Spring 2004

Instructional Technology Experiences of Student Teachers: A Case Study of Participants in the STAT Internship Program

Lee B. Vartanian
Old Dominion University

INSTRUCTIONAL TECHNOLOGY EXPERIENCES

OF STUDENT TEACHERS: A CASE STUDY OF PARTICIPANTS IN THE STAT

INTERNSHIP PROGRAM

by

Lee B. Vartanian
B.A. June 1997, Auburn University
M.S. August 2001, Old Dominion University

A Dissertation submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirement for the Degree of

DOCTOR OF PHILOSOPHY

URBAN STUDIES

OLD DOMINION UNIVERSITY
May 2004

Approved by:

Dwight W. Allen (Director)

Dean Cristol (Member)

Wendy Frazier (Member)

ABSTRACT

INSTRUCTIONAL TECHNOLOGY EXPERIENCES OF STUDENT TEACHERS: A CASE STUDY OF PARTICIPANTS IN THE STAT INTERNSHIP PROGRAM

Lee B. Vartanian
Old Dominion University, 2004
Director: Dr. Dwight W. Allen

The internship experience is an important link between preservice training and inservice teaching. The STAT Internship Program is an alternative internship program that emphasizes the use of instructional technology. A case study of seven participants in the STAT Internship Program was chosen to investigate five research questions. The research questions explored five broad areas: 1) the technology applications interns used, 2) issues that arose from their use of technology, 3) intern attitudes towards technology, 4) the influence of preservice training on intern use of technology, and 5) shared experiences with technology.

The study yielded a full description of the interns' individual and collective experiences with technology throughout the duration of the semester. Interns used a variety of instructional technology applications. The most frequent applications used were PowerPoint, digital projectors, *unitedstreaming*, and mobile laptop carts. Student behavior, time, and access were factors that hindered intern use of technology. Intern attitudes towards technology remained constant and positive throughout the duration of the semester. The study found that methods professors can have a significant impact on an intern's instructional choices and technology use during a field experience.

Members of Dissertation Committee: Dr. Dean Cristol

Dr. Wendy Frazier

For Ma Jo,

who wanted to work with children

ACKNOWLEDGEMENTS

I would like to thank the students, teachers, and administrators of Clover County for offering a rich setting in which to study the technological experiences of student teachers. I would also like to thank the participants in the STAT internship program, who demonstrated an indefatigable enthusiasm and flexibility throughout the study. I am proud of what you accomplished during your semester in Clover.

I would also like to thank my committee for offering valuable support and guidance throughout the entire process. Thank you, Dr. Dwight Allen, for your leadership and support. You have always helped me to expand my thinking to incorporate unanticipated alternatives. To Dr. Dean Cristol, thank you for mentoring me in the process of qualitative research. Your guidance and feedback, helped to strengthen the quality and validity of this study. To Dr. Wendy Frazier, thank you for your enthusiastic support, feedback, and specific guidance on choosing a theoretical framework. To Dr. Stephen Tonelson, thank you for providing useful feedback throughout the process.

To my fellow graduate students in the Ph.D. program, Jennifer Kidd, Simon Richmond, Dr. Patrick O'Shea, Ruiling Lu, Liu Han, Ren Zhongtang, Shaoan Zhang, and Matthew Dunleavy, I've enjoyed working with you these past four years. To my collaborator and qualitative research resource, Dr. Kamilla Bahbahani, thank you for listening to my ideas. Your feedback and reassurance helped keep me moving forward. To my dear friend, Ken Panko, an international leader in instructional technology, thanks for your enthusiasm and constant encouragement.

To my colleagues at Newsome Park Elementary School, I feel privileged to be working with such exemplary teachers who are continually advancing the possibilities in elementary education, through a heightened professionalism, an inability to accept conventions, and an unshakable belief that each child is a noble human being capable of learning. Thank you for understanding and supporting my effort to write this dissertation.

To my second grade class, thank you for exploring your own voices as writers, researchers, and thinkers. We are all students, and I am daily inspired by your positive energy and willingness to explore.

Most importantly, I would like to thank my friends and family for their support. In particular, I would like to thank my dear friend, Sahba Rohani, who has provided spiritual support all the way from the Holy Land. I couldn't have done it without you! Thanks also to Mandy Allen, for being such a great friend throughout this process. To my aunt, Dr. Jane Knight, who played a significant part in inspiring me to pursue education reform, thanks for being an example and inspiration!

Lastly, I would like to thank my mom and dad, Len and Lynn Bornemann, for teaching me the value of service and allowing me to pursue my dreams, wherever they lead. To my brother, David, thank you for providing an example of aiming high and following your own dreams. And, finally, I would like to thank my grandparents, Bud and Marge Bornemann, who have recently edited a compelling collection of first-hand accounts of war veterans from their community. As they documented the contributions their neighbors made to our country, I would like to thank all of my friends and family who have made me who I am.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1: INTRODUCTION

As we continue into the 21^{st} century, computers and technology are taking a more prominent role in our everyday lives. Learning how to use technology is no longer an option, but a necessity. Fortunately, technologies are becoming quicker, user-friendly, and useful. With the advent of the Internet, more opportunities for collaboration, inspiration, and information have been created. Students, in particular, have access to the world in ways unimagined only a few years ago. In order to prepare students for a highly technological world, teachers and school administrators are attempting to adequately incorporate technology into their curriculum (Moursund & Bielefeldt, 1999).

One impediment to the integration of technology in schools is the lack of expertise and experience on the part of teachers and school personnel (Solmon, 1999). Anyone old enough to be a teacher did not grow up in classrooms with powerful computers, multimedia software, and speedy Internet connections. These same teachers, most likely, were not given the kind of training and exposure they need in order to be proficient and feel comfortable integrating technology into their teaching (Strudler, McKinney, Jones, & Quinn, 1999). Consequently, many of today's teachers are unprepared and disinclined to integrate technology into their classroom (Moursund & Bielefeldt, 1999).

As a result of the increasing importance of technology in our society, teacher colleges and K-12 schools have begun attempts at training and encouraging teachers to use technology in their lessons. Nationwide, new standards for student technology use have been implemented (ISTE, 2000). Individual school districts are attempting to teach

to these standards, but are facing the problem that many of their teachers are not prepared to teach to these standards.

At the national level, standards, with emphasis on technology skills, have been developed for new teachers (NCATE, 2002). At the state level, some legislatures are making competency in instructional technology a requirement for teacher certification (Virginia Board of Education, 1998). At the college level, program planners are creating, augmenting, or revising the technological components of their teacher training programs to meet these national and state standards. However, studies have repeatedly shown that new teachers, recently out of university, do not receive adequate preservice training in instructional technology at their university (Hargrave & Hsus, 2000; Willis & Mehlinger, 1996).

One major component of preservice training is the student teaching experience. It marks an important time of transition where a student teacher's preservice training meets the realities of the classroom (Kamens, 2000). It is a crucial time in the professional life of a teacher. The lessons learned from four or five years of university training are tested in the real world. Alarmingly, these lessons can be swiftly forgotten and disgarded (Richardson-Koehler, 1988). However, the student teaching experience does provide a rich opportunity for student teachers to utilize their preservice training as foundational elements for their own professional development as teachers.

With the increasing emphasis placed on teaching with technology, it is surprising that technology does not play a more prominent role in the standard student teaching experience. Compared with the other elements of preservice training, little emphasis, in research or in practice, has been placed on the impact technology can have on student

teachers. Research, in this field, has primarily centered on the lack of preservice training with technology and the use of telecommunications during field experiences (Thomas, Clift, & Sugimoto, 1996). Numerous studies, over the last fifteen years, have indicated that new teachers do not feel adequately trained to use technology (U.S. Congress, 1988; Willis, Austin, & Willis, 1994; Topp, 1996; Strudler, McKinney, Jones, & Quinn, 1999). Additionally, with the advent of the Internet and e-mail, telecommunications have become powerful tools to link student teachers with their methods professors at the university and fellow student teachers at different schools (Schlagal, Trathen, & Blanton, 1996).

Context for Study

The current study focused on an internship approach to student teaching that gives student teachers substantial classroom teaching experience while providing specific training and support in instructional technology. The STAT (Student, Teachers, and Technology) internship program is part of a federal PT3 (Preparing Tomorrow's Teachers to use Technology) grant program that focuses on technology training for teachers. It aims to train, encourage, and support student interns to become teachers who explore the many uses of technology in the classroom.

The setting for the program is in Clover County—a rural county in the southeastern United States. Old Dominion University student teaching interns, who participate in the STAT program, spend either half a year or a full year teaching in Clover County schools. Their technology training has been enhanced at the university by this federal grant program. Additionally, one week before they start school, the interns are trained in technology use, classroom technology applications, and classroom

management strategies. Throughout their experience, they are provided continual training in instructional technology applications and access to an assortment of the latest classroom technologies, unlike many of their fellow student teaching students at Old Dominion University.

Implications for Urban Education

Although the setting of the internship program is rural, the population has significant similarities to urban areas. First of all, teachers in urban settings must meet the needs of students from diverse backgrounds (Proctor, Rentz, & Jackson, 2001). In Clover county, the majority of the population in Clover County is a minority (African American)—58% African American, 42% Caucasian (U.S. Census Bureau, 2000). Secondly, urban schools generally have students who come from low-income families (Lonegan, 2001). Clover is also the second poorest county in the southeastern state, with 23% of its population living below the poverty line (U.S. Census Bureau, 2000). Thirdly, low motivation is a problem among students, with only 51% of the population holding a high school education (U.S. Census Bureau, 2000). Additionally, many of the residents are on some form of public assistance--68% of the students are on free or reduced lunch (Clover County Public Schools, 2003).

Overall, Clover is a county facing the characteristically urban issues of diversity, poverty, low motivation, and low education levels. A "digital divide" exists, between rich and poor communities, where poor communities do not have access to computers, technology training, or the Internet, and are, therefore, at risk of missing opportunities available to affluent communities who have access to technology resources (U.S. Department of Commerce, 1995). The STAT program is an effort to bridge the digital

divide, by increasing the use of and access to instructional technologies for students and teachers in Clover County.

Purpose of Study

It has been noted that preservice teachers are not receiving adequate training to use technology (Hargrave & Hsus, 2000). Preservice teacher participants in the STAT program receive extracurricular and consistent training to use technology in their classrooms. The purpose of the study is to gain an understanding of student teachers' experiences in a technology-rich internship program, such as the STAT program. A qualitative design was chosen because it allows the researcher to probe deeply into the nuances of intern teacher behavior and "provide rich, detailed descriptions illuminating the experiences of individuals" (Bogdan & Biklan, 1998). These descriptions may provide valuable insight for college of education program directors and student teaching coordinators, confronted with the responsibility of training preservice teachers to use instructional technology. Bandura's social cognitive theory, with particular emphasis on self-efficacy, will provide the theoretical framework for the study (Bandura, 1986).

Research Questions

This study will investigate a number of questions regarding the nature of an internship experience that emphasizes technology integration. These questions cover three topics: the interns' technology use, attitudes toward technology, and the influence of preservice training on their technology use. The following questions guide the study:

1. How do interns use instructional technology during their student teaching experience?

2. What issues do interns face as they use technology during their student teaching experience?
    a. In what ways do they respond to these issues?
3. What are their attitudes and beliefs toward technology and how do they change throughout their internship experience?
4. What role does preservice training seem to play in the interns' use of technology?
5. What kinds of patterns emerge from the data indicating a shared experience with technology amongst the interns?

Missing from this inquiry is any exploration of the influence of the mentor teacher on intern use of technology. Numerous studies (Fairbanks, Freedman, & Kahn, 2000; Franke & Dahlgren, 1996; Osunde, 1996) have documented the influence of the mentor teacher on the intern. The current study does not aim to replicate such studies. Instead, this investigation seeks to explore the influence of preservice training on intern choices, in addition to the other questions regarding intern use of technology and their attitudes and beliefs towards it.

CHAPTER 2: LITERATURE REVIEW

Background of Instructional Technology

Over the past decade, it has become increasingly clear to education administrators and policy makers that technology should play a prominent role in the K-12 education. Outside school walls, technology has become a forceful presence in modern society. As schools are given the responsibility of training students to be prepared for a successful life beyond school, they must find ways of familiarizing students with technology (CEO Forum, 1999). In response to the needs of students and the growing variety and uses of technology, national standards for technology use have been developed for both teachers and students (ISTE, 2000).

The current emphasis on technology and education stems from two different initiatives in the 1980's: the Apple Classrooms of Tomorrow (ACOT) project and a report by the Office of Technology Assessment (U.S. Congress, 1988). In 1985, Apple Computers began an innovative, longitudinal study on technology in the classroom, entitled Apple Classrooms of Tomorrow (ACOT). ACOT (1985) initially set out to answer one question:

> What happens to students and teachers when they have access to technology whenever they need it?

At a time when personal computers were not as ubiquitous as they are now, Apple supplied certain partner schools and classrooms with an assortment of computers and instructional technology tools. The researchers wanted to observe what would happen if computers and technology were as readily available as books, pencils, and papers in the traditional classroom. The growth and development in the learning, attitudes, and

behavior of students were so encouraging that Apple researchers continued the study and began a process of linking with similar instructional studies across the country (ACOT, 1996). After twelve years of research, the study found that technology can have a significant impact on teaching, student learning, and assessment (ACOT, 1996). The results from the project were disseminated widely and made noteworthy contributions to the body of research in instructional technology (for examples of ACOT studies see Baker, Gearhart, & Herman, 1990; Dwyer, 1994; Sandholtz, Ringstaff, & Dwyer, 1994; Gooden, 1996).

During the first years of the ACOT project, the Office of Technology Assessment (OTA) issued a report, supported by the House Committee on Education and Labor, and its Subcommittee on Select Education, that gave a broad menu of instructional technology applications available at that time or in the process of being developed (U.S. Congress, 1988). In addition to the overview of available technologies, the report found that American teachers required a great deal of training and support in order to be able to teach with these new technologies (U.S. Congress, 1988). The report itself demonstrated that new teachers were not being sufficiently trained to use instructional technologies.

The OTA report mentioned one study, by the American Association of Colleges of Teacher Education (AACTE, 1987), which investigated student teacher preparation and comfort level. AACTE surveyed students and faculty members of 90 colleges of education, asking them to evaluate the effectiveness of their institution in preparing their students for the classroom among twelve aspects of teaching (planning instruction, teaching methods, working with other teachers, use of materials, development of materials, sensitivity to student differences, managing classrooms, evaluating learning,

diagnosing learner needs, handling misbehavior, curriculum development, and teaching with computers). Out of the twelve aspects of teaching, "teaching with computers" received the least amount of confidence from both faculty and students. 59% of the faculty and 29% of the students surveyed felt that their preservice students were prepared to teach with computers (AACTE, 1987). In the years following this report, the Office of Technology Assessment produced a number of reports on the use of technology in the field of education, covering a broad range of educational technology initiatives. These reports, supported by the U.S. Congress, have had a significant impact on the shape of preservice and in-service technology training.

During the 1980's, with the publication of "A Nation at Risk," it appeared that American schools were falling behind similar schools in other industrialized nations (National Commission on Excellence in Education, 1983). Coupled with the political climate in the education world at the time, the Office of Technology Assessment report gave education administrators a challenge (Panel on Educational Technology, 1997). Most administrators were not familiar with technology themselves, or could scarcely perceive the influence it would have on their field in the immediate future. In the nineties, however, the focus of educational policy shifted from international competition to standards-based learning and excellence reform (Berube, 1994).

Technology Standards

NCATE. Charged with the task of making sure universities meet these standards, the National Council for Accreditation of Teacher Education (NCATE) is the professional accreditation organization for colleges of education. NCATE produces a list of standards that universities must meet, if they are to be fully accredited as teacher

preparatory schools. In 1995, NCATE first included in their standards an expectation that institutions *begin* developing the capacity to "train teachers in the effective use of technology in instruction" (NCATE, 2001). In 1996, they formed the Task Force on Technology and Teacher Preparation, which made the recommendation that colleges of education should have a vision and plan for how they will incorporate technology into the training of their preservice teachers (Task Force on Technology and Teacher Education, 1997). Although this document drew political attention from the White House and Congress, without accreditation standards, it was nothing more than a suggestion.

In 2000, NCATE unveiled a new set of accreditation standards, with instructional technology playing a more prominent role. Within their current requirements, NCATE stipulates that colleges of education should "prepare candidates who can integrate technology into instruction to enhance student learning" and that field experiences should allow student teachers "to use information technology to support teaching and learning" (NCATE, 2002). There are no guidelines that mention the degree to which student teachers should use technology or with which technologies they should be familiar. NCATE standards broadly state that student teachers should be prepared to use technology and that field experiences should give them the opportunity to do so.

ISTE. The agency responsible for developing the standards, which were then approved by NCATE, is the International Society for Technology in Education (ISTE). In the 1990's, in response to the standards movement, ISTE began to develop National Education Technology Standards (NETS) for teachers and students. These standards represent the minimum technology skills that teachers and students must possess. As of December 2002, forty-one states have either adopted or referenced the NETS standards in

their department of education documents (i.e. state certification, licensure, technology plans, curriculum plans, assessment plans, or other documents) (ISTE, 2002). This is a significant shift from 1999, when only *four* states required in service teachers to meet technology-related standards to maintain their teaching credentials (Lemke & Shaw, 1999).

