.*

This disconnection could be further evidence of the participants' evolving perceptions about computer integration that was presented in chapter four and discussed below. According to Niederhauser et al. (1999) as most preservice teachers progress through their teacher preparation program their perception of the role of computers in teaching and learning evolves towards an increasingly integrated model. Posner (1982) described this process of cognitive change in his research.

Vision of Future Classrooms

Participants in this study described their vision of integrating the computer into their future classrooms. The two most commonly envisioned strategies were for research and typing assignments. These two strategies can often work in tandem. More often than not, students are asked to gather research information and then use that information to write essays, term papers and speeches. Students saw that research and writing processes are directly related. They seemed to talk about the writing process in terms of "typing up" a paper.

As participants discussed having students type assignments to integrate the computer, some of their statements contradicted their previously stated definition of computer integration. When asked why they expected assignments to be typed, participants cited their own experiences as students: "I'll want them to type their papers just like my teachers had us to" or referred to providing the opportunity for students to gain typing skills as the educational value in such assignments. Clearly, these preservice students thought that they should teach the way they were taught. The participants did not always relate the content area

of the students' research to the educational value of the assignment. Perhaps the participants were simply drawing on their own experiences with computer integration and, as the data suggest, these participants have not yet acquired a great deal of variety in experiences with computer integration. Thus their visions were limited by their own lack of variety of experiences with computer integration. Hopefully, education courses will help refocus their visions on computer use in the classroom, However, research in this area indicates that preservice teachers' perceptions about teaching and learning are often resistant to change (Niederhauser et al., 1999).

In this Internet resource-driven era, it was surprising to hear multiple participants refer to encyclopedias or CD-ROMs as examples of research resources they will encourage their students to use. Perhaps this is an example of their past experiences influencing how they envision integrating computers into their own classrooms. As presented in chapter four, the participants described experiences as K-12 students when they used CD-ROMs as a research source. With the Internet's wealth of knowledge today, and since society now overwhelmingly uses the Internet as its main source of information, many students and educators might consider CD encyclopedias as an old-fashioned information source.

Another noteworthy point came from two participants intending to teach kindergarten and first grade. Both mentioned their intention to use research and typing activities in their future classrooms. Both stated that they would have their students use CD-ROM encyclopedias to gather research related to a subject they

were studying. Of course, it is unlikely that these strategies would be appropriate for kindergarteners given that few would yet be able to read. These two participants were apparently just drawing on their own experiences with computer integration as a general use of computers and were not yet able to understand the concept of using developmentally appropriate strategies. As the data suggest, these participants have not yet acquired a large or varied repertoire of computer integration in education, and thus were calling on practically every experience they have had to describe their own visions of using computers in education when they become teachers.

The frequency with which these preservice teachers envision integrating computers in their classrooms covered a wide spectrum. Two of the participants described their aspirations of integrating the computers on a daily basis and did so with a measure of confidence and conviction. Two explained that they would like to integrate the computers as often as possible but were not exactly sure how they would achieve this. These two individuals admitted that they were not certain what to expect as a teacher. They were unsure if curricular goals and pacing schedules would make it feasible or practical to use the computer in teaching and learning on a daily basis. To allow for this, one explained that her students might be asked to use the computer outside of the classroom on a frequent basis.

As with all the participants, one participant indicated that she envisioned integrating the computer by having students use it to gather research information and type papers. However, when asked how frequently this would occur, she

responded that it would probably only be “once a semester – to meet the [technology] requirement.” She explained that she would like to use the computer more often, but cited her lack of computer skills as a formidable obstacle.

There was a discrepancy between the computer integration *strategies* that the participants envisioned using and the *frequency* with which they reported the computer would be used. In other words, all of the participants discussed a variety of strategies they would use for computer integration, but then later three of them explained that they would likely use computers in their classrooms infrequently. Perhaps this is symptomatic of their self-described evolving perceptions about computer integration. These beginning preservice teachers have had little prior opportunity to reflect on their perceptions of computer integration, and their ideas are certain to evolve as they progress their preservice experiences. In order to help preservice teachers articulate their visions of computer integration, teacher educators must understand preservice teachers’ perceptions to better enhance the professional preparation of these future teachers (Pajares, 1992; Wang, 2002).

Educational Value

All of the participants held the perception that, when implemented appropriately, the integration of computers into teaching and learning provides valuable educational contributions.

All participants described the perception that the ability to use a computer is necessary in today’s modern world. Similarly, Wakabayashi (Wakabayashi,

1997, p. 47) reported that today's teachers are preparing the computer users of tomorrow. Furthermore, Collis et. al. (1996) stated that the technological demands of modern society have changed the focus of the K-12 curriculum and schools must now prepare students to be skilled computer users in order to be competitive in the job market. To do this, educators should use technology to support and extend instruction and thus enhance learning. Providing students with the opportunity to learn computer skills in conjunction with curricular goals allows them to be better prepared to use computers for school, work and personal use.

The participants also explained their perception that using computers in the classroom increases student motivation because it adds variety to instruction. Summers (1991) maintained that technology has long attracted the attention of students. Technology assists students with retaining attention and thus more time is spent in the classroom on learning. The use of technology in education has been found to increase student motivation (Roblyer & Edwards, 2000; Whitney, 2000).

A final educational benefit of integrating computers into teaching and learning described by participants was computers' ability to work with information in a variety of modes. Computers make it possible for students to interact with audio and visual information and to experience information in ways that go beyond traditional experiences with textbooks and chalkboards. Robleyer and Edwards (2000) stated that the integration of computers into teaching provides teachers with unique instructional strategies. They suggested the integration of

computers with teaching and learning allows strategies such as tracking student progress, visualizing problems and solutions, and linking students with a wide variety of information resources.

Technology Requirement

Participants all held the perception that school administrations require the integration of computers into teaching and learning. They described the requirements that were placed on them to take computer classes in middle and high school. They also described non-computer classes in which they had to complete assignments using a computer. The participants believed that the required use of the computer to complete these assignments was based on demands by the school or district administration to integrate computers into classroom teaching and learning. The participants all held the perception that they, too, would be required to integrate computers into their future classrooms.

A search for published research to support this specific point was not found. However, their perception may be related to a widely held belief that computer technology is a powerful educational tool (Johnson, 1999; Morrison et al., 1999; Trotter, 1997; Wetzel & Zambo, 1996). Possibly, this belief is due to the enormous amounts of money being spent to put computers into schools (Barron et al., 1999; Bronner, 1997; Brush, 1999; Jones & Paolucci, 1999).

Past Experiences

The final theme of this study relates to the process by which the participants' perceptions about computer integration have developed. The response was unanimous — all of the participants explained that their

perceptions had been influenced by their previous experiences with computer integration as K-12 students. In fact, most of the experiences they discussed occurred during their middle and/or high school years. One of the most common responses given by participants was that they intended to have their students type some of their assignments using the computer simply because they were required to do so by their teachers. Niederhauser, Salem and Fields found that preservice teachers often base their perceptions about learning on their own K-12 experiences and that these perceptions are not easily changed (1999).

In most teacher preparation programs, current instructional practices in teacher education rarely challenge preservice students' existing beliefs about teaching, learning and technology. As a result, preservice teachers use their existing beliefs about teaching and learning to study and understand pedagogy (Tillema & Knol, 2001).

RECOMMENDATIONS FOR FUTURE RESEARCH

This study was designed to explore beginning preservice teachers' perceptions about computer integration and how those perceptions have developed. As an exploratory study, the results reported here are preliminary and must be viewed cautiously. Of the many important issues identified in this study, many need to be examined in more depth than was possible here. Not surprisingly, the current results also point to additional research questions. It is common and expected that exploratory research such as this be used as a springboard for additional research in this area. Therefore, the purpose of this

section is to make recommendations for future research based on my reflections of the results found here.

One of the long term goals of this research is to develop a research-based model depicting how preservice teachers' perceptions about computer integration develop. With this goal in mind, the following are recommended:

1. Longitudinal research should be carried out that follows these same participants throughout their preservice training. This longitudinal research could continue to explore how the participants' perceptions develop and possibly change.
2. Similar investigations should be conducted using preservice teachers at different stages in their undergraduate preparation as participants. The data would further inform the development of preservice teachers' perceptions about computer integration as they progress through their undergraduate preparation.
3. Additional research should examine the influence that teacher education courses which specifically address technology integration have on the development of preservice teachers' perceptions about computer integration.
4. Replications of this research should be conducted using first year classroom teachers. The data would further inform the development of preservice and beginning teachers' perceptions about computer integration.

This study was deliberately designed to focus on beginning preservice teachers who have not yet had any teacher education courses to ensure that the students' perceptions were not already based on ideas and concepts expressed in teacher education courses. This study tried to avoid having students simply "explain back" ideas or points of view they had been told in their classes but not adopted themselves. However, future researchers should follow up with how these students begin to understand, then either adopt, modify or reject these ideas, as Posner (1982) described, in relation to their own perceptions about technology integration. Understanding this developmental process will help teacher educators better understand preservice teachers' perceptions and thus enhance their professional preparation (Pajares, 1992; Wang, 2002).

A research-based model that describes the development of teachers' perceptions about computer integration from their earliest preservice training through their evolution into master teachers would also be of benefit to teacher education programs and in-service trainers.

5. This research should also be further extended to include both preservice teachers and participants at various stages of their professional teaching careers.
6. Further investigations should collect data about teachers' actual practice of integrating technology in relation to their perceptions about technology integration and especially their perceptions about how they <u>think</u> they integrate technology.

The findings from such studies would be a step towards understanding the full continuum of teachers' (both preservice and in-service) development of perceptions about computer integration. Research suggests that teachers need more training in computer integration (Jackson et al., 1997; Maddux, 1997; Norum et al., 1999) to better understand the connections between the processes of teaching and learning and technology so that they can blend the two together in such a manner that makes each indispensable to teaching and learning (Lowther et al., 1998).

This research did not seek to represent the perceptions of specific participants but rather represents the perceptions of this particular group as a whole. Therefore, the following recommendations are offered:

7. It is recommended that follow-up research use case study methodologies in order to provide insights into the development of specific participants' perceptions about computer integration.

Unlike the research report here, investigations following recommendation six might be more easily generalized to represent all preservice teachers (Merriam, 1998).

This study only represents the perceptions of the five participants. The five participants were all female and graduates of Georgia high schools. This fact leads to the following recommendation:

8. This investigation could be replicated in other regions and include both male and female participants.

In doing so, a meta-analysis of these studies might further inform teacher training programs of preservice teachers' perceptions of computer integration and the development of those perceptions. This would enable teacher education programs to provide more developmentally appropriate professional preparation (Pajares, 1992; Wang, 2002).

IMPLICATIONS

The implications of this research are informative to teacher educators. As schools, colleges, and departments of education seek to better prepare preservice teachers to effectively integrate technology with the processes of teaching and learning, these programs would benefit from knowing what beginning preservice teachers' perceptions are about computer integration before these students begin their educational training.

1. The results of this inquiry suggest that preservice teachers' visions of computer integration in their future classrooms are the reflection of their own K-12 experiences with computer integration. In fact, there are no data within this study to suggest that preservice teachers consider strategies of computer integration other than those that they experienced as K-12 students.
2. The findings also suggest that beginning preservice teachers' perceptions about the integration of computers with the processes of teaching and learning are naïve and demonstrate very little development. The participants' responses were often repetitive and lacked depth. In fact, the

individuals interviewed in this study sometimes made contradictory statements about their perceptions of integrating computers with teaching and learning.

3. It should also be pointed out that in all instances of describing computer integration (past experiences, vision of future classroom, etc.) the participants' described situations in which the teacher still "was in charge" of the activity. In their examples of computer integration (1) the class was in a computer lab and the teacher was teaching/leading the students in a specific lesson or activity, (2) the teacher assigned a project/activity and specified that it needed to be completed using a particular computer program (eg.PowerPoint presentations), or (3) the teacher assigned a topic(s) for the students to research and specified the number and types of computer resources that were to be used (CD-ROMs, Internet sites, etc.). This perception was not overtly stated by the participants, but emerged during the latter phases of the data analysis. I think this is a powerful implication. These participants did not recall any memories or describe any vision of the students using computers for independent/discovery learning or for constructing individualized learning artifacts. There was no indication of the computer being integrated with teaching and learning in a manner that empowered the students or gave the students the freedom to *choose* to use a computer to complete assignments, tasks or for organization.