TSIP. Locally, the Commonwealth of Virginia responded to the standards movement by developing its own standards for instructional technology. In January 1998, the Virginia General Assembly approved Technology Standards for Instructional Personnel (TSIP) for licensed teachers in Virginia (see Appendix A). The TSIP are inspired by the standards developed by ISTE (ISTE, 2000). They describe, in somewhat ambiguous terms, what types of technology applications teachers should be expected to perform and how school districts should provide instructional technology support for teachers (Virginia Board of Education, 1998). Beginning July 2003, demonstrated proficiency in the TSIP was required for certification in the Commonwealth of Virginia.

Federal Support

In order to confront the needs of teachers becoming technologically proficient, the federal government initially channeled more support and attention to K-12 schools for training to in service teachers, instead of preservice institutions (U.S. Congress, 1995). The emphasis behind these initiatives was to put more computers in schools and to train existing teachers to use them. However, this changed slightly, with the advent of the Preparing Tomorrow's Teachers to Use Technology Program (PT3). With PT3, the federal government began to place more attention on ensuring that preservice teachers received training to use technology, before they entered the field.

PT3. The PT3 program, initiated in 1999, aimed at educating preservice educators in the uses of technology and helping them to integrate it into their teaching methods classes. Over four hundred education consortia have received grants supported by the program (see http://www.ed.gov/teachtech/index.html for a list of these consortia). The STAT internship program, the center of this study, is part of one of these PT3 grant programs.

Background of Student Teaching

Student teaching has remained surprisingly consistent throughout its history. Although different preservice training facilities have varying durations for student teaching, most have similar requirements. Students begin of their experience with a period of observation. Over the course of a few weeks, they begin to take over more responsibility, until they have near full responsibility (Shen, 1996). Once this responsibility is achieved, they begin to free themselves of their responsibility and continue observing.

Recent studies have concentrated on the relationship between student teaching interns, cooperating teachers, and university supervisors (Hamilton & Riley, 1999). For their part, cooperating teachers have a powerful impact on the behaviors and beliefs of interns (Fairbanks, Freedman, & Kahn, 2000; Franke & Dahlgren, 1996; Osunde, 1996). Interns are often placed with cooperating teachers who are unprepared and untrained to sufficiently mentor them (Blanton, 1991). When this occurs, the mentor-intern relationship can have a detrimental effect on the intern (Hoy & Woolfolk, 1989). Other studies have examined the roles of university supervisors and cooperating teachers. A few noted that the roles of the supervisor and cooperating teacher are often ambiguous,

undefined, and conflicting (Hoy & Woolfolk, 1989; Kauffman, 1992; Richardson-Koehler, 1988). Because of this role confusion, interns are not likely to receive adequate guidance in reflective thinking on their teaching practices (Blanton, Thompson, & Zimmerman, 1993; Richardson-Koehler, 1988).

However, little emphasis has been placed on technology integration in internships (Blanton, Thompson, & Zimmerman, 1993). Increasingly, interns are expected to learn how to use instructional technology in their preservice training, but there are no requirements for them to use technology during their internship experience. The national standards only state that field placements should "allow" student teachers to use technology with their instruction (NCATE, 2002)

The STAT program is a student teaching internship program that emphasizes technology integration throughout the student teaching experience. The philosophy behind the program is that instructional technology, integrated well and used effectively, is a powerful instructional tool teachers can use to present their lessons in dynamic ways and prepare their students for a technological world.

This study aimed to examine the experiences of the STAT interns as they attempted to use technology during their internship experience. Because this is such a unique program, the results of the study provide an indication of whether other colleges of education should consider adding a more significant instructional technology component to their student teaching programs.

Preservice Instructional Technology Training

Research on preservice training with technology since the OTA report in 1988, has not been illuminating. It has been documented how preservice training programs are

generally not preparing their teacher candidates to be technology proficient. Numerous studies have found that recent graduates of colleges of education do not feel adequately prepared to use technology. As far back as 1987, a nation-wide study found that only 29% of education majors felt prepared to teach with technology (AACTE, 1987; cited in U.S. Congress, 1988). Seven years later, a similar study found that less than half of teacher education graduates felt prepared to use technology in the classroom (Willis, Austing, & Willis, 1994: cited in Strudler et al, 1999).

A few years after that, a separate survey of teacher education graduates in one school, found that they rated their technology proficiency as low and reported that they used computers infrequently (Topp, 1996). This study used a sample of three hundred and ninety seven teachers from Iowa, who graduated from a large Midwestern university from 1986 to 1990. 67% of the one hundred thirty five respondents described their preservice training in computer related technologies as "inadequate" or "very inadequate" (Topp, 1996). Because this study was limited to the graduates from one preservice training program, the results cannot be generalized to other universities.

In 1999, a survey of first year elementary teachers found that the respondents do not feel as prepared to use technology in the classroom as they are with other instructional strategies (Strudler et al, 1999). The respondents indicated that technology was not an integral component of their preservice training (Strudler et al, 1999). The respondents of this study lived in one state and they graduated from different preservice training programs. Because of this, the findings may not be generalized to teachers in other states.

In the same year, the National Center for Education Statistics conducted a national survey of over four thousand full time teachers from all fifty states. The survey found that 44% of new teachers feel "well prepared" to use technology (NCES, 2000). This study, with its comprehensive sample, lends the strongest and most current indication that preservice institutions have not been successful in preparing their students to use technology in the classroom.

Although preservice teachers may be taught how to use technology, they are not always taught how to apply it in the classroom. One study, surveying sixty seven college methods professors, found that the respondents described teaching their students about technology as a distinct subject, instead of modeling it as an integrated element across the curriculum (Willis, 1994). This study indicates that, in some cases, instead of teaching preservice teachers about how to integrate the Internet into instruction, they are taught how to use the Internet.

Technology skills of methods faculty. Not only are preservice teachers not being prepared to use technology, studies have shown that a significant number of teaching methods faculty do not feel prepared to use technology either. In 1998, the Southeast and Islands Regional Technology in Education Consortium surveyed nearly four hundred teacher preparation programs. The respondents reported that 61.9% of their faculty had meager or inadequate familiarity with skills necessary for technology integration. The main software programs that preservice teachers were required to use were word processing software and Internet browsers (SEIR-TEC, 1998). Of the 397 institutions that were issued surveys, the SEIR-TEC only received a 41% response rate (n=164). This may indicate that the findings are not necessarily representative of most universities

at that time. The consumer of this research is left wondering: Are the remaining 233 institutions doing less, the same, or more with technology?

Approaches to preservice technology training. In response to the growing influence of instructional technology and the recent list of NCATE standards, preservice training institutions have historically provided technology training through two avenues:

1) an added instructional technology class that is either required or available as an elective or
2) systematic integration of technology into all education courses (Topp, 1996).

Many colleges of education have chosen the first option—to provide an introductory course on instructional technology. One study, surveying 53 colleges of education, found that 73% offered a specific introductory instructional technology course for preservice teachers (Hargrave & Hsu, 2000). This supplemental technology course generally covers a wide variety of instructional technology topics. By teaching technology through one course, colleges of education can have one self-contained technology course that fulfills their initial requirements of teaching instructional technology. However, it became increasingly apparent that having one class that teaches instructional technology among a host of other methods courses that generally do not integrate technology, does not work (Novak & Berger, 1991; Willis & Mehlinger, 1996).

Recently, however, the second option has become increasingly popular. Studies have shown how modeling of technology has a positive affect on student use of technology (Persichitte et al. 1999). When technology applications are integrated across the curriculum, the students are able to see technology being used and demonstrated by their teachers, and are more likely to use it themselves. Therefore, some colleges are

currently working with their teaching methods faculty to ensure that technology is being taught across the curricula (Drazdowski, Holodick, & Scappaticci, 1998).

A few preservice training institutions have begun to use initial field experiences (before student teaching) as an opportunity to give students a chance to use technology in the classroom. One study has indicated that initial field experiences also enhance the professional growth of preservice teachers and challenge preconceived notions of technology integration in the classroom (Balli, Wright, & Foster, 1997). For this study, 285 junior and senior education majors took part in an instructional technology training program at a major American university. They were divided into teams of four to six people, based on their grade level, interests, and content areas. Each team attended instructional technology workshops, developed a technology infused lesson, implemented the lesson, and developed a portfolio of the experience. Their reflections were qualitatively assessed, looking for common themes among the participants. One theme the researchers found was that many students were surprised by the amount of technology available in contemporary classrooms. Students' low expectation of the technology available in schools was superceded by the reality they encountered once they entered the schools and presented their lessons (Balli, Wright, & Foster, 1997). A limitation of this finding is in the fact that the researchers do not describe the school districts that the participants visit. The sample of schools may or may not be representative of "contemporary classrooms."

Other studies on initial field experiences have used telecommunications to link practicum students with education faculty and have found that such usage decreases loneliness experienced during field placements (Schlagel, Trathen, & Blanton, 1996;

Thomas, Clift, & Sugimoto, 1996). One study paired sixteen senior education majors with five instructional methods professors (Schlagel et al., 1996). For one year, including their student teaching experience, the students were required to communicate with the professors over e-mail at least twice a week. Because the students were engaged in regular dialogue with each other and their former professors, few reported feelings of loneliness. Instead, the researchers found that regular use of e-mail became a major factor in eliciting spontaneous exchanges of ideas that helped alleviate some of the problems they experienced in the field (Schlagel et al., 1996).

One group of researchers studied three purposefully sampled teacher preparation programs with an established reputation as having a strong instructional technology emphasis in their program (Persichitte, Caffarella, & Tharp, 1999). Their study concluded that it is important for teacher preparation programs, that are trying to promote new technology initiatives, to have expectations of technology integration from preservice teachers and methods teachers that model effective use (Persichitte et al., 1999). This study was conducted before the year 2000, when NCATE's new standards, with added technology emphasis, were posted.

Because of the NCATE standards, colleges of education are making concerted efforts to prepare their preservice teachers to use technology in the classroom. However, how each institution will respond to these standards is not clear. This is a new endeavor for everyone involved. It appears that systematically integrating technology throughout teaching methods curriculum is one avenue. Field experiences also play an important role in the training of preservice teachers, and should be considered as another avenue for instructional technology training (Hofer, 1999). The current study looks into one

program that is trying to use the student teaching experience as a time to train preservice teachers to become proficient with technology.

Student Teaching

There does not appear to be an agreed upon definition of what student teaching means (Zeichner, 1986). Each institution trains its teacher candidates in different ways and provides various paths to certification (Hofer, 1999). Some researchers have pointed out that studies of student teaching experiences lack sufficient depth as to what specific components in them are influential on the preservice teachers practices (Carter, 1990; Zeichner, 1986). Instead of looking in depth into different components of student teaching, many studies simply look at student teaching in the broadest sense—seeing it as one complete entity.

Each student teaching experience is different. "By their very nature, no two placement sites are alike. All vary on a number of dimensions, and it is likely that they may have potentially different effects, and make potentially different contributions to a student's growth" (Becher & Ade, 1982; quoted in Zeichner 1986). Each school has it's own unique situation and context. No two student teaching placements are alike. Each classroom is made of a unique blend of students with various personalities that coalesce or confound with the personality of the student teacher (Zeichner, 1986).

Additionally, the duration of student teaching experiences varies. Student teaching placements generally run from seven to nineteen weeks (Yates & Johnson, 1982; cited in Blanton et al., 1993). Old Dominion University, for example, requires student teachers—officially referred to as "interns"—to complete two separate seven-week teaching placements, for a total of 14 weeks. The duration of student teaching,

along with the number of hours of direct teaching, is defined within each state by the department of education.

Impact of Student Teaching

The student teaching experience has been described as the most influential part of teacher training (Hoy & Woolfolk, 1990). It marks the transition between formal training and preparation to professional independence and autonomy (Kamens, 2000). The insulation of preservice preparation is replaced by the limited introductory freedom of the student teaching experience—giving the intern a taste of the implications of the responsibilities of full-time teaching.

Isolation. Throughout a number of studies, student teaching has been described as a lonely experience. Placed in isolation, many student teachers report loneliness as being a factor in their experience (U.S. Congress, 1995). The teacher is now out on their own to fend for themselves (Delvin-Scherer & Daly, 2001). Placed in a situation where they do not regularly see their supervisor—generally adjunct faculty who tend to be new to them, student teachers feel separated from other classrooms, and disconnected from their peers (Schlagel, Trathen, & Blanton, 1996). Whereas previously they were surrounded by fellow students in familiar classroom settings at their university, they are placed in a school that they may not be familiar with, away from their peers, and absorbing an environment that has its own rules and mores.

Isolation does not merely have a psychological effect. One frequently cited study indicated that isolation may lead to interns dismissing what they learned in their preservice training in as little as two weeks (Richardson-Koehler, 1988). These results came from a participant observation study where the researcher was a university

supervisor observing fourteen (n = 14) elementary school student teachers. However, this study does address some of the problems inherent in the traditional student teaching model: the strong, and often misguided, influence of the cooperating teacher, the lack of reflective thinking on teaching methods by the cooperating teachers, and the ineffectiveness of the university supervisor.

Findings, such as those unveiled in Richardson-Koehler (1988) study, are alarming to preservice teachers and their educators. They indicate that preservice teachers are at risk of dismissing the skills they learned from years of college, because of being alone during their initial teaching experience. It follows that some sort of link must be established, to connect student teachers with their preservice training institutions, in such a way that the development of the skills they have learned in their preservice training are developed and improved during their field placement.

Some have looked to technology to help make this important connection. As early as 1987, some colleges were experimenting with nascent telecommunication technologies to link student teachers with faculty (Harris, 1988). One study concluded that such "telecommunications can help alleviate the loneliness and isolation experienced during the student teaching experience" (U.S. Congress, 1995). In a previously cited study of interns and education faculty who communicated regularly through e-mail, Schlagal and others concluded that telecommunications can provide a powerful link between preservice institutions and their far-flung interns in the field (1996). Following such guidance, some teacher preparation programs have set up online communication mechanisms where student teachers regularly interact online with methods faculty and each other (Blanton, Thompson, & Zimmerman, 1993; Persichette et al., 1999; Delvin-

Scherer & Daly, 2001). In response to this, the STAT program requires its interns, at least once a month, to communicate, via e-mail, with their former methods professors at Old Dominion University.

Bandura emphasizes the importance of social support in reducing stress in one's occupation (1997). Having social support contributes to one's self-efficacy (Bandura, 1997). In the context of student teaching, having peer groups of student teachers within the same school has shown to reduce the stress of isolation in student teaching. One study of a peer collaboration group of eleven student teachers at the same elementary school found that not only did the collaboration group provide an emotional support system and a forum to share ideas, but developed increased confidence levels of the student teachers, as well (Kamens, 2000).

Participants in the STAT program, do not generally mention isolation as a problem during their internship experience (Curry-Corcoran, 2002a). Interns live together in the same houses, meet weekly, and often work in the same schools.

Classroom management. Isolation is not the only issue student teachers face, classroom management is a prominent concern that all interns must encounter (Delvin-Scherer & Daly, 2001; Hamilton & Riley, 1999). Learning how to lead a group of students through a series of tasks is not a simple assignment. A preservice student, who has most likely spent at least sixteen years being a student, must now assume the role of teacher and carry themselves in such a way that students respect his or her authority. Many student teachers find classroom management as one of their biggest concerns (Whitney, Golez, Nagel, & Nieto, 2002). Whitney et al. surveyed over nine hundred inservice teachers in one school district close to a major university. The participants

answered Likert-type questions regarding the efficacy of the preparation they received during preservice training. Based on the answers they received, the researchers assimilated four focus groups of voluntary survey participants to follow up on the themes indicated from the surveys. A common suggestion from the focus group participants was that preservice training institutions should concentrate more effort on preparing teachers for the classroom management issues they will face (Whitney et al., 2002).

Time constraints. Time constraints are also a primary concern of many new teachers. A case study of six beginning elementary teachers from three different school districts, explored teacher use of technology and factors influencing their usage (Novak & Knowles, 1991). Participants described being overwhelmed from trying to juggle the multifarious responsibilities of being a teacher (Novak & Knowles, 1991). The participants indicated that planning for many different subjects, completing required paperwork, and participating in after school meetings, committees, and programs all compete for their time (Novak & Knowles, 1991). This can be overwhelming for a teacher who is not used to doing such an assortment of tasks.

Isolation, classroom management, and time constraints are just a few of the multitude of issues student teachers deal with throughout their field placement.

Student Teaching and Technology

If students are taught technology in preservice training, but do not see it practiced in the schools, they are unlikely to incorporate it into their own teaching (NCATE, 1997). Student teaching provides a crucial transition period between preservice training and inservice teaching. For teaching interns, the nature of their placement, the type of mentor

they have, the school environment, and expectations can have a significant influence on their behavior.

Availability of technology. The kinds of technologies available to students varies from school to school and district to district. Some schools are fully furnished with more than one late model computer per classroom as well as enough digital cameras, digital projectors, and educational software to satisfy the needs of each teacher (Roblyer, 2000; Stuhlmann & Taylor, 1999). Other schools struggle just to get one computer per classroom that is connected to the Internet.

In 1998, the Milkin Foundation and ISTE conducted a major national survey of 416 colleges of education, investigating the use and availability of technology for student teachers. Most institutions reported that instructional technology was available for student teachers during their field experiences, but most of them do not routinely use technology during their placement, and that they do not work with mentor teachers and supervisors who can advise them on the use of instructional technology (Moursund & Bielefeldt, 1999). The researchers concluded that "student teachers need more opportunities to apply instructional technology during field experiences under qualified supervision" (Moursund & Bielefeldt, 1999). Alarmingly, only four percent of the institutions in the survey had student teachers who regularly used instructional technology in their field experience (Moursund & Bielefeldt, 1999). This study is quite significant in its findings and in its scope. The sample is sufficiently large (n = 416) and representative of many colleges of education in the country. The study reports that 75% of student teachers have access to technology at the schools they are assigned, but less

than half report routinely using it. They also do not receive sufficient guidance, from their mentors, on how to use technology.

The Milkin study reports that K-12 schools have technology available (Moursund & Bielefeldt, 1999). This seems to indicate that the emphasis the federal government initially placed on fitting schools with computers was successful (U.S. Congress, 1995). However, it highlights the present need for training and encouragement of both preservice and inservice teachers to use it, who do not appear to be doing so.

As mentioned in the Milkin report, "qualified supervision" is important for a student teacher to have as they attempt to integrate technology into their teaching (Moursund & Bielefeldt, 1999). In this regard, cooperating teachers have a significant role to play in mentoring the student teacher they are partnered with. Studies have shown that cooperating teachers attitudes and actions have a significant affect on student teacher performance and attitudes (McIntyre, Byrd, & Foxx, 1996; Richardson-Koehler, 1988).

Another study showed that preservice teachers enter field experiences with incongruous preconceived ideas of what educational technology practice in contemporary classrooms looks like (Balli et al, 1997). These ideas seem to be colored by their personal experience and history as a student in K-12. Preservice teachers tend to reflect their own experience with technology in their previous education and assume that things have not changed (Balli et al, 1997). Therefore, their twelve years of experience as a student, watching their teachers use or not use technology, affects their own usage of it.

In 2002, Britt investigated the perceptions of 216 student teachers from one university, towards technology. The study found that 91% of the respondents (n = 216) rated their computer expertise as average or above average and 72% viewed technology

as very important or extremely important in today's schools (Britt, 2002). The respondents, who were displaced over 109 schools in 19 school districts, reported having access to overhead projectors, televisions, VCRs, and at least one computer in their classroom linked to the Internet. However, a majority of the student teachers reported not having access to more advanced technologies such as digital cameras (93%) and digital projectors (77%) (Britt, 2002). When asked about the most important technologies used during their student teaching assignments, the student teachers ranked word processing as the most important, followed by the Internet, e-mail, drill and practice software, and computer games (Britt, 2002). Although the Internet and e-mail were ranked as important to student teachers, further results indicated that they did not regularly use Internet and e-mail for instructional purposes (Britt, 2002).

Respondents reported using the Internet for planning instruction and background research as well as assigning projects where students use the Internet for research. The results indicated that teachers used technology more often than their students (Britt, 2002). In her concluding remarks, Britt recommended that "qualitative research should be conducted that describes the process that student teachers' encounter with technology integration in different subject areas" (Britt, 2002).

Although 91% of the respondents rated their computer expertise as average or above average, the technologies they mentioned—word processing, Internet, and email—as using do not reveal a truly integrated approach. Also, the availability of technology at the schools was not impressive: only about one computer per classroom and few had access to digital projectors and cameras. Although revealing, this study has one serious limitation in that it only surveyed students from one university. This

indicates that it is only confidently generalizable to its immediate population. The data with regard to preservice teacher's perceptions and reported use of is suspect. However, the data with regard to the availability of technology in schools is slightly more generalizable, because it encompasses over 109 schools and 19 school districts. Even this wide variety of placements is within one state's department of education, with its own budget, requirements, and standards.

The Britt study highlights a consistent issue within the research on instructional technology practices: they focus on one institution. Although this compromises the generalizability of the study, looking closely at similar studies, one can see similarities with the efforts and interventions of the Darden College of Education. Although each state has certain requirements and each college meets them in their own way, most colleges of education have similarities in the way they train their preservice teachers. The current study will concentrate on one program affiliated with one university. It is anticipated that the findings will relate to student teachers in colleges of education elsewhere, because of these similarities.

Technology integration strategies of new teachers. In 1991, Novak and Knowles conducted a year long study of the technology integration attitudes and strategies of first-year elementary teachers (1991). They found that at the beginning of the year, the teachers were too overwhelmed with coping with their other responsibilities as teachers to begin putting technology integration as a priority in their instruction. Their interview comments suggest that new teachers view technology as something secondary or "extra" to be used on special occasions. They did not view computers as tools to enhance instruction. At first, the teachers felt uncomfortable using computers for anything other

than direct instruction—where the teacher stands at the front of the class and has students complete individual assignments at their desks (Novak & Knowles, 1991). Teachers also felt uncomfortable having one student work on the computer while other students were engaged in separate activities. Although teachers did not initially view technology as important, teachers were motivated to use it because their students wanted to use it (Novak & Knowles, 1991).

Gradually, the new teachers began to view computers as an integral part of society that students must learn how to interact with (Novak & Knowles, 1991). However, there was little evidence that their classroom computer uses were academically relevant:

> many of the programs...demonstrated weak instructional design and were only remotely related to the existing curriculum. And, most of the programs provided practice in skills which the majority of the students had already mastered (Novak & Knowles, 1991).

Although the subjects of the study were not student teachers, this study provides some reasons for helping preservice teachers use technology during their internship experience—before they become overwhelmed with the responsibilities of teaching full time. Otherwise, not being a priority for them, they may not pursue it on their own (Novak & Knowles, 1991).

Although the Novak and Knowles study is more than ten years old, it provides an important contrast to what the current study investigated. Their study was conducted before the advent of the Internet and with relatively limited computers (Apple II's) compared with the ones available to the interns in this study. The Novak and Knowles study observed three characteristics in their new teachers: 1) they viewed computers as

something secondary, 2) were uncomfortable with differentiated instruction (where one student is on a computer, while others are working on something else, 3) did not use computers in academically relevant ways (Novak & Knowles, 1991). The findings of this study may be outdated. Because of the nature of technologies invented since the Novak and Knowles study, such as mobile laptop labs, wireless Internet, digital data projectors, PDA labs, and new peripheral hardware (digital microscopes, PDA's, etc), STAT interns have vastly different technology tools at their disposal than the subjects of this study.

Attitudes and Beliefs

Attitudes and beliefs influence our actions (Busch, 1995; Milbrath & Kinzie, 2000). A large amount of research has been done on teacher's perceptions, attitudes, beliefs, and self-efficacy with technology (Busch, 1995). Although it is anticipated that qualitative data will be collected on perceptions and self-efficacy, this study will primarily concentrate on attitudes and beliefs.

Attitudes and beliefs are important concepts in the study of the classroom practices, thought processes, and changes in teachers (Nettle, 1998). "Attitudes and beliefs are a subset of a group of constructs that name, define, and describe the structure and content of mental states that are thought to drive a person's actions" (Richardson, 1996). Attitudes are thought of as predispositions that can influence actions. Allport defined attitudes as "a mental and neural state of readiness, organized through experience, exerting directive or dynamic influence upon the individual's response to all objects and situations with which it is related" (1967).

Research has shown that attitudes towards computers and technology, has an affect on teacher's usage of technology (Dupagne & Krendl, 1992). Specifically, one study indicates that teachers' attitudes toward technology have a strong influence on how their students perceive technology (Christensen, 1999). Over two hundred teachers and at least three thousand students from three Texas schools were surveyed regarding their attitudes towards and use of computers. The research design was quasi experimental with one treatment group and two comparison groups. In this study, the treatment group received on site technology training from a partnership with a local university. A time lag regression was used on the pre and post data, indicating a teacher's rating of the importance of computers is a strong predictor of students perception of the importance of computers ($b=1.03$, $p<.00$) (Christensen, 1997).

The opposite is also true. In one meta-analysis of recent research and trends in technology integration, it was observed that student attitudes also affect teachers' perceptions. One reason the authors provided was that teachers perceived the use of computers increasing student motivation (Valdez, McNabb, Foertsch, Anderson, Hawkes, & Raack, 2000).

Software may be an influencing factor on teacher perception of technology, as well. In a survey of 1,093 elementary teachers in a western state, Niederhauser and Stoddart found that teacher attitudes towards effective computer-based instructional methods are related to the types of software teachers report using with their students (2001). It appears that teachers "enjoy" some types of software more than others.

Other studies indicate that a teacher's experience with computers has a positive impact on their attitudes toward computers (Dupagne & Krendl, 1992). Also, whether or

not a teacher owns or uses a computer has a positive affect on their attitudes toward technology (Dupagne & Krendl, 1992).

In another report measuring technology practices and attitudes of elementary, middle, and high school teachers, attitudes were comparable, across grade levels (Harmes, Kemker, Kalaydjian, & Barron 2000). These researchers also found that elementary school teachers were integrating computers into the classroom more frequently than middle and high school teachers, despite the fact that attitudes were comparable. Although many teachers were surveyed (N = 1,665), this study was conducted amongst teachers in one urban school district. There is no indication as to whether the findings would be comparable among teachers in a different setting.

"To be effective users of computer technologies and be models for students' computer use, teachers must have positive computer attitudes and feel self-efficacious in using them" (Milbrath & Kinzie, 2000). Research has indicated that having knowledge of computers has a positive influence on teacher attitudes toward computers and computer use (Dupagne & Krendl, 1992).

In one study, methods faculty, preservice teachers, and recent graduates, of three teacher preparation colleges, stated that their biggest concern regarding educational technology is the rapid pace of development as well as its corresponding new classroom applications (Persichitte et al., 1999). They were also concerned about the increasing expectations of new teachers being prepared to integrate technology within their classroom. The study above is unique in this field, in that it covers more than one school or program. Its validity is substantiated by the broad use of different data collection types as well as the use of a team of independent researchers from outside institutions.

Attitudes are closely linked to beliefs. Fang, in his review of research on teacher beliefs and practices, noted that most studies focus on where teacher's theoretical beliefs corresponded with their classroom practices (1996). He stated that this was not enough: "Rather than simply providing teachers with more theories, educators must help teachers understand how to cope with the complexities of classroom life and how to apply theory within the constraints imposed by those realities" (Fang, 1996). One of the aims of this study is to investigate how interns connect their attitudes and beliefs regarding technology with their actual practice. The pitfalls and difficulties they encounter, in their attempt to make this linkage, shed light on how preservice educators can teach preservice teachers to use their theoretical knowledge to teach in a real-life classroom.

Description of the Internship Experience

Participants in the STAT internship program come from different educational concentration programs (elementary, secondary, special education, etc.). As participants in the program, they are required to teach in Clover County for one semester—half a school year—according to Clover County's schedule. During their field experience, interns are required to teach for half of the day. The interns are encouraged to begin assuming this responsibility on the first day of the semester, so that their students will see them as a teacher from the beginning, instead of a *student* teacher. Interns are free to use the other half of the day for lesson planning, observation of other teachers, and tutoring.

Although there are many different placement scenarios, two options generally occur. The first, and most common among secondary teachers, is that interns are given two class periods as their own. Both the junior high and high school in Clover County are on block scheduling, with four one-and-a-half hour classes. Interns placed in one of

these schools are given two classes. The other option is that the interns co-teach with their cooperating teachers. This usually occurs at the elementary schools, where interns share both a class and classroom with their cooperating teachers. The structure of the elementary classroom is more conducive to co-teaching. For the current study, six of the seven interns are in the junior and senior high schools. Each of them has two class periods to teach. The remaining intern teaches second grade at the elementary school and uses the co-teaching model.

Because Clover County is more than a few hours drive from Old Dominion University, Clover County Public Schools supplies living quarters for the interns, free of charge. Clover County rents three identical three-bedroom houses that are situated next to each other. All of the interns, except one who lives nearby, live in these houses. Therefore, not only do interns teach in the same schools, they are roommates and neighbors as well.

The interns receive a $4,000 salary for their participation in the program. This money is supplied by Clover County Schools as part of their contributions to the matching funds supplied by the $1.3 million STAT grant. Because this program is part of the STAT program, a grant program focused on giving teachers proficiency in instructional technology, the overarching theme of the STAT internship program is technology integration. In the spirit of the grant, interns are trained, encouraged, and expected to use technology (see Appendix B for an overview of the STAT program).

Preservice preparation of STAT interns. Before coming to Clover County, new interns come with varying degrees of instructional technology proficiency. As a requirement of the College of Education at Old Dominion University, all teacher

candidates must complete an instructional technology course, ECI 304 "Educational Applications of Computers". This course gives an overview of classroom technologies, learning theories, and addresses Virginia's Technology Standards for Instructional Personnel (TSIP) competencies. According to Lynn Schultz, lecturer and coordinator of preservice and in-service instructional technology courses at the College of Education, ECI 304 teaches preservice teachers how to "become proficient at making web pages, evaluate content on-line, develop a toolbox of productivity tools (including Excel and database software), come up with a lesson integrating technology, and discuss applicable learning theories" (Schultz, 2003).

The external evaluator of the program has studied the intern's use of technology in Clover County, since the inception of the program. At the beginning of each semester, he gives an entrance survey as well as an interview that contain items related to preservice training. Over the first five semesters of the program, STAT interns have come with different levels of exposure to technology. Most have had basic exposure to word processing and the Internet. Although they may be aware of different technology applications, interns generally have a minimal understanding of how to effectively use technology in classroom settings (Curry-Corcoron, 2002b).

Interns arrive in Clover County one week prior to the first day of the semester to participate in a weeklong orientation. This week provides an introduction to Clover County, an introduction to the STAT program, a communication workshop with interns and cooperating teachers, and an introductory workshop on technology available in Clover County. It gives interns a chance to learn about the context of Clover County and provides opportunities to begin planning with their cooperating teachers.

Most interns begin teaching on the first day of school. As can be expected, many other issues, beyond instructional technology, play a prominent role in their thoughts. Of particular concern, early on, is classroom management. To help them out with classroom management, an orientation workshop is devoted to the subject and interns are supplied a copy of Harry Wong's "The First Days School" (1999).

The key purpose of the STAT program, however, is focused on technology integration. To facilitate the use and experimentation of a variety of classroom technologies, the STAT program provides mandatory weekly two-hour technology workshops. These workshops teach interns new technology applications and give them a chance to work and collaborate on technology initiatives.

Digital portfolio. One common theme throughout the technology workshops is the building of a digital portfolio. All student teachers with Old Dominion University are required to develop a teaching portfolio. Typically, this professional portfolio is a folder with lesson plans, a resume, teaching philosophy, evidence of student work, etc. (Nagy & Russo, 1998). However, the STAT program requires that its interns create a digital portfolio—augmenting the same contents as the typical portfolio with multimedia materials.

The digital portfolio is a web-based presentation of an intern's teaching portfolio. An intern's teaching philosophy, copies of lesson plans, and resume are posted on the portfolio website. Having a website as a portfolio allows the intern to post video of themselves teaching, and photos of their students performing tasks.

The digital portfolio is the main assignment interns work on during the technology workshops. This achieves two purposes:

1) Making a digital portfolio requires the intern to become proficient in the elements of making a webpage—including web design, file management, and web posting.
2) The digital portfolio provides a place to post the different technology applications and teaching strategies they have used.

Because interns enter the program with varying degrees of familiarity and comfort with instructional technologies, differentiated instruction is used frequently in these workshops. Since many of the interns teach different subjects and grade levels, it is helpful for them to receive instructional technology strategies that are more closely linked to their specific area of interest. For example, Kidspiration is an interactive word processing software program that allows students to easily map sentences and link them with pictures (http://www.kidspiration.com/). This program has specific applications with language arts for elementary students. This software would not be as interesting for an intern teaching secondary history. However, that intern would likely be interested in the University of Virginia's e-text library—which hosts a number of original texts of historical documents (http://etext.lib.virginia.edu/). After showing an intern a technology application, they are then charged with finding a way of integrating it into their teaching. Both of these technology applications represent the kinds of ideas presented to interns during a normal technology workshop, and provide an example of differentiated instruction.

Statement of the Problem

The STAT program is a unique student teaching internship program that aims at preparing preservice teachers for the reality of the modern classroom through an

authentic teaching experience that emphasizes instructional technology. This program is in reaction to the lack of adequately trained new teachers who feel prepared to use instructional technology (Solmon, 1999). Most colleges of education train their teacher candidates to use technology by either providing a required instructional technology course or integrating technology experiences throughout the curriculum. Little has been said about integrating technology during student teaching. NCATE (2000), the accrediting agency for colleges of education, only mentions that technology should be "available" to student teachers.

Some studies have found that student teaching provides a forum where student teachers discard what they have learned in their preservice training at an alarming rate (Richardson-Koehler, 1988). The STAT program not only aims to help student teachers apply, and therefore retain, what they have learned in their prior training, but tries to show them new technology applications, as well.

Student teaching is a crucial link between preservice training and inservice teaching (Shen, 2002). The STAT program attempts to ensure that instructional technology lessons learned at the university are transferred and augmented during the internship experience. Relying on the emphasis the STAT program places on instructional technology, this study explores which types of technologies the STAT interns use and how preservice training influenced their usage. It also uncovers intern attitudes regarding technology and how those attitudes change throughout their experience.