CONCLUSIONS

Several important conclusions can be drawn from this research. Teacher preparation programs need to provide preservice teachers with a variety of effective experiences with computer integration that can be adopted for use in their future classrooms. Keeping in mind that this research suggests that beginning preservice teachers envision teaching the same way they were taught, it is important that preservice teachers be provided the opportunity to more fully develop their perceptions about integrating computers with teaching and learning while simultaneously acquiring a wide variety of strategies to use in their future classrooms. I recommend that this be done throughout preservice training and not be reserved for the one or two courses that are identified as educational technology classes. Preservice teachers would benefit from the collaboration of faculty members across curricular areas which would provide much broader experience of effective computer and curriculum integration for future teachers.

Purposeful efforts should be made to encourage preservice teachers to frequently reflect on and evaluate their perceptions about computer integration. As exemplified in this study, these beginning preservice teachers described strategies of teaching and learning with computers that were a contradiction of their definition of computer integration. Teacher educators providing preservice teachers the opportunity to reflect on and evaluate their perceptions of computer integration could lead these preservice teachers to self-identify their conflicting ideas and result in the development of deeper and more thoughtful beliefs and perceptions about computer integration.

The implementation of assignments, tasks, projects, etc. in preservice education courses that provide preservice teachers the opportunity to *choose* to use a computer or *choose* which type of computer program to use could aid these future teachers in developing strategies of computer integration that are student-centered. This would keep preservice teachers from having only teacher-centered perceptions about teaching and learning with computers. It is important that teacher educators (possibly working in collaboration as previously mentioned) provide models and examples of computer integration to preservice teachers that empower them while they are in the role of the student. Remember, this study suggests that these participants will integrate computers in their future classrooms in the same way that they experienced computers being integrated in their K-12 education. In order for future teachers to move towards more constructivist kinds of computer integration strategies, teacher educators need to provide these preservice teachers with these kinds of experiences.

Finally, although this research study has not changed my personal definition of computer integration it has informed my understanding of beginning preservice teachers' perceptions of computer integration. I would not have predicted that they would offer a definition of computer integration with this level of sophistication. I was pleasantly surprised that the participants felt strongly that simply using a computer did not qualify as computer integration, but instead stated that the use of the computer must be connected with the curriculum to truly be considered integrated. However, I found it striking that all of their perceptions of how they envision integrating computers with teaching and

learning were a reflection of their own experiences, some of which were a contradiction of the definition about which they were so adamant. These realizations about what these beginning preservice teachers' perceptions are and how these perceptions have developed have all informed my research agenda and the way that I design and teach my preservice courses.

CHAPTER SUMMARY

Further studies such as the ones mentioned in this chapter, and doubtless many more, will inform educational practice in the area of computer integration. As new technologies emerge and become available to educators, it is imperative to maintain this research impetus to develop new teaching models. Doing so will enable teacher education programs to provide developmentally appropriate programs that enable new teachers to effectively integrate computers with the processes of teaching and learning.

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Appendix A: Participant Informed Consent Form

CONSENT FORM

I, _____, agree to participate in a research study titled "Beginning Preservice Teachers' Perceptions about Technology Integration" conducted by Clif Mims from the Department of Instructional Technology at the University of Georgia (542-3810) under the direction of Dr. Lloyd Rieber, Department of Instructional Technology, University of Georgia (542-3986). I understand that my participation is voluntary. I can stop taking part without giving any reason, and without penalty. I can ask to have all of the information about me returned to me, removed from the research records, or destroyed.

The reason for this study is to (A) identify what future teachers' perceptions about technology integration are prior to their induction into a teacher preparation program and (B) investigate how these perceptions have been developed.

If I volunteer to take part in this study, I will be asked to do the following things:

1. Consent to participate by reading and signing this letter. (Approximately 5 minutes)
2. Participate in 2 audio-taped individual interviews. (Maximum 1.5 hours each)
3. Create a timeline depicting technology over the course of your lifetime. (During interviews and possibly 30 minutes on your own time)
4. Participate in an audio-taped focus group with 4-8 of your peers. (Maximum 3 hours)

No risk is expected by my participation in this research.

No information about me, or provided by me during the research, will be shared with others without my written permission, except if it is necessary to protect my welfare (for example, if I were injured and need physician care) or if required by law. I will be assigned an identifying pseudonym and it will be used on all research materials.

The investigator will answer any further questions about the research, now or during the course of the project (227-6953).

I understand that I am agreeing by my signature on this form to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

_____	_____	_____
Name of Researcher	Signature	Date

Researcher's Phone: _____

Researcher's Email: _____

_____	_____	_____
Name of Participant	Signature	Date

Please sign both copies, keep one and return one to the researcher.

Additional questions or problems regarding your rights as a research participant should be addressed to Chris A. Joseph, Ph.D. Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu.

Appendix B: Protocol for Initial Interview

Equipment & Materials:
- Tape recorder
- Cassette tape
- Microphone
- Timer/clock
- 2 copies of Participant Consent Form
- Extension cord

Equipment Check:
- Tape recorder on
- Microphone works
- Cassette tape works

Housekeeping:
- Interviewee (Pseudonym):
- Interviewer:
- Time:
- Day:
- Date:
- Time lapse since previous interview:
- Place:
- Permission to record
- Confidentiality
- Consent form

Introductory Material:
- Welcome participant to session and thank him/her for coming.
- Introduce self.
- Review purpose of the research project.
- Share the purpose of this interview.
- Encourage frank and open discussion.
    - All responses are valued and free from critique.
    - Remind participants about the confidentiality of responses.
- Please state your name, age, gender, race, classification, major and career goals.
- Choose a pseudonym

Interview Questions:

1. Tell me a story about a time in which a computer(s) was integrated into learning.

How was it used?
Why was it used?

- Describe a memory of a computer being used in a lesson.
- Is this a pleasant memory?
- Do you think it was an effective from an educational standpoint?
- Have you used a computer in an educational way outside of school?