Essentially, the study examines how participation in a technology rich internship program influences student teacher actions and attitudes. Old Dominion University and

similar institutions benefit from the results, as they give an indication to the worth of emphasizing technology integration in student teaching. The problems and issues interns experience with technology provide useful data for college of education policy makers who are interested in bolstering the technology requirements of their student teaching programs.

Theoretical Framework

The study relies on social cognitive theory as its theoretical framework. This perspective on human action believes that individuals possess self beliefs that influence their actions. Prior to Bandura's social learning theory, the precursor to his social cognitive theory, most cognitive psychologists translated human behavior from a behaviorist lens, where human action was predicated by empirical, observable stimuli (Pajares, 2002). Bandura's theory does not refute the influence of observable behavior, but adds the influence of one's own thoughts and beliefs: "What people think, believe, and feel affects how they behave" (Bandura, 1986). This study aims to investigate how interns think, believe, and feel with regard to teaching with technology during their student teaching experience in Clover County.

It is assumed, through the studies cited above as well as the confirming research on Bandura's self-efficacy, that an intern with a positive attitude toward technology will use it more and perhaps even more successfully than one with negative attitudes. Many correlational studies have been conducted that look at the relationship between teachers' attitudes toward technology and their use of it. Studies have repeatedly shown that there is a positive correlation (Dupagne, 1992). However, this study is more concerned with studying what those attitudes are, how they change, and what elements of the internship

program influence them. Knowing what intern attitudes are and where they come from may offer insight into preservice preparation and give indications as to how to make student teaching experiences more conducive to the development of positive attitudes toward technology.

CHAPTER 3: METHODOLOGY

The choice of methods, for this study, is a case study design. When studying a phenomenon, it is important to understand the setting within which it occurs (Yin, 2003). Yin defines a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context (2003, p. 13).” By using case studies, a researcher can provide a detailed description of the phenomenon within its context.

Besides revealing the context, Merriam describes case studies as “particularistic, descriptive, and heuristic (1998, p. 29).” They are particularistic in that they focus on a “particular situation, event, program, or phenomenon” (Merriam 1998, p. 29). They also provide rich descriptions of the phenomenon being studied. Case studies are heuristic, as well, because they illuminate the reader’s own understanding of the phenomenon (Merriam, 1998, p. 30). Using the case study approach, with a phenomenological perspective, the study will thoroughly explore the thoughts and experiences of each intern, and achieve an authentic account of the essence of their collective and individual experience.

Because the purpose of the study is to thoroughly explore the interns’ technology teaching experience and discover what types of issues they encounter with technology, a qualitative study appears to be the most suitable model for data collection. Quantitative studies are used to confirm or negate a certain predisposed hypothesis. In a qualitative study, there are no predisposed ideas or a priori assumptions (Lincoln & Guba, 1985). The researcher relies on observations and firm methodology, to openly investigate a phenomenon.

The field of educational technology research has been dominated by quantitative studies. However, qualitative educational technology studies are becoming more prevalent (Hoepfl, 1997). Some researchers recommend qualitative methods as a needed approach in the field of educational technology (Hoepfl, 1997; Britt, 2002).

Site

The study was conducted in Clover County, a rural county in a southeastern state. Clover is the second poorest county in the state, with 23% of its population living below the poverty line (U.S. Census Bureau, 2000). The major employers in the county are two federal prisons, a brick mill, and the public school system (Clover County Industrial Development Authority, 2003). The majority of the population in Clover County is a minority—58% African American, 42% Caucasian (U.S. Census Bureau, 2000). Thirdly, low motivation is a problem among students, with only 51% of the population, 25 years and older, holding a high school education (U.S. Census Bureau, 2000). Additionally, many of the students are on some form of public assistance--68% on free or reduced lunch (Clover County Public Schools, 2003).

Description of the Clover County and ODU Partnership. Clover County was chosen as a partner with Old Dominion University because of the long professional relationship between the superintendent of schools in Clover County and an Old Dominion University faculty member. The high needs of the county, coupled with opportunities for collaboration between Clover county teachers and Old Dominion University provided for an attractive partnership.

The partnership includes a field-based masters program which emphasizes instructional technology, weekly technology workshops for Clover county residents,

technology initiatives held at the university for methods faculty and their students, as well as a student teaching internship program. Through the STAT field-based masters program, over a quarter of Clover's teaching population (47 teachers) received a master's degree and teaching certificate from Old Dominion University. Some of the teachers, trained through the field-based master's program, act as cooperating teachers for the interns in this study.

The internship portion of STAT program provides benefits for both partner institutions. Old Dominion University preservice teachers gain from their participation in a technology rich student teaching experience where they have more autonomy and longer teaching opportunities than they would in other field placements. Clover County Schools benefit, as well, from the new ideas and energy preservice teachers bring. They also use the internship program as an opportunity to recruit interns interested in teaching in Clover County.

Demographics. Clover County Schools has six schools: four elementary schools, one junior high school, and one senior high school. Four schools within Clover County Public Schools acted as the sites where the interns taught (see Table 1).

Table 1

Number of Clover County Students on Free or Reduced Lunch

School	Enrollment	Lunch	
		Free	Reduced
Welch Elementary	341	219 (64%)	36(11%)
Reynolds Elementary	589	386 (66%)	62 (11%)

School	Enrollment	Lunch	
		Free	Reduced
Townes Junior High	584	294 (50%)	59 (10%)
Clover Senior High	583	194 (33%)	52 (9%)

Note: data is from January 2003

Necessary permission was granted to conduct the research at these five sites, from Clover County Schools and each individual school.

Challenges. In addition to poverty and illiteracy, Clover County Schools is confronted with a number of other problems. First of all, recruiting, hiring, and retaining fully certified teachers is difficult for the school system. Unable to fill the necessary teaching positions with certified teachers, the school system had to hire a number of uncertified teachers. Recently, the local private school, Clover Academy, attracts more of the upper, middle class white students from the public schools. This impacts the balance of students in the schools and has robbed Clover Schools of a group of traditionally high achieving students.

To confront the problems of poverty, illiteracy, and teacher attrition, Clover County chose technology integration as a central theme in their motto for teaching success: “Teachers + Students + Technology = Learning!!!” To achieve their technology goals, Clover County is proactive in writing and receiving a number of technology grants. These grants afford them the fiscal ability to furnish their schools with an abundance of instructional technology tools, which rival schools in higher income areas.

Technology resources. Each classroom in Clover County Schools has at least one recent model computer connected to the Internet through a broadband connection. Each

school has at least four digital projectors, a digital camera, and a digital video camera. Three of the six schools have mobile laptop carts, in addition to their regular computer labs. Mobile laptop carts consist of twenty-four laptop computers that connect to the Internet through a wireless connection. Instead of a class of students physically moving to a computer lab to do work, through the use of mobile laptop carts, the computer lab comes to the class.

Specific technology peripherals, such as Palm Pilot labs and digital microscopes, are available for the corresponding grade and subject levels that require them. For example, Palm Pilot labs, consisting of more than a dozen Palm Pilots, are available for secondary science classes. There are a wide variety of accessories for Palm Pilots that can be used in scientific investigations and experiments. Technology applications, such as these, provide teachers and interns with a powerful array of instructional tools. In such an environment, STAT interns have access to a wide variety of technology tools that assist in them in becoming teachers proficient in educational technology.

Participant Selection

The sample of interns used in this study was achieved through the recruitment of the researcher. As part of his responsibilities as coordinator of the STAT internship program, the researcher employs a number of strategies to make prospective student teachers from Old Dominion University aware of the STAT internship program. He gives introductory presentations to teaching methods classes, organizes a meeting for those interested in the program, passes out informational flyers to methods teachers, and places descriptive pamphlets in the office responsible for coordinating student teaching. While many interns hear of the program directly through the researcher's initiatives,

others find out about it through other channels. For example, some interns hear about the program from former interns, their professors, or their advisors.

The number of interns participating in the Spring 2003 semester (n = 7) is slightly above the average number of interns participating in the program over the first five semesters of its existence (average number of interns = 5.8).

To become a part of the STAT program, a prospective intern must fill out two sets of applications: one for Old Dominion University's Teacher Services office and one for the STAT program. The Teacher Service office must approve each intern who participates in the program. Once the Teacher Services office informs the STAT program of the approval of prospective interns, the STAT program then informs the superintendent and principals of Clover County Schools of the list of interns, in order to begin discussing placement possibilities.

Sampling procedures are chosen with some purpose in mind, whether the design is qualitative or quantitative (Lincoln & Guba, 1985). For qualitative researchers, who are interested in observing similarities and variations as subjects interact under different contexts, maximum variation sampling is the method of choice. Maximum variation sampling is a procedure that attempts to include subjects from a wide variety of backgrounds in order to maximize the depth of information from each case (Patton, 2002).

For this study, the researcher had little choice in the population of interns who participated in the program. Fortunately, the participant group for this study was diverse, providing the researcher with an opportunity to study interns from various backgrounds and concentrations. Out of the seven interns: two at elementary schools, two at the junior

high, and three at the high school. The subject areas they taught vary, as well. Although two interns are teaching secondary history, the rest teach seventh grade World History I, eighth grade Spanish I, ninth grade Earth Science, tenth grade math, and second grade (all subjects), respectively (see Table 2).

Table 2

Intern Placement

Intern name	School	Grade level	Subject
Tammy	Reynolds Elementary	2nd grade	All subjects (particularly Social Studies & Science)
Donald	Welch Elementary	5th grade	Social Studies
April	Townes Junior High	9th grade	Earth Science
Ryan	Clover Senior High	10th grade	Geometry
		11th grade	Algebra II (remedial)
Rhonda	Clover Senior High	10th grade	English
		12th grade	English
Anne	Clover Senior High	11th grade	U.S. History
Tripp	Clover Senior High	10th grade	World Geography

Not only were the teaching placements diverse, the interns themselves came from different backgrounds, age groups, and racial groups. Although five of the interns were in their early twenties, two of them were over thirty. Ethnically, there was a rich

diversity. One of the interns was Buddhist and was born in Sri Lanka. Another intern was African American, while the rest were Caucasian. The variation achieved in the sample was reflective of the diversity of the urban university from which these interns come from.

Generalizability. In qualitative studies, the purpose of sampling is "to maximize information, not facilitate generalization" (Lincoln & Guba, 1985). Because qualitative research does not attempt to generalize findings to a greater population, statistical sampling is not required. The emphasis is placed on the depth and quality of information that will be generated from the subjects, rather than whether or not the findings are generalizable.

However, without some sort of relevant transfer into another situation, research would be useless. Qualitative researchers approach generalizability in different ways (Bogdan & Biklen, 1998). Some prefer to have their findings generalizable to other groups, while others have no interest in generalizability. Lincoln and Guba suggest that qualitative studies can have "naturalistic generalizations" (Lincoln & Guba 1985, p.120). Instead of generalizability being conditional on the sampling methodology, a qualitative study can be generalizable to the degree with which it harmonizes with the reader's own experiences. The drawback for this type of generalizability is that it is internal and intuitive, and is not sufficiently formal and objective (Lincoln & Guba 1985, p.120).

For more formal generalizations, Lincoln and Guba propose the idea of a "working hypothesis" (p.123), where instead of studying a phenomena and making a broad generalization to other "similar" contexts, the researcher continually generates working hypotheses that explain what he sees in the context of the setting he is studying.

These hypotheses change, or stay the same, as new information and data is gathered. For this study, working hypotheses will be developed as part of the process of the study (further discussion can be found in the data analysis section).

For the purposes of this study, the findings have a degree of generalizability to other students at Old Dominion University. Although, from a quantitative perspective, the sample is not statistically large enough or representative, all of the interns are from ODU and have come from a variety of backgrounds. However, within the context of a qualitative study, the statements of one individual can have universal applications: "qualitative research is interested in deriving universal statements of general social processes than statements of commonality between similar settings such as classrooms" (Bogdan and Biklen, 1998). With this in mind, the statements made by the participants in this study have the potential to be related to other student teachers at other institutions.

The case study approach, used in this study, allowed each of the seven interns to be studied in detail, while providing sufficient diversity for the exploration of common themes, as well. In anticipation that some interns may have provided more information than others, the researcher reserved the option to spend more time on data analysis with one than the others. However, all interns were full participants in the study.

Data Collection Methods

When undertaking a qualitative study, it is important to have some understanding of what to expect in the field. "Until we enter the field, we do not know what questions to ask or how to ask them" (Taylor & Bogdan, 1984). As an administrator of the program for two and a half years, the researcher had many field experiences observing interns teaching with technology and talking with them about their experiences. Using

these field experiences, in the Fall 2002 semester, he developed an interview protocol and observational checklist. Through pilot interviews with the interns, he drafted a list of interview discussion questions that form the basis of the current interview protocol. Through repeated preliminary observations, he further defined the scope of future observations. These field experiences resulted in the development of tools that will aid in the process of collecting data.

Qualitative studies rely on three primary sources of data: interviews, observations, and artifacts (Patton, 2002). These sources complement each other and allow the researcher to investigate behaviors from different perspectives. These three categories provide the framework for the description of the varied methods used in this study.

Interviews

Interviews are an important component in qualitative studies. "Interviewing is necessary when we cannot observe behavior, feelings, or how people interpret the world around them" (Merriam, 1998). It is a particularly strong technique when used in intensive case studies (Merriam, 1998).

Before beginning to collect data in a study, it is important to conduct pilot interviews, in order to develop a strong list of questions (Merriam, 1998). By testing his preliminary questions, the researcher is able to understand which questions seem to generate the most data, which questions need discarding, and which questions require revision. In the process, the wording of the questions improves and an indication of the kinds of data the questions will produce is discovered.

In order to improve the face and content validity of the interview protocol, as an instrument, the researcher took two preliminary steps: 1) he interviewed previous interns

using the interview protocol, and 2) he shared the instrument with leaders in the field of instructional technology for expert review. During the Fall 2002 semester, the researcher interviewed two interns using the interview protocol. The data collected from these initial interviews led to substantial revisions of the protocol. In early February, he consulted three instructional technology researchers regarding the interview protocol. Dr. Rhonda Christensen, from the University of North Texas, stated, "these look like useful tools and should provide a nice balance to the qualitative instruments" (Christensen, 2003). Christsensen, and a few of her colleagues, provided helpful suggestions for the improvement of the instrument. Their input assisted in the improvement of the quality, validity, and usefulness of the interview protocol.

For this study, the researcher interviewed interns once a month. This time period between interviews gave intern sufficient time to experiment with different technologies, develop professionally, and accumulate rich experiences. The interviews provided intermittent snapshots into the progression of the interns' thoughts and attitudes towards technology. It was anticipated that conducting more frequent interviews would yield redundant data.

With permission, the interviews were recorded, using a digital voice recorder, and transcribed immediately. The interviewer took notes, as well. Interviews range from being highly structured (where the wording and order of the questions is predetermined) to being unstructured (where there is more flexibility and no predetermination to the questions) (Merriam, 1998). Combining the consistency of a structured interview and the flexibility of an unstructured interview, semistructured interviews have the ability to capture rich, consistent data.

For this study, interviews were semistructured and followed the interview protocol, which contained nine questions (see Appendix C for the Interview Protocol). Each question was intended to provide clarification on the three central themes of the research questions—technology use, attitudes toward technology, and preservice training:

Interview questions. After reading the introductory paragraph—explaining the purpose of the interview and requesting permission to tape record—the first question asks, "How do you feel your use of technology has progressed over the past month?" This question begins the interview by encouraging the intern to reflect on his or her use of technology over the past month. The purpose of conducting regular monthly interviews is to provide data on the interns' progress in technology use over semester. For each interview, the researcher is concerned with the experiences the intern has had since the last time he or she was interviewed. This question attempts to encourage interns to scan what they have done since the last time they were interviewed.

The next two questions direct the intern's attention to specific technology applications they have recently used, "What kinds of new technology applications or strategies have you used recently? How did those go?" The first questions cover two areas: 1) the types of technologies used and 2) the strategies interns use to implement them. These questions are in response to the first research question: How do interns use instructional technology during their student teaching experience?

The following question, "In what ways is technology helpful to you in the classroom?" probes the interns' perception of the usefulness of technology in the classroom. A number of studies link teacher perception of technology with their use of

technology (Dupagne & Krendl, 1992). This question attempts to provide an indicator of their perception of technology.

The next question explores the negative issues interns encounter with their use of technology, "What kinds of problems have you had with technology?" This question is directly inspired by the research question: "What are the issues interns mention as being most prominent in their use of technology during their student teaching experience?" The study aims at gaining a deeper understanding of the issues that interns face as they attempt to use technology during their teaching. The researcher is interested in documenting the inevitable problems interns face during their experimentations with instructional technology. This question is accompanied with a follow-up question, "How have these problems affected your teaching?" that attempts to elicit intern responses describing the affect technology problems have on their teaching. The researcher believed that, if technology problems significantly affect their lessons, teachers would be inclined to minimize their use of technology.

The research question, "What are their attitudes and beliefs toward technology and how do they change throughout their internship experience?" inspired the next two questions: "Has your perception of technology, and its usefulness in the classroom, changed? If so, how has it changed?" Numerous studies found a positive correlation between attitudes toward technology and teacher use of technology (Dupagne & Krendl, 1992). These questions gave interns an opportunity to share their changing perceptions of technology. Because they were interviewed throughout the semester, this question allowed the researcher to follow the fluctuations in intern attitudes toward technology throughout the semester.