2. How do you define computer integration?
   - What are some of the characteristics of computer integration?
   - What do you think computer integration looks like?

3. How do you see yourself using the computer in your future classroom?

How will you use computers in your classroom?
Why will you use them in this way?

- Do you plan on using the computer while you teach? If so, how?
- In what kinds of ways do you think you will use computers in your class?

4. How did you develop this vision?
   - What are you plans for using computers while teaching based on?
   - Is the way that you think that you will use computers in your classroom based on experience, information you have read, something you have heard, etc.?

5. What types of experiences would help you achieve this vision?
   - What can your college classes do to enable you to use the computer in the way you just described?
   - As a future teacher, what kinds of experiences with computers do you wish that you could have?

Follow-up and probing questions will be asked as needed.

Wrap-up:

1. Thanks for your time and participation.
2. Overview of Technology Timeline.
3. Schedule appointment for Interview 2.

Appendix C: Protocol for Second Interview/Technology Timeline

Equipment & Materials:
- Tape recorder
- Cassette tape
- Microphone
- Timer/clock
- Extension cord(s)
- Note paper/art paper
- Writing utensils

Equipment Check:
- Tape recorder on
- Microphone works
- Cassette tape works

Housekeeping:
- Interviewee (Pseudonym):
- Interviewer:
- Time:
- Day:
- Date:
- Time lapse since previous interview:
- Place:
- Permission to record
- Review confidentiality

Introductory Material:
- Welcome participant to session and thank him/her for coming.
- Review purpose of the research project.
- Share the purpose of this interview and the Technology Timeline.
- Encourage frank and open discussion.
    - All responses are valued and free from critique.
    - Remind participants about the confidentiality of responses.

Follow-Up Items:
- Before beginning, do you have anything that you wish to ask, add, or clarify from our first interview?
- Rate your computer comfort level from 1-5.
- Should computers be used in teaching and learning? Why or why not?
    - If so, *how* should they be used?
- Voluntary information:
    - Hometown:
    - School district:

- UGA educational courses:

Individualized Follow-Up Questions:

- Conduct any needed follow-up discussion from previous interview. The follow-up questions from the first interview will concentrate on gaining further understanding of how the participant's perceptions of computer integration shared in the first interview have developed.

Technology Timeline:

Consider as many times as possible that you encountered a computer(s) in an educational setting and create a timeline of all the major events that you can recall. These events may have impacted you directly (e.g. – Your family bought a computer) or indirectly (e.g. – Challenger explosion).

Take up to 20 minutes to work on your timeline. Once you have your ideas organized, you will share and discuss it. You have freedom in the design of your timeline.

Sharing and Discussion of Timeline:

1. Participants will share and discuss their timelines.
    a. *When* was the computer used?
    b. *How* was the computer used?
    c. *Why* was the computer used?
2. In the first interview when asked how you envision using technology in your future classroom you stated [insert quote(s) from interview transcript(s) here].

    a. Which of the events on your timeline, if any, most influence this vision?
    b. Why?
    c. Have you had any negative experiences with computers in teaching and learning?
    d. How have these negative experience influenced your vision?
3. What types of events would have been/would be beneficial in helping you achieve this vision?

Wrap-up:

1. Collect timeline
2. *May* include in your portfolio when you apply for admittance to Teacher Education. **Teacher Education disclaimer**.
3. How to contact you:
    a. Picking up timeline
    b. Member check
4. Closing comments and gratitude