The last question covers the research question on preservice training, "What role does preservice training seem to play in the interns' use of technology?" The interview question, "In what ways do you see your preservice training influencing you as you try to use technology in your classroom?" concludes the interview by asking the interns to reflect on the influence of their preservice training.

Interview procedures. Each question in the protocol was asked. However, the interns inevitably responded in ways unanticipated by the pre-set questions. Because the interview was semi structured, the interviewer had the flexibility to ask probing questions to explore those responses. If certain probing questions arose consistently, they would be added to the core list of interview questions. If some questions did not yield sufficient data-rich responses, they would be discarded.

The interviewer conducted the interviewed in the spirit of a mutually beneficial conversation (Kvale, 1996). Both the interns and the researcher benefited from the interviews. For the interns, they engaged in a discussion of their teaching strategies with technology and reflected on their pedagogical purposes for using technology in the classroom. The researcher received abundant data revealing the interns' thoughts regarding their experiences with technology and their changing attitudes towards technology.

Observations

Observations provide another avenue for data collection—allowing the researcher to view the studied phenomenon in its natural environment. Observations permit "the inquirer to see the world as his subjects see it, to live in their time frames, to capture the phenomenon in and on its own terms, and to grasp the culture in its own natural, ongoing

environment" (Guba & Lincoln, 1981; as cited in Lincoln & Guba, 1985, p. 273). In conducting a case study of the experiences of interns participating in a technology integrating internship program, observations provided valuable descriptions of what actually goes on in the classroom as interns attempted to use technology. In addition to being able to record classroom activities and behaviors, observational data provided topics for discussion during interviews with the interns.

Observations differ from interviews in a number of ways. First, observations occur in natural field settings, instead of neutral interview settings (Merriam, 1998). Second, observations allow the researcher to see the phenomena firsthand, as opposed to hearing it described by the participant (Merriam, 1998). Additionally, direct observation provides the researcher with an opportunity to "understand and capture the context within which people interact (Patton, 2002)."

Before beginning observations, a researcher must determine what to observe (Merriam, 1998). A few factors guide this decision. The most important factor is the purpose of the research (Merriam, 1998). For this study, the purpose in choosing to do observations was to "see" what it looks like when an intern attempts to teach with technology: How did they use technology in the classroom? What kinds of problems did interns confront as they tried to teach with technology? How did their students respond?

Other practical considerations are necessary to consider when deciding what to observe. For one, a researcher must understand that some behaviors are impossible or difficult to observe (Merriam, 1998). One way a researcher can determine what to observe, is by performing preliminary observations. Preliminary observations help a researcher anticipate what is possible to observe.

Observation guideline. During the Fall 2002 semester, the researcher used preliminary observations to draft an observation guideline to direct classroom observations and field notes. The initial draft of the guideline consisted of a list of questions about what to observe (i.e. "How is the intern using technology?", "How are the students responding?", etc.). These questions were designed to remind the observer of what he or she should pay attention to. The researcher discarded some questions because they proved difficult to observe or yielded little data. Throughout the repeated, preliminary observations, the researcher revised the list of questions by adding new ones or rewording and grouping other ones.

After repeated revisions and field tests, the observation guideline consisted of 13 questions under five categories (see Appendix D). The categories were lesson objectives, technology use, student engagement, pedagogical skill with technology, curricular effectiveness of the technology used, and National Education Technology Standards (NETS) for Teachers. The researcher chose these categories because of their relation to the research questions and their ability to provide observational data.

The first category, "learning objectives," guides the observer to list the learning objectives covered in the lesson. Each intern must write a lesson plan for each lesson he or she teaches. Within each lesson plan is a section for learning objectives. The observer looked at the lesson plan to find the list of learning objectives.

The second category, "technology use," investigates the research question "How do interns use instructional technology during their student teaching experience?" The researcher was interested in what technology was used and how the intern used it.

"Student engagement," the third category, focuses the observer on how the students respond to the lesson. Studies have shown a positive correlation between student attitudes towards instructional technology and teacher attitudes toward instructional technology (Dupagne & Krendl, 1992). Therefore, if the students respond positively to an intern's lesson incorporating technology, that experience is likely to have a positive affect on the intern's attitude toward technology.

"Pedogogical skill with technology" explores two research questions: "How do interns use instructional technology during their student teaching experience?" and "What issues do interns face as they use technology during their student teaching experience?" Using technology in the classroom requires preparation and practice (ISTE, 2000). Specifically, this category sought to understand how transitions were made from non-technology segments of the lesson to technology segments and vise versa. The category also investigated the types of problems interns faced while using technology. When attempting to use technology, small problems inevitably occur. Examples of technology problems, culled from the researcher's preliminary observations, include: "laptop has problem connecting to the digital", "students tripped over the exposed power chords", and "video stream did not work."

"Curricular effectiveness of the technology" used explored how interns use technology and how the chosen technologies corresponded with the learning objectives. Two questions in this category explored the first research question while investigating a question first debated by Kozma and Clarke in 1994. Kozma (1994) supported a broad range of technology applications in the classroom, believing that the medium used in presenting a concept has an affect on student learning. Clarke (1994) argued that the

medium is merely a different delivery mechanism, and that lesson content is most important. According to Clarke (1994), whether or not a teacher uses a blackboard or a digital projector, is inconsequential to learning.

The last category, "NETS for Teachers," covered the National Educational Technology Standards (NETS) for teachers. The NETS for Teachers are a nationally recognized frame of reference for teacher proficiency in technology integration. Currently, forty-one states have either adopted or referenced the NETS standards in their department of education documents (i.e. state certification, licensure, technology plans, curriculum plans, assessment plans, or other documents) (ISTE, 2002).

NETS for Teachers. The NETS for Teachers (ISTE, 2000) consist of 21 standards organized into six categories (see Appendix E). Each of the six categories contains a number of specific standards. These standards serve as indicators of teacher proficiency with instructional technology. Not all of the standards are observable during a classroom visit.

The first category, "Technology Operations and Concepts," has two standards. It states that teachers should "demonstrate a sound understanding of technology operations and concepts" (ISTE, 2000). The first standard, within this category, states that teachers should "demonstrate introductory knowledge, skills, and understanding of concepts related to technology (as described in ISTE's National Educational Technology Standards for Students)" (ISTE, 2000). The National Educational Technology Standards for Students (NETS-S), referred to in this standard, are organized with the same six categories as the NETS-T. ISTE provides NETS-S technology performance indicators

for K-12 students. The observer used these indicators to rate an intern's fulfillment of this standard (see appendix F).

The second category, "Planning and Designing Learning Environments and Experiences," supplies five standards. It is not possible to observe the implementation of some of these standards. For example, it is not likely that an observer is capable assessing whether an intern uses current research to guide their technology-infused lessons, as stated in the second standard (NETS-T-2-B; see appendix F).

"Teaching, Learning, and the Curriculum," the third category, contains four standards that are possible for the researcher to observe in the classroom. The first standard (NETS-T-3-A) in this category, states "teachers facilitate technology-enhanced experiences that address content standards and student technology standards" (ISTE, 2000). With access to both content standards (Virginia's SOLs) and student technology standards (NETS for Students), the observer was able to determine if an intern used technology to enhance instruction, while meeting the SOLs and the NETS for Students.

The next category, "Assessment and Evaluation," requires teachers to "apply technology to facilitate a variety of effective assessment and evaluation strategies" (ISTE, 2000). The researcher used this category, to indicate whether an intern used technology to assess student learning.

The fifth category, "Productivity and Professional Practice," states that teachers must "use technology to enhance their productivity and professional practice" (ISTE, 2000). This category focuses on behaviors that are not associated with the act of classroom teaching, which renders it useless for observation. However, one of the standards within this category (NETS-T-5-C; see Appendix E), is observable in a

classroom setting. It states that teachers should "apply technology to increase productivity" (ISTE, 2000). If an intern uses technology to increase productivity in the classroom, he or she meets this standard. Otherwise, this category is not particularly useful for observations.

"Social, Ethical, Legal, and Human Issues," the last category, says that teachers should "understand the social, ethical, legal, and human issues surrounding the use of technology in PK-12 schools and apply that understanding in practice" (ISTE, 2000). In addition to promoting ethical use of technology, this category emphasizes using technology to support the needs of "learners with diverse backgrounds, characteristics, and abilities" (ISTE, 2000). Each of the four categories, within this category, is observable in the classroom.

Improvement of the observation guideline. In order to increase the instrument's face and content validity, the observation guideline received similar treatment as the interview protocol. The researcher: 1) using the guideline, observed previous interns, and 2) consulted the same group of researchers in the field of instructional technology for review of the observation guideline. Both activities were instrumental in the process of revising the observational guideline. The guideline combines the researcher's own questions, influenced by the research questions and preliminary observations, with a section devoted to the NETS for Teachers, as well as space for additional observations not anticipated by the questions (see Appendix D for the Observation Guideline).

The purpose of the observation guideline was to assist the observer to focus on observing behaviors consistent with the subject area of the research questions. While collecting qualitative data, it is important to maintain some sort of focus (Miles &

Huberman, 1994). Without proper focus, data collection may become too scattered to yield the necessary depth and richness characteristic of solid qualitative studies. The observation guideline was a tool, developed by the researcher, to direct the observer's attention on behaviors related to the purpose of the research, as defined by the research questions.

Observation procedures. In a similar qualitative case study of student teachers, Richardson-Koehler (1988) conducted formal observations once every two weeks. Following this example of observational frequency, the interns were observed no less than once every two weeks. The interns teach for 18 weeks. Therefore, each intern were to be observed at least nine times.

To begin an observation, the observer enters the intern's classroom and finds the least conspicuous seat in the classroom from which to comfortably observe. Using a laptop computer, the observer utilizes the observational guideline as a template to guide the field notes. After the session, the observer reviews the field notes, corrects grammatical mistakes, smoothes over incomplete sentences, and adds additional thoughts, if they arise.

In conjunction with the observations of the interns, the researcher kept a reflective journal on his thought processes with regard to methodology and ongoing data analysis. This journal provided insight into the progress of his thinking, and helped document the changes and adjustments made with regard to data collection and data analysis.

Observations provided data to document a wide variety of classroom lessons, giving an indication of how interns used instructional technology and the issues interns faced as they used it. The observer looked closely at six major areas: learning objectives,

types of technology used, student engagement, pedagogical skill with technology, curricular effectiveness of the technology used, and the NETS for Teachers addressed. The observer used the questions in the observation guideline as a checklist and reminder for what to pay closest attention to.

Artifacts

Artifacts provide an additional source of qualitative data. Artifacts are written materials that offer documentation of activities within an organization or program (Patton, 2002). Artifacts can range from personal documents (autobiographies, personal letters, diaries, etc.), official documents (newsletters, policy documents, code of ethics, case records, etc.), and popular culture documents (feature films, television shows, recorded music, magazines, advertisements, etc.) (Bogdan & Biklan, 1998). They have the potential of revealing data that observations and interviews cannot (Eisner, 1991). In educational research, artifacts represent important data sources that can be compared with interview statements made by teachers (Eisner, 1991).

For this study, the researcher looked at the interns' daily lesson plans for evidence of technology integration. Clover County Schools require all teachers to write lesson plans for each subject and class period they teach (see Appendix G). Clover County Schools lesson plans include a section including the pedagogical purposes of the study and the list of activities the teacher will do. As participants in the study, interns compile their lesson plans into an accessible three-ring binder.

Using lesson plans as artifacts, has a threefold purpose: 1) to indicate evidence of the inclusion of technology, 2) to indicate verification of a pedagogical purpose to any

inclusion of technology, 3) to compare classroom observation data with the contents of the lesson plan (did the lesson taught follow the lesson plan?).

Technology log. Another artifact used is a technology log sheet the interns filled out, documenting their use of technology. As part of their responsibilities, interns filled out a simple technology log, documenting every time they used technology. The technology log is a form that includes fields for the date, subject/grade level, and the type of technology used (i.e. "May 21; 5th grade Social Studies; used Internet site to view historical documents") (see Appendix H). In a study of student teacher use of technology, Wetzel, Zambo, Buss, and Arbaugh (1996) used a similar instrument called "classroom implementation logs" to assess the time student teachers spent using technology and their purposes for using it.

Online group discussion. With the growth of the Internet and the increasing numbers of connected users, online discussion platforms are becoming increasingly popular for a variety of educational applications (Roarke & Anderson, 2002). For many college courses, online forums, list serves, and bulletin boards are now prominent elements of the course requirements (McLoughlin & Luca, 2001). Reflecting on a topic and communicating one's thoughts into words are powerful educational experiences (Freedman, 1989). "Explaining, elaborating, and defending one's position to others (as well as to oneself) forces learners to integrate and elaborate knowledge in ways that facilitate higher order learning" (Oliver & Naidu, 1996; cited in Rourke & Anderson, 2002). When placed into the context of an online discussion group, this teaching strategy takes on a new dimension.

To provide an added element to the data collected in the study, each week interns responded to an open ended discussion question posted on an online discussion platform. The discussion platform, hosted by ezboard.com, Inc., is an online threaded discussion website. Using this website, interns answered questions posted by the researcher. Intern responses were visible to all the participants, and participants were able to respond to each other. The researcher generated the discussion questions each week in response to his observations, interviews, and discussions with interns.

The discussion platform provided a forum for interns to interact with each other. In this regard, the platform became a weekly focus group around one common question. The discussion platform presented an opportunity for interns to reflect and respond to questions about using technology in the classroom. The data accumulated from the written responses to open ended surveys are considered artifacts (Patton, 2002, p. 4).

The discussion questions purposefully provoke contemplation and thoughtful responses. Certain types of questions create rich, vivid responses. Carefully crafted discussion questions, such as hypothetical or ideal position questions, were used to elicit meaningful responses. Below is a list of two discussion questions asked during the semester:

> A hypothetical question: "If someone were to come into your classroom, what do you think they would see?"
>
> A question asking for an ideal position: "If there are three things you could change (for the better) with regard to your classroom management strategies, what would they be?"
>
> (Strauss, Schatzmann, Bucher, & Sabshin, 1981; cited in Merriam 1998)

Ethical Issues

All studies using federal funds, must be approved by an institutional review board that is federally approved. Because the STAT program is part of a federal grant, the current study required approval from Old Dominion University's Institutional Review Board (IRB). On December 16, 2002, the IRB approved the study.

Bogdan and Biklan (1998, p. 43) suggest that human subjects should "enter research projects voluntarily, understanding the nature of the study and the dangers and obligations that are involved". Subjects should also not be exposed to unnecessary risks (Bogdan & Biklan, 1998). STAT interns, the participants in the study, signed an informed consent form, explaining the purpose, procedures, and possible risks of the study (see Appendix K). Pseudonyms were used for the names of interns, their cooperating teachers, schools, and the county the study took place in.

Researcher's role

"In addition to understanding general aspects of the culture you are studying you have to understand how your personal characteristics and status might affect your fieldwork relationships with individual subjects you encounter" (Bogdan & Biklen, 1998, p. 84). In addition to my role as researcher, I have a number of roles in the STAT internship program. Without a proper explanation and exploration into each of them, it may appear to compromise my objectivity and credibility as a researcher.

First, I worked for the STAT program as the internship program coordinator. I recruited, oriented, and directed the ODU interns that participate in the program. I also organized the interns' living situations and facilitated their move to Clover. A week or two before classes start, I facilitated an orientation program that included: an introduction

to Clover County, an introduction to the STAT program, a workshop with their cooperating teachers on communication skills and expectations, a workshop on classroom management, and workshops on classroom technologies.

After orientation week is over, the interns went to the schools and began teaching. From that time forward, I concentrated on two things: organizing their weekly technology seminars and maintaining regular communication with them to help alleviate any problems that arose during their experience. For the technology seminars, I initially took a secondary role. Although I help with the organization and content of the seminars, a Clover County Instructional Technology Specialist, was the lead facilitator. I attended each meeting and concentrated on giving individual attention to the interns who needed the most help with certain technology applications. Midway through the semester, the lead facilitator accepted another job, and I became lead facilitator of the technology workshops.

I maintained regular communication with the interns, through classroom visits. I knew each of their schedules and visited each intern at least once every two weeks. When observing their classrooms, I provided them written feedback using the 2 + 2 method. The 2 + 2 feedback method is a simple way of providing useful feedback. Using 2 + 2, the observer provides two compliments and two suggestions to the person being observed (Allen & Leblanc, 2002).

The interns did not rely on me for a grade. The university appointed a supervisor for them who assigned their final grade. Therefore, interns did not have to "perform" for me so that I would give them a passing grade. If I were responsible for their grades, the interns might have been less honest with their interview responses. In my experience of

working with interns, most want their classes to run flawlessly smooth in front of their university supervisor. Because this study aimed at capturing their experiences teaching with instructional technology, interns may have felt less secure experimenting with new technologies if I was their university supervisor. The credibility of the study and observations would have been compromised. Ultimately, I wanted interns to feel as comfortable as possible to say what they wanted and unafraid of letting me see their lessons when they did not run as smoothly as they had hoped.

Although STAT interns received a $4,000 stipend for participating in the program for one semester, I was not responsible for their paycheck. They were paid by Clover County Schools. If, for any reason, an intern was dismissed or fired from their position, that decision would be made by the superintendent of schools. If I controlled their funding as well, my role as internship coordinator and researcher might have been conflicting. If I controlled their paycheck, interns may have been less candid in their responses and actions in the study. Since I did not pay the interns, my roles as internship coordinator and researcher were less likely impact intern behavior.