Appendix D: Participants' Timelines

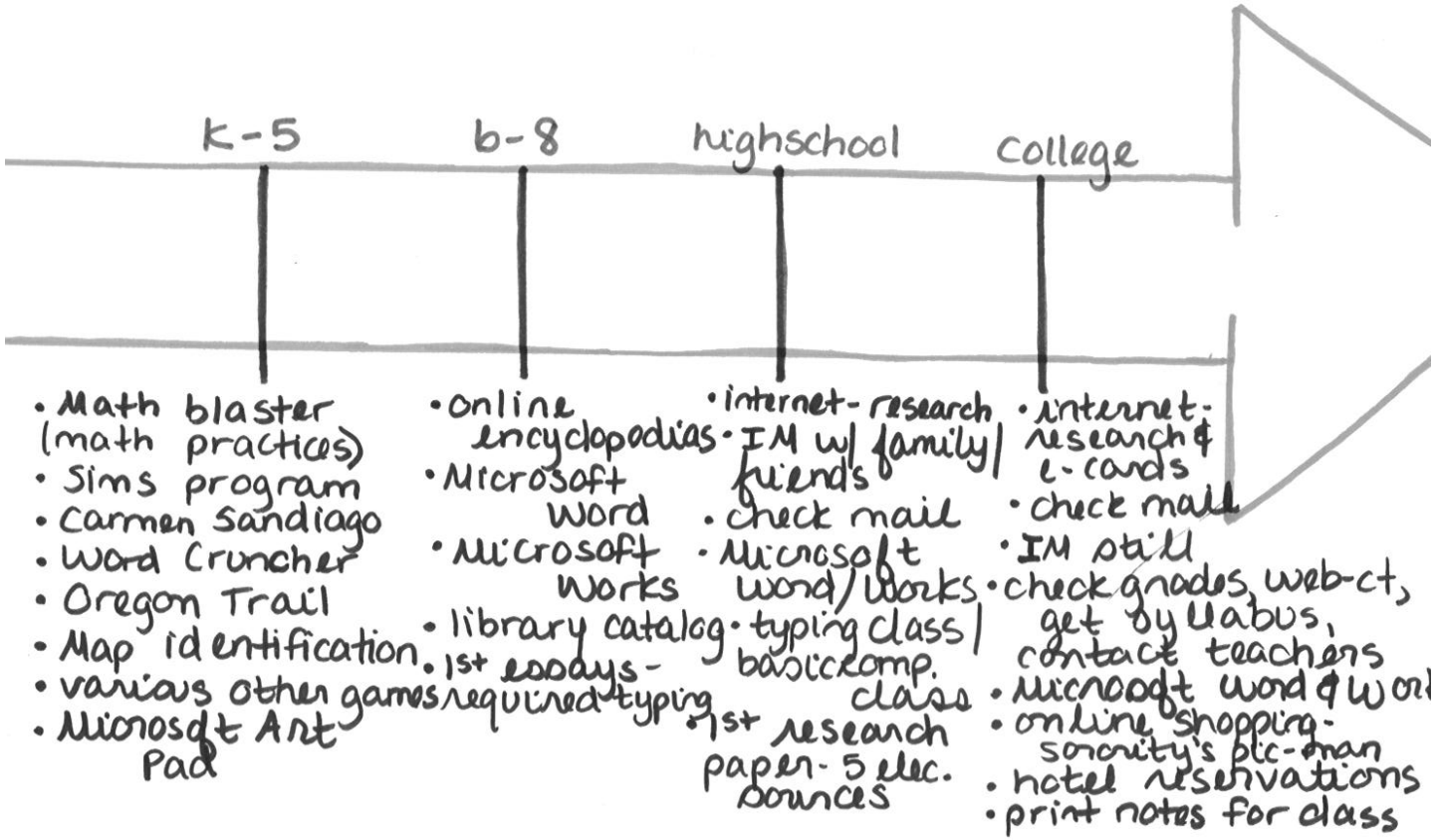
Timeline

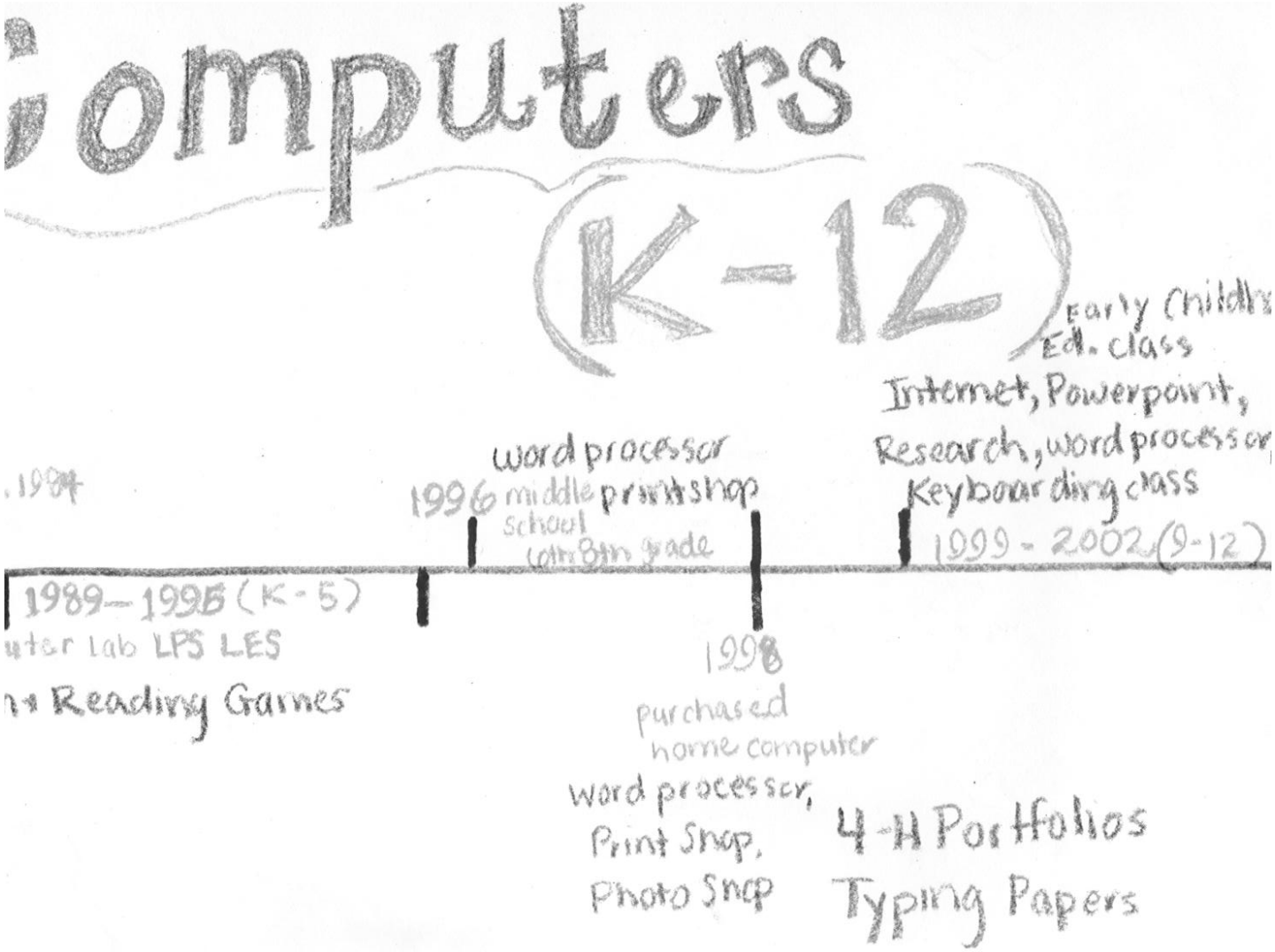
elementary-

typing class
math zapper
map game
research for term papers &
science projects
typing papers
power point presentation at
Church

high school-

Technology in my Education-




omputers
(K-12)
Early Childhood Ed. class
Internet, Powerpoint, Research, word processor, Keyboarding class
1999 - 2002 (9-12)
word processor
1996 middle school (6th-8th grade)
printshop
1989—1995 (K-5)
uter lab LPS LES
Reading Games
1998
purchased home computer
word processor, Print Shop, Photo Shop
4-H Portfolios
Typing Papers

technology timeline:

elementary school-

* computer lab days at school
* computer time at home on father's computer

- played games (oregon Trai educational programs (math Blaster)
- video games and educati games (math and readi programs)

middle school-

* computer class (mandatory elective class)
* in library - to find books
* Language Arts poetry book (in 7th grade)
* used computer at home

- learned typing skills and computer commands
- learned how to work wi computer program and follow directions
- use microsoft word to tu poems; used math prog to create book cover.
- for research and project

high school-

* word processing class
* technology requirement for every class
* used computer at home often

- learned typing skills an how to create different documents
- teachers had to incorpor technology into classroo created power point for

Appendix E: Organizing 200+ Codes into an Outline

NOTE: This outline is organized by research questions and NOT by themes.