Although I did not give interns their grades or supply their funding, I played a prominent role in their internship experience. In addition to their cooperating teachers and principals, I interacted with them in a personal and professional level. In addition to the novelty of teaching for the first time, most interns have never lived in Clover County and some had never lived away from home. They needed someone to orient them to the schools, culture, and surroundings of Clover County. Particularly during the first two weeks, but also throughout their experience, I played the role of their orientation guide

and advocate. I tried to ensure that their needs were met and that they were able to function within the setting of Clover County.

Data Analysis

Qualitative studies use the process of induction for data analysis. Lincoln & Guba simply define inductive data analysis as "making sense of field data" (1985, p, 202). As this is a multiple case study, both within case and cross case analysis were performed (Miles & Huberman, 1994). These two categories acted as the two main foci of the data analysis. For within case analysis, a researcher looks for patterns and categories arising within each individual's case. A within case analysis is particularly useful for documenting the progress and change in individual intern attitudes toward technology and teaching. The cross case analysis encompasses the similarities and differences that emerge from the data across different cases.

Analyzing data requires some sort of mechanism for categorization. The process for categorizing data, advocated by Glaser and Straus, is the constant comparative method (1967). This method involves "sorting units into provisional categories on the basis of "look-alike" characteristics" (Lincoln & Guba, 1985, p. 203). The researcher identifies individual characteristics and properties in a process of continuous categorization. The categorization process refines the categories until they meet the following criteria: 1) they reflect the purpose of the research, 2) they are exhaustive (all data units must be able to fit into a category or subcategory, 3) they are mutually exclusive (a data unit must qualify to fit into one unit only), 4) they are sensitizing (graphically define the sense of the category), and 5) they are conceptually congruent (exist at the same level of abstraction) (Merriam, 1998, p. 183-4).

Categories are derived from coded data. Miles and Huberman (1994, p. 57) describe codes as "tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study." Coding is the process of labeling these units of data in order to organize and classify them. "Coding occurs at two levels—identifying information about the data and interpretive constructs related to analysis (Merriam, 1998, p.164)." The researcher not only classifies the data by labeling subsets or units, he applies some level of interpretation, as well. One level is objective and the other subjective. In general, codes provide the language with which the researcher categorizes and summarizes data.

For this study, coding occured both during and after the data collection process. Miles and Huberman (1994, p. 65) advocate this:

> Coding is not just something you do to "get the data ready" for analysis, but, as we have said several times, something that drives ongoing data collection. It is a form of early (and continuing) analysis. It typically leads to a reshaping of your perspective and of your instrumentation for the next pass. At the same time, ongoing coding uncovers real or potential sources of bias, and surfaces incomplete or equivocal data that can be clarified next time out.

During data collection, after observation field notes and interview transcripts were typed, the researcher began to code the data. As the list of codes becomes longer, the researcher grouped and regrouped the codes into categories. A cyclical process of grouping and regrouping was anticipated, until the categories satisfied the five criteria of the constant comparative method, mentioned above.

The NETS for Teachers were referred to during cross case analysis, providing a general overview of how the interns met each standard. Examining the NETS for Teachers offered a context and backdrop for the interns' instructional technology accomplishments.

The qualitative data analysis software, NUD*IST, was used to help with coding (QSR International, 1997). Bogdan & Biklen (1998) suggest for major research projects, such as dissertations, that a technology competent researcher consider using a qualitative data analysis software program "for the various mechanical aspects of data analysis." Because all of the data was housed on a laptop, a qualitative computer software, such as NUD*IST, lent significant assistance to the discovery of themes within the data sets. For this study, NUD*IST assisted in the coding, categorization, organization, management, and retrieval of data. In the end, the researcher should find a method of analysis that complements his organizational style (Bogdan & Biklen, 1998). Due to his experience and comfort level with computers, this researcher chose to use a computer for data analysis.

Issues of Verification

Qualitative studies rely on the researcher's senses, perceptions, and skill in uncovering meaningful data (Patton, 2002). Before accepting the findings of a qualitative study, the researcher must convince the reader of his credibility and trustworthiness in conducting the study. Patton (2002) states that credibility in qualitative studies is dependent on three elements of inquiry: rigorous fieldwork methods, researcher credibility, and philosophical belief in the value of qualitative inquiry.

For qualitative studies, it is crucial that the researcher implement rigorous fieldwork methods. One way of demonstrating rigorous fieldwork in data analysis is by systematically searching for "alternative themes, divergent patterns, and rival explanations (Patton, 2002, p. 553)." In the analysis of the data, the researcher continually challenged his personal predispositions and biases. Those personal predispositions and possible biases were shared within the report of the findings.

One technique for establishing trustworthiness and credibility is the keeping of a reflexive journal. A reflexive journal is a "kind of diary in which the investigator, on a daily basis, or as needed, records a variety of information about *self*...and *method*" (Lincoln & Guba, 1985, p. 327). For this study, a reflexive journal was used for me to reflect on the process of the research and how my own predispositions affected the data collection. Throughout the study, I used the reflexive journal as a way of brainstorming and entertaining different approaches and conclusions.

Another way an investigator demonstrates credibility is through the use of negative cases (Lincoln & Guba, 1985, p. 309; Patton, 2002). Negative cases are those data elements that do not fit into the categories constructed by the researcher. They are exceptions. Once a negative case is found, it is the researchers task to make an "assiduous search" for other negative cases "until no further negative cases are found" (Lincoln & Guba, 1986, p.77; cited in Patton, 2002, p. 554). I used negative cases as a chance to alter categories and constructs. The reflexive journal was a helpful tool in providing a forum to express my thought process in assimilating the negative cases into the constructs.

Triangulation. Triangulation establishes the credibility of collected data, by using different sources, methods, investigators, and theories. By triangulating data, a researcher can "overcome the intrinsic bias that comes from single-methods, single-observer, and single-theory studies" (Denzin, 1989, p. 307; cited in Patton, 2002, p. 555). Triangulation is a major part of the data collection methods of this study. There are four different types of triangulation: methods, source, investigators, and theories (Denzin; cited in Lincoln & Guba, 1985, p. 305).

Methods triangulation compares findings achieved from different data collection methods—particularly qualitative and quantitative (Patton, 2002). For this study, qualitative research methods were used exclusively. Therefore, this study can not benefit from methods triangulation.

Triangulation of sources compares different data sources within the same method (Patton, 2002). Various data sources, within the qualitative design, were used to confirm the authenticity of the data collected. For example, an intern says something in an interview that conflicts with what the researcher observed in the classroom. Also, the learning objectives, found in an intern's lesson plans (artifact), can be compared with what the researcher actually observes in the class (observation).

Analyst triangulation uses different investigators to review the findings (Patton, 2002). The study uses analyst triangulation in two ways. First, two investigators are currently studying the internship program, the current researcher and the independent investigator of the STAT program. The findings from the surveys and interviews of independent investigator of the STAT project were used to compare with the data and conclusions of this study. Secondly, to increase the reliability of the researcher's

observation field notes, an outside observer was used to observe interns, using the observation guideline, at the same time as the researcher. The results from both observers were compared and assessed for inter coder reliability. Although qualitative researchers do not expect two observers to report the same findings, it is important that their observations be compatible (Bogdan & Biklen, 1998; p. 36).

Prolonged engagement. Lincoln and Guba suggest that for a study to be credible, it must have prolonged engagement and persistent observation, in addition to triangulation (1985; 301). Prolonged engagement "is the investment of sufficient time to achieve certain purposes: learning the "culture," testing for misinformation introduced by distortions either of the self or of the respondents, and building trust" (Lincoln & Guba, 1985; 301).

Prolonged engagement requires that the researcher be in the field and interact with the participants for a sufficient amount of time to understand the context and culture of the subjects they are studying (Lincoln & Guba, 1985, p. 302). A researcher must get to know the culture and context surrounding the phenomenon. It takes time to become sensitive to the intricacies of culture and context. My five semesters experience working in the context of Clover County schools gave me a deep understanding of the intricacies associated with the context of the schools and how interns fit into them. In addition, respondents may provide false information that is misleading to the researcher (Lincoln & Guba, 1985, p. 303). A researcher with sufficient time in the field, is less likely to be fooled or diverted by misinformation. Finally, prolonged engagement gives the researcher an opportunity to develop trust with the participants and their surroundings (Lincoln & Guba, 1985, p. 303). As I was the recruiter of the program, my relationship

with the interns predates the duration of the study. I also acted as their program supervisor, which allowed me time to get to know them in both formal and informal settings. I saw my job as trying to be their advocate in a new setting, Clover County. I worked hard and purposefully at building their trust and feel that I was successful in establishing good rapport with them. The evaluation reports, by the external evaluator of the STAT program, indicate this (Curry-Corcoran, 2003).

Patton (2002, p. 566) states that the principle mission for establishing researcher credibility is "to report any personal and professional information that may have affected data collection, analysis, and interpretation—either negatively or positively—in the minds of users of the findings." I will use the reflexive journal as an outlet for discussing what has occurred during the entirety of the research process. I intend to discuss any issue that may affect the results in the narrative of my data analysis.

Data Collection

On January 27, 2003, all seven interns signed the informed consent form (see Appendix K). Data collection began on the first week of school (February 3), when I posted the first question on the online discussion board (ezboard 1).

Observations. A week later, I conducted my first interview and observation. For the rest of the semester, I attempted to observe each intern teach once every two weeks (see Table 3). Each week, I asked the interns to inform me of when they would use technology, so that I could observe them. Sometimes, I observed them on a time they suggested. Other times, I observed them unannounced.

Table 3

Number of Observations, Interviews, and Online Postings per Intern

Intern	Observations	Interviews	Online postings (ezboard.com)
Tammy	8	4	17
Donald	9	4	17
April	8	4	17
Ryan	8	4	17
Rhonda	8	4	16
Anne	8	4	17
Tripp	7	4	17

The Observational Guideline was used in each observation. I used the Guideline questions to remind me of what I should concentrate on (see Appendix D). The observations were written in a narrative form, following the sequence of events in the intern's lesson. Each applicable question in the Guideline was answered in the narrative. At the end of the Observation Guideline is a list of the NETS for Teachers. I intended to list each NETS standard I saw demonstrated within the lesson. Initial attempts demonstrated that such a task was highly subjective, if not impossible.

Towards the end of the semester, I asked a former intern to observe two classes with me, using the Observational Guideline. The differences between the NETS standards she and I listed were significant. Our coding of the NETS Standards for Teachers was in agreement 41% of the cases. Because of low inter coder reliability, I

decided to forego referencing the NETS standards in each observation. It became apparent that a discussion of the NETS standards would be more appropriate after the data had been analyzed. Therefore, a discussion of the interns' adherence to the NETS standards is included at the end of Chapter 4.

Interviews. I interviewed each intern four times throughout the semester. The first three interviews relied exclusively on the Interview Protocol (see Appendix C). I noticed, after three interviews using the Interview Protocol, that the interns' answers had become similar to their previous interviews. Using the Interview Protocol for the final would likely yield little new data. Therefore, I decided to come up with a flexible list of questions that focused on the interns' reflections on their internship experience and their future use of technology as a teacher:

> So, you've been teaching here for a whole semester and you've been able to experiment with different technologies. What are your thoughts on technology at the moment?
>
> What kind of a role do you see technology playing in your life as a teacher next year and they years to come?
>
> In your opinion, do you think that student teaching is a good time to be emphasizing and learning about instructional technology?

I transcribed each interview soon after it was conducted. I found that personally transcribing each interview helped me to gain an intimate familiarity with the interview data. I also felt that transcribing the interviews soon after an interview helped keep alive the context and setting in which the comments were made.

Data Analysis

Developing a framework. Following data collection, I transcribed the remaining untranscribed interviews while developing a framework for data analysis. From the start, the research questions guided the analysis (Patton, 2002). I began by splitting the five research questions into separate categories. I then looked at the three types of data sources (interviews, observations, and artifacts) and grouped them according to which research question each type would illumine (see Table 4).

Table 4

Research Questions and Data Sources

Number	Research Question	Data Sources
1	How do interns use instructional technology during their student teaching experience?	Interviews, observations, lesson plans, technology logs, ezboard
2	What issues do interns face as they use technology during their student teaching experience?	Interviews, observations, ezboard
2a	In what ways do they respond to these issues?	Interviews, observations, ezboard
3	What are their attitudes and beliefs toward technology and how do they change throughout their internship experience?	Interviews, philosophy (ezboard)
4	What role does preservice training seem to play in the interns' use of technology?	Interviews, ezboard

Number	Research Question	Data Sources
5	What kinds of patterns emerge from the data indicating a shared experience with technology amongst the interns?	All

I noted that my observations would naturally yield information for the first two questions regarding how interns used technology and what issues, with regard to technology, they faced. However, observations would not yield information on intern attitudes or indicate the role preservice training had on their use of technology. For the third and forth questions, regarding intern attitudes and the role of preservice training, interviews and online discussions would naturally yield data in this category.

I also grouped the data into the types of analysis methods I planned to use with each data type (see Table 5). For the electronic data—including interviews, observations and ezboard posts—I chose NUDIST, a qualitative analysis software. The remaining artifacts—lesson plans and technology logs—were turned into me, by the interns, in various formats (electronic, handwritten, hard copies). Analysis of these artifacts was done individually and by hand. The purpose of collecting lesson plans and technology logs, was to provide a source of triangulation and verification for the data collected through observations, interviews, and online discussions. Another factor influencing the initial strategy for data analysis was whether or not the data type could be used for cross case analysis, within case analysis, or both (see Table 5).

Table 5

Tools and Strategies for Analysis

Data Type		Analysis Tool	Analysis Strategy
Interviews		NUDIST	Coding (CC & WC)
Observations		NUDIST	Coding (CC & WC)
Artifacts			
	Lesson Plans	Hand	WC (comparing with observational data)
	Technology Logs	Hand	CC & WC
	Ezboard Posts	NUDIST	Coding (CC & WC)

CC = cross case; WC = within case

Initial analysis. At the beginning of analysis, I considered it important to get a broad view of the field of data and the general themes across the cases. Therefore, I read all of the observations, interviews, and ezboard postings. Using NUDIST, I constructed an initial framework of codes for each data source. The structure for the coding followed the research questions. The first research question was coded as (1), the second question (2), and so on. For example, if an intern described her use of PowerPoint in an interview, that would apply to the first research question and would be coded within that section (1). Within each main category included many subcategories that gradually emerged as each interview was coded.

The initial coding of all the interviews yielded 56 nodes (coded sections). Although these sections were not final and needed reorganization, I chose to analyze the observations next. Because the observations cover only two research questions, I decided to code them by the structure of the Observation Guideline. For example, the first item in the Observation Guideline was, "Technology Used." Therefore, if I observed an intern using the wireless laptop cart, I would code that data within the umbrella of the first category node (1), "Technology Used."

The last data type to receive cross case coding was ezboard discussion items. Again, because this data type addressed all of the research questions, I went back to the research question based coding scheme used for the interviews. Using the insights I gained from the initial coding of the interviews, the initial structure of nodes were more logical. For instance, during my initial coding of the interviews, I created a long, uncategorized list of technology uses. For the ezboard coding, I decided that it was more logical to create two subcategories beneath the technology use node: hardware (1 1) and software (1 2). If an intern mentioned their use of a digital projector, I would code that as "1 1 4" (i.e. Technology use – Hardware – Digital Projector).

After the initial cross case coding, I began to examine each case individually. For each case, I read all of the data associated with it, while taking notes and gleaning passages that illuminate the research questions. While reading and rereading the data, data sets were compiled into different sections associated with the research questions. For example, if, during an interview, April discussed her use of PowerPoint presentations, I included this passage with other data associated with the first research question (technology use).

After the data was divided into categories according to the research questions, I began writing a rough draft of the narrative of each case study. The narrative of each case study was structured to follow the themes of the research questions, while attempting to maintain a semblance of chronological sequence. I studied each case individually. After finishing one, I moved on to the next.

After a thorough analysis of each case study was complete, I re-read the data from a cross case perspective. Taking the perspective I gained from examining each case, I inspected the initial coding scheme that was created at the beginning of the analysis process. I found that some categories were mislabeled, others needed expansion, and some needed to be deleted. Rereading the data, I was able to ensure that all of the data fit appropriately into each category. When I felt satisfied that the categories reflected my research questions and were exhaustive, mutually exclusive, sensitizing, and conceptually congruent (Merriam, 1998), I began writing the cross case analysis.

CHAPTER 4: RESULTS

Overview

This study attempted to investigate a number of aspects of attempting to integrate technology during an internship experience. Using a case study approach, seven interns were studied. An analysis of the data reveals a number of themes related to the five research questions. To begin the narrative, case studies of the seven participants are shared. Each case study is organized according to the research questions. Short headings are used to refer to the central topics of each research question (see Table 6).

Table 6

Short Headings for Research Questions

Number	Research Question	Short Heading
1	How do interns use instructional technology during their student teaching experience?	Technology Use
2	What issues do interns face as they use technology during their student teaching experience? In what ways do they respond to these issues?	Issues
3	What are their attitudes and beliefs toward technology and how do they change throughout their internship experience?	Attitudes
4	What role does pre-service training seem to play in the interns' use of technology?	Preservice Training

Number	Research Question	Short Heading
5	What kinds of patterns emerge from the data indicating a shared experience with technology amongst the interns?	(none)

Following the discussion of each case study is a cross case analysis of the field of data, which explores the themes of the research questions across all of the cases. Ending the cross case discussion is an analysis of the interns' fulfillment of the technology teaching standards, (NETS for Teachers).

Case Study 1: Tammy

Tammy is married and lives in a rural town, with similar demographics as Clover County. She and her husband are farmers. She is in her late forties and has a grandchild. Previously she worked as a nurse and decided that she wanted to become a teacher. She went back to school in order to earn a master's degree in education as a reading specialist. This semester marks the culmination of several years of taking classes at video conferencing sites and commuting to and from the University, an hour's ride from her home.

Tammy is hard working and driven. During the first weeks of the program, she repeatedly stated how determined she was to make her teaching experience in Clover a success. Her previous teaching experience had been a bitter one, as a long term substitute in her home school district. She said that she was given little support from the administration, which frustrated a number of serious classroom discipline issues. She left that experience feeling wounded and defeated.

She saw the STAT program as a way to prove that she could find success in a challenging teaching experience. This was not easy. She entered a 2nd grade classroom that had been identified by other teachers and administrators, in the building, as being unique in the behavioral problems and discipline issues that arose from the students.

The semester before her arrival, an intern was placed in the same class. By the end of the fall semester, that intern wanted to leave the program. He felt helpless as a classroom disciplinarian and bitter about being stuck with such a difficult class. As the coordinator of the program and a frequent observer in that classroom, I was unsure how Tammy would handle her placement. I knew that the students were active, talkative, and

"busy." In the end, she kept her focus and determination and, most importantly, her positive attitude, which seemed to sustain her throughout her experience.

Prior Experience with Technology

When I first talked to Tammy, over the phone, about participating in the STAT internship program, I asked her if she had an email address, so that I could contact her. She told me that she "doesn't do email." This struck me as peculiar, because, in my experience as the recruiter of the program, I had not encountered any prospective intern who did not use email. In our initial interview, on February 13, 2003, I asked her about her comfort level with technology, in general:

> Well, I'm not a novice. I'm kind of between beginner and midway. I know how to get what I need out of a computer. And if I see it done and I write it down, then I can replicate it. I feel pretty comfortable on the Net, the web. I use that a lot. The word processors, you know, Word and those kinds of things. I'm self taught, Word. Never had a class. I'm (familiar with) WordPerfect. And I'm self taught at that too. (Interview 1)

She also discussed the training she received, two years prior, during her preservice studies. She described her graduate general education technology class "Instructional technology and the Classroom":

> It briefly just touches on things. It's very quick paced. You have to really know right much about computers before you go into the class. You can do it to say, "yes I've done a web quest", "yes I've done a spreadsheet", you know, the assignments, you're able to do them, but you struggle to get them done. The time is so short. I found it difficult, but I made an A. But it was a lot. A lot of people

> were just really stroking to get assignments done. I'd meet them in the lab (laughs). A lot of people were frustrated because there wasn't enough time. (Interview 1)

It appeared that Tammy learned what she needed to pass the computer class, and little more. Using technology on a daily basis was not part of her routine. Even though she was given a free email account through her admission with the University, she never used it. Knowing this information at the beginning of the semester, new questions, as a researcher, naturally appeared: "Would she start using technology more regularly?" or "Would she merely use it to get by?"

First Interview and Observation

When I first interviewed Tammy, she had been in Clover County for two and a half weeks (one week of orientation, a week and a half of teaching). We met in the teacher's lounge of Reynolds Elementary School, where she teaches second grade.

In this initial interview, I asked Tammy about some of the new technology applications she had learned since her arrival in Clover County. She said that she was "fascinated by *unitedstreaming*" and that she would be using it for the first time later that day.

After our interview, Tammy left to go back to the classroom and prepare for her lesson, which was on magnets. I walked into the class a few minutes later, and observed her lesson:

> Tammy started off her lesson with the digital projector projecting an unclear image on the screen. This was not used for instructional purposes, but did let the students know that they could expect a digital presentation. With the lights on,

standing in the front of the room, she told a story about a telephone call, as an anticipatory set. She then asked about what a telephone call had to do with magnets. One student said, "there are magnets in there."

She said, "Yes, we'll learn more about that in the video."

She then walked to the back of the room, and began finding the *unitedstreaming* site on the web. The computer she used was connected to a digital projector. Apparently, it was cued to the site. However, it took almost a minute to get the video to function properly.

After the video started, a few students commented on the size of the video screen: "It's little", "Can you make it bigger?"

When the narrator of the video asked a rhetorical question [i.e. "Will a magnet attract a penny?" (pause)], about four students answered the question. About ten subsequent questions were asked. Only a few more students responded. The answers they gave were all correct. From my perspective, I saw this as students being engaged and interacting with the presentation, rather than being disruptive.

About 8 minutes into the presentation, I noticed some students began moving around in their seats and a couple started talking. At this point, it appeared that many of the students became bored with the video. From this point, the video lasted twelve more minutes.

After the video was over, Tammy asked a student to turn on the lights. From that point four or five students left their seats to do a number of things. She wanted to give them a practice quiz. However, it took a lot of reminding and

effort on her part to get them to quiet down and remain in their seats for the practice quiz. Within two minutes the students were working in their seats.

In this observation, it seemed that the streaming video captivated the attention of the class for about eight minutes, after which, the class appeared to grow increasingly restless and distracted. As it was presented, it did little more than a video cassette could have done. The technology used, *unitedstreaming*, was simply the displaying of an online video. *unitedstreaming* offers online quizzes which actually offers tests to accompany their videos.

The Clarke and Kozma debate over whether or not the medium of technology makes a difference, is particularly pertinent here. Clarke (1994) argued that the delivery mechanism (the medium) makes little difference on the students' learning. The content of the lesson is more important than the medium it is delivered in. In this instance, it appeared that Tammy used technology the same way a teacher from forty years ago might have used a film projector. Although the medium changed, the method seemed similar. Perhaps the lesson might have been different if she was able to interact with other web pages on the subject or images culled from the Internet. This would have showcased the versatility of technology and created an atmosphere of interaction between the class and the Internet.

Classroom Management

As interns in other studies experienced (Delvin-Scherer & Daly, 2001; Hamilton & Riley, 1999), student behavior and classroom management posed significant problems for Tammy. At Reynolds Elementary, Tammy's class developed a reputation as being

difficult to manage. Even at the onset of her experience, Tammy foresaw problems with the overly active nature of her students impeding her use of technology:

> Classroom management is an issue. So once we get that down to where we feel more comfortable with that and more at ease. I do hope to integrate it into the classroom, because they [students] do love the computers. I mean, they're always begging to go to the computers. So I hope that can be... that's my goal is to be able to go in and just do it. Whatever I need to do. (Interview 1)

A few weeks after her lesson on magnets with a *unitedstreaming* video, Tammy assessed her students' knowledge using eduTest, an online assessment tool. Her experience using an online assessment tool was made difficult by classroom management issues.

She brought up similar issues with classroom management and the use of technology, in response to an ezboard discussion platform question. I posed a question regarding the strategies interns use to encourage their students to be actively engaged:

> Lee - As some of you have mentioned, it can be quite a task trying to get your students interested and "engaged". What strategies, tools, or "tricks" have you employed to help get your students actively participating in your lessons? What has frustrated you the most about student engagement? (ezboard 4)

Her response highlights how she felt issues with classroom management impeded her intended use of instructional technology:

Our second grade listens well to oral tests or quizzes. Today I tried to use the Dukane projector to complete a teacher created eduTest on magnets. Mrs. Simmons' 2nd grade came into our class today for a Dukane Math lesson and the kids were really wound

up after they left. I tried to utilize technology and they were so loud that I just read the review out to them. Most of them did listen to the questions and respond on paper to the 19 questions. Some of them were so excited that they wanted me to grade this in addition to their Magnet end of unit test.

> The most frustrating thing for me is that they do not listen and will not stop talking. They are very rude and will talk back continuously. They do not even care if you warn that a referral is just around the corner because they cannot continue to interrupt the entire class. I wrote my first referral two days ago on a student that had just returned that day from a four day suspension at home. Even though she knows she has been written up, she continues to act out every day. (ezboard 4)

Her response reveals her growing frustration with managing the classroom. She tried to use the Dukane projector to review for a quiz, but her students were being too loud. I did not observe this lesson, but she explains that she wanted to use technology, but, because of the students' loudness, she "just read the review to them". She had to alter whatever plans she devised for instructional technology and simply read a quiz to her students.

Second Observation

The second time I observed Tammy using technology, she took her class to the computer lab to take an online assessment through eduTest. It is a demanding assignment for a new teacher to take a class full of active second graders into a structured and foreign environment of the computer lab. One new teacher helping twenty young students find a site, program, or file on the computer, while troubleshooting individual problems, is challenging. Her experience, during this lesson, seems to encapsulate the

problems and frustrations new teachers face as they attempt to lead a class of students through new activities:

> I came into Tammy's classroom as the students were getting ready to go to the computer lab and take a practice test using eduTest. It took 8 minutes for the students to line up in the classroom, walk down the hallway, enter the computer lab, and find their seat.
>
> Tammy had the students enter the computer lab in groups of four. The students were assigned seats.
>
> They were asked not to touch anything. A few did and one in particular had difficulty quitting a program he clicked into. A student next to him showed him how to quit out. The teacher admonished the student for entering a program when he wasn't supposed to.
>
> She then went to the front of the class and gave all of the students directions on what they were supposed to do. Two or three students had problems starting the program. At least four different students tried to get her attention while she helped one student. They needed help from her. She explained that she needed them to raise their hands and that she would come to them. After about a minute, the talking out of turn subsided and the room was quiet, as the students began taking their online tests.
>
> However, one student still had problems. For the first 15 minutes, she was not able to take the test. I could not tell if she was finally able to get connected and start taking a test.

> I sat in the back close to two boys who talked intermittently during the lab. At one point, I found that I was having a hard time concentrating on writing my field notes, because of the noise they were making. It made me think about how hard it might be for the other students.
>
> One of the students, sitting next to me, opened up some type of music streaming program. He had it loud enough for other students to hear. Tammy was on the other side of the room, so she didn't seem to hear him. She never acknowledged what he was doing.
>
> Forty five minutes after they arrived in the computer lab, they began to line up. It took 5 minutes for the students to line up properly.

This experience demonstrates how intimidating the prospect of leading a class through a new task, in the computer lab, can be. Tammy not only had to face technology problems, which she was only minimally equipped to handle, she had to facilitate a process where an active group of students engaged with a computer one-on-one and go through the steps of taking an online test. With the Internet only a click away, as well as other enticing programs with which these students were undoubtedly familiar with, Tammy faced a challenging obstacle.

Third Observation

A few weeks later, I observed Tammy teaching a lesson using *unitedstreaming* again. This lesson was similar to the lesson she taught seven weeks before: she began with an anticipatory set, played a video, and gave the students a quiz on the material on the video. The only difference was that the video was shorter. The first video was about

20 minutes and this one was less than 10 minutes. I observed, previously, that the students appeared to lose their attention after 8 minutes.

> I arrived when Tammy was introducing the topic using an anticipatory set about the salt content of oceans. As she was doing this, the projector was already turned on and the lights were out. The streaming video was queued.
>
> While starting the video (going over to the computer to press the play button), she told the students that there would be a quiz at the end of the video. When she started the video, one of the students was sitting in front of the projector. Tammy asked her to move.
>
> As soon as it started, there was a hushed murmur of voices in the class. This class is normally extremely talkative, so it is rare that they are quiet. For the first few minutes, one complete side of the class (about seven children) did not pay attention to the video. She had spent a lot of her time standing beside them, perhaps hoping that her proximity would encourage them to stop talking.
>
> After 5 minutes of the video, the murmuring of voices decreased and more heads seemed to be directed toward the screen. Overall, she spent most of her time during the class period disciplining students, reinforcing good behavior, and reminding them of the rules and to pay attention to the video.

I'm not sure why the students watched more intently after the first 5 minutes. I had the sense that they needed that transition time to get used to watching the program. I noticed that the narrator in the video talked in a completely different rhythm—soothing, soft, slow and methodical—much different than the more high-strung "busy" nature of the

classroom. I also think the nature of the video helped. It was about the animals of the ocean. There were nice shots of tropical fish, penguins, sharks, whales, etc.

> The video lasted 10 minutes. Once the video was finished, Tammy told the students to move back to their desks, get a sheet of paper, and prepare for the test. The time of transition between the end of the video and the actual taking of the quiz was over five minutes. While the students prepared for the test, the lights were still out and the projector stayed on. Right before she started the test, she asked for the lights to be turned on. She went back to where the computer was and seemed to try to turn it off but nothing happened. I'm not sure what she was doing and I will ask her about this when I interview her this week.

I interviewed her three days later and asked her what happened after the video. She said that she tried to start an on-line quiz, but that it "didn't work at all. So that went to plan B, which was my own quiz." She said that the way she set up the digital projector with the classroom computer impeded smooth transitions with technology. Instead of hooking up the laptop she was supplied with, she hooked up the classroom computer, located at the back of the class. This meant that, in order to start and stop the video or move to a different site, she had to walk to the back of the class, turn her back to her students and "fumble" with the technology. She had difficulty finding the site for the quiz. I asked her why she didn't use her laptop and she said:

> Cause I'm lazy, that's why. That would make much more sense, but I hadn't figured that out until right now. It just came to me, seeing yours sitting here, so nice and battery charged and not limited. And here I am limiting myself with that computer, breaking my neck, and all of those dumb things that I shouldn't be

> doing… if I had a laptop it would've worked like clockwork. I think it really would. (Interview 2)

In this interview I asked her about something I had observed during my two prior classroom visits. In both of these lessons, Tammy left the projector on, before and after the video was played. So, throughout the rest of her 45 minute science period, the projector projected a blank screen on the board in the front of the class. Although it did not seem to be a distraction to her or her students, it seemed peculiar and unnecessary, that she left it on. After all, it only requires that you push a button to turn the projector off. I asked her about why she did not turn off the projector. She said, "I didn't think about it. I probably should have. I just didn't think to do it." (Interview 3)

Technology Use

Tammy was able to incorporate a number of technologies into her lessons. She took her students to the computer lab for instruction and periodic assessment (eduTest), administered online quizzes, used textbook CD-Roms for classroom materials, used on line video streaming (*unitedstreaming*), and a PowerPoint presentation.

In answer to an online discussion question regarding how she assesses student learning (question 5; see Appendix J), Tammy stated that eduTest, an online assessment tool, where teachers can submit questions in formats similar to learning standards tests, was used regularly:

> I am using eduTest religiously--both teacher created and ones that I myself have created--for each unit. I am currently having the students take a pre and post unit test on Living Systems SOL 2.5. (ezboard 5)

Midway through the internship experience, I asked the interns a hypothetical question, on the online discussion, how they would spend $5,000, if it were given to them to help classroom instruction (see Appendix J). The interns' response to the question gives an indication as to which technology they favor and why. Tammy chose to buy laptops:

> First I would buy five laptops because the students do much better in the computer lab than with more conventional strategies. I would try to group the kids and have them create projects and web quests on the computer for each other to complete. It is really hard with only one computer in our classroom that works most of the time. I think they would work better in groups of five or less to complete their assignments. I could work with those who are waiting to get on the computer. I believe this would be a great use of $5,000. (ezboard 10)

Issues

Classroom discipline. In interviews and online discussion postings, Tammy repeatedly stressed how her biggest challenges were classroom behavior and motivating her students to learn:

> With regards to academic assessment, there are approximately four students who refuse to complete the assignment on a daily basis. Today I moved one of them beside my desk so that I can watch him and to separate him from the other students. (ezboard 5)
>
> If you were to come into my classroom, it would depend on what kind of day the students were having as to what kind of teaching is going on. Sometimes they just refuse to complete their work, speak out rudely, and sometimes as was the case

> today, just scream and curse violently. One of our students even yelled at our assistant principal. He obviously is experiencing some difficulty maintaining control in our classroom. If I can get these three or four students motivated and keep them on task, the rest of the class is ready to learn. (ezboard 6)

She also stated that she feels like she needs to be an "entertainer":

> I feel like teachers are expected to be entertainers for the kids ... I do believe that I could not entertain these children everyday like this. It is too exhausting and emotionally draining on a person. (ezboard 9)

Classroom management problems became a major issue in her decision not to use technology. Trying to keep her students engaged and focused during a technology infused lesson, seemed an impossible task to her. Towards the end of her experience, her posts on the discussion board reflected her frustration with her students' behavior:

> I have experienced great difficulty with technology because the students feel like this is the time to act out. I hope to use Mapmaker this week and will advise. (ezboard 11)
>
> I would definitely like to use more technology in my classroom but I still say that the children are too out of control to use technology. They are loud, disrespectful, and down right nasty at times. It seems that no matter what I do to try to help them, it is never enough. (ezboard 12)

Perhaps most revealing of Tammy's frustrations is the following ezboard post on the fourteenth week of the program:

> I do not use technology because they go crazy if they see any kind of technology in the classroom. I am just too frustrated to try it anymore. I really don't see the

> positive outcomes that one should get with this method of teaching. I would really like to use it more, but it is not worth the hassle to have to keep stopping and discipline them. They do much better with writing or seatwork when they are responsible for their own learning. I have discovered that a couple of the kids that were once a big behavior problem do much better in a self-directed learning situation. I hope another situation will lend itself to a greater use of technology. (ezboard 13)

The following week she made a similar statement:

> I am so very excited about the use of technology, however I believe that until we deal with the discipline issues in the classroom, we are just spinning our wheels to no avail. (ezboard 14)

Digital projector. She also seemed to have a significant problem hooking up the digital projector. However, even the students' behavior seemed to be a distraction for her with this issue as well:

> I could never remember how to hook it up. I believe this could be a very effective tool if the behavior of the students was better. (ezboard 17)

At the end of her experience, she taught a lesson to her class and another class. Although she projected documents that she developed on her laptop, she chose to make them into transparencies and use the overhead projector. She could have easily projected them with the digital projector in the classroom, if she had felt comfortable with it. On our final interview, at the end of the semester she described her dilemma:

> I didn't do the Dukane. I didn't have time to really... I had never worked with these students or these teachers and I didn't want to look like a dummy the first

> time. So I said, I'd better give myself a little more time before I try that. (Interview 4)

Knowing this, coupled with the fact that she decreased her use of technology as the semester progressed, it seems that Tammy did not quite become technology proficient by the end of the semester. Although she tried out many new technologies that she had never experienced before (digital projector, eduTest, *unitedstreaming*, etc.), it did not seem to become part of her routine, nor did it appear to be something she was comfortable, as attested in her statement above. She said that she needed to give herself "a little more time" before trying to project images on the digital projector. I am curious whether or not she will actually attempt using the digital projector, and other technologies that she is hesitant to use, in the future.