R1: What are beginning preservice teachers' perceptions about computer integration?

I. I1-2: Definition of tech. Integration

- A. Correlates/Connects with what you are learning (Application)
- B. Multiple Modes
- C. Using comp in ANY way

II. I1-3: Vision of Future Classroom

- A. Strategies
- B. Teaching Elem
  - 1. Centers
  - 2. Journals
  - 3. Games
  - 4. Comp practice for kids
- C. Teaching MS
- D. Teaching HS
  - 1. Science
    - a) Simulations
  - 2. English
  - 3. Latin
  - 4. PowerPoint
  - 5. Projection
- E. Keyboarding
- F. CD-Roms
- G. Internet
- H. Research
- I. Typed Work
- J. individual work
- K. Group work
- L. Assistance
- M. Tech requirement for students
- N. Tech requirement for teachers
- O. Teacher directed
- P. Social studies
- Q. Presenting info
- R. Organizing info

S. Free time/Reward
T. Labs
U. Benefits of using computer
V. Ed. value
W. Easier access to resources
X. Remember/Memory
Y. Drill & practice
Z. Reinforcement
AA. Enrichment
AB. Student use
    1. Projection
    2. Equipment
AC. Teacher use
    1. Projection
AD. Management/organization
AE. Connections/application
AF. Choice/Options
AG. Frequency of use
AH. Incorporate
AI. Projects
AJ. Equipment
AK. Multiple modes

III. Motivation

A. Different/Variety
B. Fun
    1. Free time/Reward
C. Work Individually
D. Grp work
    1. Choice/Options

IV. I1-1: K-12 Memories

A. School Memories
    1. Elementary
        a) Games
            (1) Simulations
                (a) Sims
        b) Library
        c) Labs
        d) CD-Roms
        e) Internet
        f) Research
        g) individual work
        h) Group work

i) Assistance
j) Multiple Modes
k) English
l) Teacher directed
m) Free time/Reward
n) Benefits of using computer
o) Ed. value
p) Easier access to resources
q) Remember/Memory
r) Drill & practice
s) Reinforcement
t) Enrichment
u) Math
v) Science
w) Geography
x) Social studies
    (1) Games/Simulations
y) Student use
z) Teacher use
aa) Management/organization
ab) Connections/application
ac) Choice/Options
ad) Frequency of use
ae) Centers
af) Projection

2. Middle School
    a) Keyboarding
        (1) Microsoft Works
    b) Internet
    c) Research
    d) Typed Work
    e) individual work
    f) Group work
    g) Assistance
    h) Email
    i) English
    j) Teacher directed
    k) Free time/Reward
    l) Labs
    m) Benefits of using computer
    n) Ed. value
    o) Easier access to resources
    p) Remember/Memory
    q) Drill & practice
    r) Reinforcement
    s) Enrichment

t) Math
u) Science
v) Geography
w) Student use
x) Teacher use
y) Management/organization
z) Connections/application
aa) Frequency of use
ab) Indep discovery/Exploring
ac) Library
ad) Artwork

3. High School
   a) Teacher Training
      (1) Portfolio
   b) Internet
      (1) Indep discovery/Exploring
      (2) Projection
   c) PowerPoint
      (1) Comp practice for kids
   d) Research
   e) Typed Work
   f) individual work
   g) Group work
   h) Assistance
   i) Email
   j) IM
   k) English
      (1) Bulletin board
   l) Tech requirement for students
      (1) Keyboarding
         (a) Microsoft Works
      (2) Computer language
   m) Tech requirement for teachers
   n) Teacher directed
   o) Presenting info
   p) Organizing info
   q) Free time/Reward
   r) Labs
   s) Benefits of using computer
   t) Ed. value
   u) Easier access to resources
   v) Remember/Memory
   w) Drill & practice
   x) Reinforcement
   y) Enrichment
   z) Math

- aa) Science
  - (1) Simulations
- ab) Geography
- ac) Social Studies
- ad) Latin
- ae) Student use
- af) Teacher use
- ag) Management/organization
- ah) Connections/application
- ai) Choice/Options
- aj) Frequency of use
- ak) Economics
- al) Psychology
- am) Projects

B. Non-school
1. 4-H
   - a) Artwork
2. Church
   - a) PowerPoint
   - b) Projection
3. Remember/Memory

C. Personal Use
1. Home
   - a) Artwork
2. Communication
   - a) Email
   - b) IM
3. Entertainment
4. Comfort
5. Frustration
   - a) Word Perfect
   - b) Intuitive
6. Management/organization
7. Frequency of use???

D. Real world
1. Used in real world
2. Benefits of using computer
3. Easier access to resources

E. Negative Experiences
1. Comfort
2. Frustration
3. Resistance

F. Previous Experiences
1. Comfort
2. Resistance
3. Lesson learned

4. Equipment

V. I2-3: Timeline
   A. WHEN was tech used??????
   B. HOW was tech used?
      1. Student use
      2. Teacher use
   C. WHY was tech used??????
      1. Benefits of using computer
      2. Ed. value
      3. Easier access to resources

R2: How did these perceptions develop?

I. I1-4: How vision developed

   A. Influences
   B. Remember/Memory
   C. Lesson Learned
   D. Experiences Had???
   E. Comfort???
   F. Resistance???
   G. Personal Use???
   H. Frustration???
   I. Benefits of Using Comp???
   J. Ed. Value???

II. I2-3: Timeline

   A. HOW was it used?
   B. WHEN was it used?
   C. WHY was it used?

III. I2-4: Most influencial experiences

   A. That's the way it was when I was in school
   B. Influences
      1. High School
         a) Tchr Training
            (1) Comp practice for kids

IV. I2-5: Negative experiences

   A. Influences

V. I1-5: Needed experiences & I2-6: Experiences that would be helpful

A. Real World
B. Research
C. To be familiar
D. Exposure
E. Practice
F. Tchr Ed Modeling
G. How lrn f/m tech
H. Good programs
I. Don't know
J. Tech Course
K. Field experience

Appendix F: Condensing 200+ Codes

NOTE: This outline is organized by research questions and NOT by themes.

1/15/2004 R1: What are beginning preservice teachers' perceptions about computer integration? Page 1

R1: What are beginning preservice teachers' perceptions about computer integration?

I. I1-2: Definition of tech. integration
   - A. Correlates/Connects with what you are learning (Application)
   - B. Multiple Modes
   - C. Using comp in ANY way

II. I1-3: Vision of Future Classroom
   - A. Strategies
   - B. Teaching Elem
     1. Centers *
     2. Journals
     3. Games *
     4. Comp practice for kids *
   - C. Teaching MS
   - D. Teaching HS
     1. Science *
        a. Simulations *
     2. English *
     3. Latin
     4. PowerPoint *
     5. Projection *
   - E. Keyboarding *
   - F. CD-Roms *
   - G. Internet *
   - H. Research *
   - I. Typed Work *
   - J. individual work *
   - K. Group work *
   - L. Assistance *

Tchg in general

* Code found in Vision for Future Classroom and in K-12 Experiences

M. Tech requirement for students
N. Tech requirement for teachers
O. Teacher directed
P. Social studies
Q. Presenting info
R. Organizing info
S. Free time/Reward
T. Labs
U. Benefits of using computer
V. Ed. value
W. Easier access to resources
X. Remember/Memory
Y. Drill & practice
Z. Reinforcement
AA. Enrichment
AB. Student use
    1. Projection
    2. Equipment
AC. Teacher use
    1. Projection
AD. Management/organization
AE. Connections/application
AF. Choice/Options
AG. Frequency of use
AH. Incorporate
AI. Projects
AJ. Equipment
AK. Multiple modes

III. Motivation

A. Different/Variety

B. Fun

1. Free time/Reward

C. Work Individually

D. Grp work

1. Choice/Options

IV. I1-1: K-12 Memories

A. School Memories

1. Elementary

E a. Games *

E H (1) Simulations *

E (a) Sims

E M H b. Library

E M H c. Labs *

E d. CD-Roms *

E M H e. Internet *

E M H f. Research *

E M H g. individual work *

E M H h. Group work *

E M H i. Assistance *

E j. Multiple Modes

E H k. English

E M H l. Teacher directed *

E M H m. Free time/Reward *

E M H n. Benefits of using computer *

E M H o. Ed. value *

E M H p. Easier access to resources *

E M H q. Remember/Memory *

E M H r. Drill & practice *

E M H s. Reinforcement *

E M H t. Enrichment *

E M H u. Math

E M H v. Science

* Code found in Vision for Future Classroom & in K-12 Experiences

K-12 Memories

E = Coded as an Elementary experience

M = Coded as a Middle School exper.

H = Coded as a High School Exper.

E M H w. Geography

E M H x. Social studies

E ? (1) Games/Simulations

E M H y. Student use

E M H z. Teacher use

E M H aa. Management/organization

E M H ab. Connections/application

E H ac. Choice/Options

E M H ad. Frequency of use

E ae. Centers

E H af. Projection

2. Middle School

M H a. Keyboarding

M H (1) Microsoft Works

E M H b. Internet

E M H c. Research

M H d. Typed Work

E M H e. individual work

E M H f. Group work

E M H g. Assistance

M H h. Email

E M H i. English

E M H j. Teacher directed

E M H k. Free time/Reward

E M H l. Labs

E M H m. Benefits of using computer

E M H n. Ed. value

E M H o. Easier access to resources

E M H p. Remember/Memory
E M H q. Drill & practice
E M H r. Reinforcement
E M H s. Enrichment
E M H t. Math
E M H u. Science
E M H v. Geography
E M H w. Student use
E M H x. Teacher use
E M H y. Management/organization
E M H z. Connections/application
E M H aa. Frequency of use
? M H ab. Indep discovery/Exploring
E M H ac. Library
M ad. Artwork

3. High School

H a. Teacher Training Tchr in-service
H (1) Portfolio → re-certification
E M H b. Internet
M H (1) Indep discovery/Exploring
E H (2) Projection
H c. PowerPoint
H (1) Comp practice for kids
E M H d. Research
M H e. Typed Work
E M H f. individual work
E M H g. Group work
E M H h. Assistance

E M H i. Email
H j. IM
E M H k. English
H (1) Bulletin board - Discussion boards
H l. Tech requirement for students X
M H (1) Keyboarding X
M H (a) Microsoft Works
H (2) Computer language
H m. Tech requirement for teachers X
E M H n. Teacher directed
H o. Presenting info X
H p. Organizing info X
E M H q. Free time/Reward
E M H r. Labs
E M H s. Benefits of using computer
E M H t. Ed. value
E M H u. Easier access to resources
E M H v. Remember/Memory
E M H w. Drill & practice
E M H x. Reinforcement
E M H y. Enrichment
E M H z. Math
E M H aa. Science
E H (1) Simulations
E M H ab. Geography
E M H ac. Social Studies
H ad. Latin
E M H ae. Student use

EM H af. Teacher use

EM H ag. Management/organization

E M H ah. Connections/application

E H ai. Choice/Options

E M H aj. Frequency of use

H ak. Economics

H al. Psychology

? H am. Projects

B. Non-school

1. 4-H

a. Artwork

2. Church

a. PowerPoint

b. Projection

3. Remember/Memory

C. Personal Use

1. Home

a. Artwork

2. Communication

a. Email

b. IM

3. Entertainment

4. Comfort

5. Frustration

a. Word Perfect

b. Intuitive

6. Management/organization

7. Frequency of use???

D. Real world
    1. Used in real world
    2. Benefits of using computer
    3. Easier access to resources
E. Negative Experiences
    1. Comfort
    2. Frustration
    3. Resistance
F. Previous Experiences
    1. Comfort
    2. Resistance
    3. Lesson learned
    4. Equipment

V. I2-3: Timeline
A. WHEN was tech used??????
B. HOW was tech used?
    1. Student use
    2. Teacher use
C. WHY was tech used??????
    1. Benefits of using computer
    2. Ed. value
    3. Easier access to resources

R2: How did these perceptions develop?

I. I1-4: How vision developed

A. Influences

B. Remember/Memory

C. Lesson Learned

D. Experiences Had???

E. Comfort???

F. Resistance???

G. Personal Use???

H. Frustration???

I. Benefits of Using Comp???

J. Ed. Value???

II. I2-3: Timeline — See K-12 memories I-1 question 4

A. HOW was it used?

B. WHEN was it used?

C. WHY was it used?

III. I2-4: Most influencial experiences

A. That's the way it was when I was in school

B. Influences

1. High School

a. Tchr Training – Tchr requirements

(1) Comp practice for kids

IV. I2-5: Negative experiences

A. Influences

V. I1-5: Needed experiences & I2-6: Experiences that would be helpful

A. Real World

B. Research

C. To be familiar

D. Exposure

E. Practice
F. Tchr Ed Modeling
G. How lrn f/m tech
H. Good programs
I. Don't know
J. Tech Course
K. Field experience

Appendix G: Member Checks

Participant 1

1. How do you define computer integration?

    - It has to correlate with what you are doing in class.
    - It has to go along with what you are learning to be beneficial.
    - Doing this adds to the kids experience. They will remember things better because they will get to work with the material in a variety of ways which will make it more memorable.

2. How do you see yourself using the computer in your future classroom?

    - To relate the material I am trying to teach them in class.
    - As a Kindergarten teacher I probably won't have the kids use it that much.
    - I think it could be used with Kindergarteners to teach them visually (ex. – colors, shapes, etc.).
    - It could be used to teach basic math.
    - It could help them get acquainted with computers because they will have to use it more when they are older.
    - To motivate students.
    - Help students with short attention spans.
    - To let the students research information.
    - To help reinforce stuff that they need to know.
    - To follow the requirements that the school or district has for teaching lessons and using a computer.
    - Having students learn to type.
    - Taking the children to the computer lab.

3. How did you develop this vision?

    - Based on past experiences with computer integration when you were a K-12 student.

4. Experiences with computer integration.

    - Used computers for gathering research to help me write essays, giver presentations, etc.

- Used to type papers.
- Created PowerPoints for school presentations.
- Playing computer games in the computer lab.
- Took a couple of computer classes that were required of students.
- Playing computer games in the computer lab.

Participant 2

1. How do you define computer integration?

    - When the computer is used in conjunction with teaching.
    - It's not really integrated if you're just playing a game or surging the Internet, because that's not educational.
    - It needs to be tied directly with what you are learning in class.

2. How do you see yourself using the computer in your future classroom?

    - To keep grades on the computer.
    - The students will use it to research information and type papers.
    - My classes will use it to give PowerPoint presentations.
    - I will use it to create worksheets and tests.
    - To meet the requirement that teachers have for using the computer in their lessons.
    - To teach my kids how to type with a computer.
    - To have quick access to information from the classroom.

3. How did you develop this vision?

    - It's the same things that my teachers did to integrate computers when I was in school.

4. Experiences with computer integration.

    - Playing computer games in the school computer lab.
    - Using the art software to draw pictures on the computer.
    - Encyclopedias in CD-ROM.
    - Searching the Internet for research.
    - Typing papers.
    - Required computer classes.
    - Lessons that teachers taught with computers to meet the requirements from the administration.
    - Creating PowerPoint presentations.
    - Communicating with email and instant messenger.

Participant 3

1. How do you define computer integration?

    - When the teacher or students use the computer to do more stuff about what you are studying in class.

2. How do you see yourself using the computer in your future classroom?

    - To teach it the required number of times and the way that they [administration] wants us [teachers] to use it.
    - The students will use it to gather research.
    - Reinforcing concepts that I am teaching.
    - I will use it for entering grades.
    - To help students with writing papers or giving presentations.
    - For motivation.
    - Bring in resources that would not otherwise be available in the classroom.
    - I can use it to research information about a lesson I'm going to be teaching.
    - For assisting children learn how to type.

3. How did you develop this vision?

    - I guess from watching and remembering what my teachers did when I was in school.

4. Experiences with computer integration.

    - Teachers using computers in their lessons to meet the administration's requirements.
    - Learning to type.
    - Typing papers.
    - Giving presentations.
    - Collecting research.
    - Required computer classes.

Participant 4

1. How do you define computer integration?

    - When it goes hand-in-hand with education.
    - Also, when the teacher is teaching the students how to USE the computer at the same time that they are learning the class lesson.
    - It is not just using the computer for the sake of using the computer.

2. How do you see yourself using the computer in your future classroom?

    - For my own organization as a teacher.
    - Teaching the children how to use the computer because it is going to be so important for them as they get in older grades and then get a job.
    - The kids can use it for researching term papers.
    - Having the kids make PowerPoint presentations.
    - I will use it to make tests and worksheets and then save them for the next year.
    - I'll have to also make sure that I meet the requirement for using technology as a teacher that my school has.
    - The students will learn to type better.
    - Working in the computer lab.

3. How did you develop this vision?

    - All my experiences with computers have given me lots of ideas about how to teach with computers.

5. Experiences with computer integration.

    - The teacher used it for keeping attendance and the gradebook.
    - Played computer games like *Carmen San Diego*.
    - Typing research papers, essays and a poetry booklet.
    - Using art software to create pictures, drawings, signs, etc. on the computer.
    - Preacher uses PowerPoint as a visual aid at church.
    - Typing class in high school.

Participant 5

1. How do you define computer integration?

    - Using the computer to complete projects, papers, research, etc. that go along with what is being studies in class.
    - When the computer is not just used for games, but it is used for a learning tool.

2. How do you see yourself using the computer in your future classroom?

    - My first grade students (at least a few of them) will use it everyday.
    - In center time.
    - For reading comprehension (ex. Accelerated Reader).
    - Go to the lab at least once a week.
    - The students can make PowerPoint projects and present them to the class.
    - To teach my students how to type.
    - To meet the technology teaching requirement.

3. How did you develop this vision?

    - From all the times that computers were used when I was in school.

4. Experiences with computer integration.

    - Created portfolio using the computer.
    - Going to the computer lab in elementary school.
    - Mandatory computer class in middle school.
    - Typing class in high school.
    - Playing a variety of computer games.