Attitudes

"To be effective users of computer technologies and be models for students' computer use, teachers must have positive computer attitudes and feel self-efficacious in using them" (Milbrath & Kinzie, 2000). Interview and online discussion data suggest that Tammy's attitudes toward technology remained consistent throughout her experience. In the beginning of the intern experience, she was excited about the prospect of learning and using new technologies.

> I see it as being a really effective tool, because it's right there. I feel like it's right at my fingertips. All I have to do is take it out of the case and use it. It's not like I have to go someplace and get it. I think that makes it really better for the teacher and the student, cause they love it. (Interview 2)

Toward the end of her experience, I asked all of the interns, online, whether or not they were tired of technology (question 15). Tammy said:

> I am not tired of technology because I believe this is the key to a successful career for me. I am very pleased with my skills and I feel much more confident than I have before.

At the end of her experience she also reflected on her future use of technology:

> In my position as Reading Specialist with Clover County Schools, I will be using a lot of the technology that I have acquired during my experience. (ezboard 17)
> As a reading specialist and teacher, I think it's going to have an active role. I think its going to be a high asset, as a reading specialist, being abreast of technology. There are a lot of teachers who are really great with it, and there are some who are a little anxious about it, just listening to the teachers at the school. I haven't done a lot of talking, believe it or not. I've done a lot of listening and sitting back. And you learn a lot more that way about what's going on. A lot of your long-timers, you know, feel a little bit anxious about technology, and they don't use it, and I think my role will be active in helping them--being a facilitator and mentor and guide with technology. So I hope that's going to be a real plus. And I'm looking forward to using it. I feel a lot more comfortable with it having gone through this internship and these Wednesdays. That's really helped a lot. (Interview 4)

In her final comments, Tammy shows an enthusiasm for teaching with technology. Although teaching with technology did not become a part of her routine by the end of the semester, she used technology to a degree she had not reached previously. She entered

the program as someone who "did not do email" and exited as someone who had used a number of new technology applications that she had never used before. Throughout her experience, she had problems with classroom management, which she cited as being a deterrent to using technology in the classroom. With the exposure and experience she has gained in this program, I feel that she has basic ability to integrate technology in any situation. I am curious whether or not she will chose to use technology in her future endeavors as a teacher and reading specialist.

Case Study 2: April

April taught ninth grade Earth Science at Townes Junior High School. She was paired with a veteran mentor teacher and a classroom well suited for the use of instructional technology. Her mentor teacher, Mrs. Denton, had experience mentoring five previous interns in each of the previous five semesters of the STAT internship program. Mrs. Denton is a recent graduate of the field-based master's program, as well, and a recognized school leader in instructional technology. She keeps a digital projector in her room, in addition to using a host of instructional technology accessories for Earth Science. It is rare for an intern to have a supportive mentor, such as Mrs. Denton, who is capable and successful at encouraging the use of technology (Moursund & Bielefeldt, 1999).

Mrs. Denton works closely with Mr. Samuel, the school's other Earth Science teacher. Their classrooms are connected with a double door, which they generally keep open. Frequently, both classes are co taught by Mrs. Denton and Mr. Samuel. Other times, they teach their classes separately. Throughout her experience, April valued the guidance she received from Mrs. Denton and Mr. Samuel. Midway through her internship experience, she remarked, "I've probably gotten a year's worth of experience from everything I've learned from them" (Interview 2).

Background in Instructional Technology

April is in her mid-thirties. She is about fifteen years older than most of her fellow interns. Like Tammy, this age difference played a part in her difficulty with the technology course required for her teaching program. She took her required instructional technology course three years ago. Because of her age and perceived lack of technology

background, April felt overwhelmed and out of place by the technology course. Her comments about the course are similar to Tammy's.

> I learned a lot in there. But I had a disadvantage, when I took it 3 years ago. When I took it, I could barely use a word processor. So they moved at a pace a lot faster than me. So I missed out on a lot of stuff. Still, she (the professor) helped me out as much as she could. Even though I had had a computer class before that, it just moved a bit faster than me. I'm older than most of these kids and most of these kids grew up knowing how to use all this stuff. But still, I learned a lot. I learned a lot in the computer class... (Interview 1)

Although it was difficult and she felt that it moved at a faster pace than she was comfortable with, April felt that the class was beneficial to her.

> It laid a lot of foundation, even though I still don't know how to do a webpage real good or a web quest, I'm learning it! I'm learning! They've gone over it enough, and from what ya'll have shown me too, I can figure it out now, which is real nice. (Interview 1)

Even though she could not independently create a webpage or a web quest on her own after taking her computer course, with the assistance she received from the STAT program, she felt confident that she could successfully create them. If she had not participated in this internship program, I doubt whether she would have had the confidence to attempt these types of technology applications on her own.

April came into the program feeling comfortable with using the Internet and software programs such as Microsoft Word and PowerPoint.

> I can do anything on the Internet. I can find just about anything I need. I've been doing that a long time. But like spreadsheets and stuff, forget it. Word processing, I don't have any problems with. Making a webpage, yeah... (laughs) not good. But just basic stuff on there, I don't have any problems with anything like that. (Interview 4)

Technology Use

In an 18 week semester, there are 90 days of school. In her technology log, April reported using technology 29 times. Therefore, roughly 1 out of every 3 days, April used technology in some way. In her technology log, she listed using temperature and pH probes, a digital projector, mobile laptop carts, content specific CD-Roms, PowerPoint, and *unitedstreaming* videos. In an interview, she said that she uses PowerPoint 2 to 3 times a week.

Observations

I observed her 8 times throughout the semester. Many of these were unannounced visits. Four of these visits, I happened to observe her using technology.

First Observation. April teaches two hour and a half periods (bells), out of a four bell schedule. She teaches third and fourth bells. Her third bell class generally has six students and is her most difficult class. The behavioral issues in that class prohibited her use of technology:

> I mean, you have to keep such a tight guard on third bell. It's horrible. Actually, I dread the day when I have to use computers with third bell. (Interview 3)

Her fourth bell has more students and less behavioral problems. She felt more comfortable using technology with them. On the online discussion board, she described what a visitor would witness when coming into her classes:

> If someone would come into my fourth bell class they would see students learning. If someone came into my third bell class they would see me trying to keep students attention and me telling them to go back to their seats and to be quiet and pay attention. My fourth bell class does talk some but it is a big class, but they pay attention and they pick things up rather fast, but third bell does not pay attention all of the time. Third bell has it's good days and bad days. So it would depend on the day of the week and the bell that was observed. In general my students learn, just each bell learns at a different rate. (ezboard 6)

Although I observed her two times previously, on the ninth week of the semester, I first observed April using technology during her third bell class:

> When I first entered the room at the beginning of the class period, I saw April organizing her students and her mentor teacher setting up the laptop. When it came time for her to start the presentation, all she had to do was turn it on. Her actual class had only six students, but Mr. Samuel, at the start of the class, brought his class of fourteen in for the review, as well. April was conducting a test review on weathering and erosion. During the presentation, she stood next to the projector, with the exception of a few times when she went to the back of the class to remind a few students to pay attention. She seemed to do this so that she could click on the mouse and shift to the next slide. Mrs. Denton and Mr. Samuel sat in the back of the class. One student, in the back, refused to do anything.

> Although Mr. Samuel went back to him and encouraged him to pay attention, he refused. However, he did not interfere with the lesson. No other students had their heads down. Everyone else appeared to be listening to and watching the presentation. Periodically, some students asked questions about the themes presented. When the presentation was over (it lasted over thirty minutes), she just turned off the projector and turned back on the lights, and transitioned to the next part of the review.

Everything seemed to work out during this presentation. Her mentor teacher set up her projector for her, the students paid attention, and she had two veteran teachers sitting in the back to help out, if she needed them. The next three observations would not be so smooth.

Second Observation. Two weeks later, I went to her third bell class again and saw her use a *unitedstreaming* video. This time, she only had four of her students. Last time, Mr. Samuel included his students, which made it a bigger classroom, with a different dynamic. I observed a different classroom dynamic:

> After reviewing different geological eras with the overhead projector on one side of the room, April moved to the back of the class, where the computer and digital projector were. The digital projector, laptop, and *unitedstreaming* video were hooked up and ready for her. All she needed to do was turn the projector on and position it properly (it was on a stand with wheels). After a few seconds of the video, April stopped the video and told some of the students to pay attention to the video. She continued the video, but she still had to periodically remind the students to "pay attention."

> There were no problems with technology. However, talking was a problem at the beginning of the presentation. Some of the students got up and walked around. April had to call their names and ask them to return to their seats. Periodically, I glanced at the students and noted how many eyes were fixed on the screen. At any time, no more than two or three students, out of four, had their eyes directed towards the video.

Even though there were no apparent problems with the presentation of technology in the lesson, only two of four students seemed to pay attention.

Third Observation. The next time I observed April using technology was in the fourteenth week of the program. Again, I observed her teaching her third bell class, with six students in attendance. This observation, I observed her having problems getting technology to work:

> I arrived in the class at 11:30, and April was standing in the center of the class next to the cart with the projector and laptop on it. The projector was warming up. The projector projected a blue screen saying "DUKANE", indicating that the projector was on but that it was not picking up a signal from a computer. For eight minutes, until 11:38, she interacted with the projector. The screens changed from her desktop screen to the Dukane screen again. As she stood there, she asked her students what they would rather do, "take notes or do the green book." They said they wanted to "do the green book." I believe the notes were to be projected on the board. I'm not sure what the green book option was. She said, "Well, I choose for you to take notes." However, after another minute of interacting with the laptop and projector, she said, "the projector is not

cooperating today," and turned it off. She then moved to the front of the class and reviewed thunderstorms, lightning, and other extreme weather patterns, using her own hardcopy of notes.

At my next interview with her, I asked her about this incident. She felt that her third bell students "sabotaged" her laptop:

April - Yeah, I had a PowerPoint, it was a very nice one, I worked hard on it to get to show the kids. I had a worksheet for them and everything, cause it was a really long one, we didn't have much time that day, and I wanted them to get the notes. So, it was working fine. I had two girls that had missed the day before. I added on to the one I had. They were copying down the notes from the day before that they had missed. Then they left, and it was fine. And then, suddenly, for some reason, the computer crashed, and wouldn't start up again. I don't know why, I rebooted it. It worked fine for fourth bell. I didn't have a problem. Next day the same thing happened. Then I find out I think one of the kids sabotaged the computer. Not to mention that one child stuck gum on the Dukane.

Lee - On the lens?

April - On the lens. On the lens. Luckily, I was able to clean it and it was alright. But third bell just got the short and sweet version. I just basically took the PowerPoint presentation and they had the sheet and I just read it and told them what to fill in. I mean, it was boring. It was slow. It took longer to do that than to show the PowerPoint. But I didn't have a choice, with the computer down. And, of course, my PowerPoint was too big, with pictures, to transfer to Mrs. Denton's computer, and use it from there. Cause I would've done that but it was too big.

(Interview 3)

I'm curious as to what they could have done to sabotage her computer. I'm not sure what type of button or "trick" one could perform to make a computer not connect to a projector. Therefore, I am not sure if her laptop was sabotaged by her students on that occasion. However, chewing gum on the lens of the digital projector is undeniable and indicative of some of the frustrating behavioral issues April had to confront.

It is interesting that April did not let this incident stop her from using technology with her students in that class. Instead, she merely guarded the technology more closely in that class. I asked her about her use of technology since the incident:

> Lee - So, have you used technology with your third bell, since that incident?
>
> April - Ah, yeah, yes, but I guard it and don't let them near it. One time I actually let them do the presentations once and a while: let them hit the button and read it. Because sometimes, once in a while, they do better with that. If there is something I really need to tell them, I just stop them, and tell them and let them go back to reading it and doing it. Cause I basically let the kids teach it and I add stuff, cause they seem to like that.
>
> Now, I have it set up in the corner, and I don't move it out, to get it out to present it, until I am ready for it. Even though it wastes 3 or 4 minutes, I don't want to risk that valuable equipment in front of the children I have. (Interview 3)

She did not feel the need to make the same accommodations to her fourth bell class.

> But in fourth bell, I just leave it out. It's ready to go when the kids come in. They won't mess with it. But my third bell is an exception to any rule. Any other

> school... even any other groups of kids from that school, I could leave it out and I wouldn't have a problem. It's just those certain children in the class. (Interview 3)

Fourth Observation. The following week (week 15), I observed April using instructional technology with her fourth bell class. This time, there were more students, and the technology functioned properly.

> When I arrived, the bell had just rung, the lights were on, and the students were in their seats. She informed the students that they would be watching a video on the moon and its influence on the earth. Within a minute, April went to the back of the class, turned on the projector, and found the united streaming file she was looking for. Within another minute, the video was successfully started. While the video began, students did not seem to listen. Some continued talking. It took about three minutes for the talking to calm down. At that point, more of the students seemed to be paying attention. Throughout the 17 minute video, some students did not pay attention and talked quietly. The mood, however, was quiet and by the end of the movie, it appeared that all of the students were listening.

After the video was over, something interesting happened to me that provides an indication of the environment April is working in. I was sitting in the back of the class and I had my back turned to a group of boys. I suddenly felt something hit the back of my head. I could not tell if it was spit or a small rubber band. Whatever it was, I felt uncomfortable. I looked over at the group of boys, who pretended as though nothing happened. I could not discern who did it. Although I maintained my composure, I was livid. I decided to leave the class and have a talk to the assistant principal, Mr. Roberts,

who handles discipline issues at the junior high school. I told April about my conversation with him in our interview:

> Lee - I talked with Mr. Knight after the "rubber band in the head incident." It was funny. He said something I thought was pretty wise: He said, "now you know not to turn your back on those kids!" (laughs) Instead of saying, like "those kids should not shoot rubber bands at visitors' heads," it's like, "now *you* know better!"
>
> April - (laughs) Yeah, you don't turn your back on some of those kids. That's why Power Points are so nice! (laughs) But yeah, he's right, but with fourth bell, you can usually turn your back to them, but not too much. But yeah... but using the technology, it really helps out, it really makes the day go faster. The kids have a lot to do. But, like I said, I don't like writing on the board! (Interview 3)

It's interesting, in her response to my incident, how she mentions that PowerPoint presentations help her not to turn her back to the class. Using a digital projector, helps her keep her eyes on her students, and avoid uncomfortable incidents like the one I experienced. In response to my question, she explains the benefits of using Power Points:

> Lee - In what ways, and you've explained a few ways in our previous interviews, in what ways is technology helpful for you in the classroom?
>
> April - Helping keep the kids straight. Instead of just writing on the board, your back is to them and you're a moving target. That's the main reason I started doing those Power Points was for my third bell. Like I said, I'm a moving target for everything, you know: pencils, erasures, spit. So, I can do that. I can keep my eye on them and I can walk around the room and talk to them while they are writing it. And also, they focus on that, instead of focusing on each other cause

> the lights are off. Kids are automatically quieter when the lights are off. So, it makes them focus better. They focus better when you do a PowerPoint, or even the notes from the overhead, cause the lights are off, they seem to focus better than if you are just writing it up on the chalkboard or a whiteboard, the kids pay more attention. They really do. It's amazing the difference. (Interview 3)

Technology Use

April started using technology at the beginning of the semester and steadily added new technology applications to her repertoire as the semester progressed. She developed such a connection to technology use that she bought a digital camera for use in PowerPoint presentations.

> I was one of the few who did not start off teaching the first day, but my use of technology has increased. I use computers and other forms of tech. more now than I ever have. I use digital cameras to take pictures to but in PowerPoints. I even went and bought a nice digital camera with my tax money. It has already come in handy. (ezboard13)

Dukane projector. April developed an almost immediate connection with the Dukane projector. In every interview, and frequently throughout her online discussion posts, April mentioned how much she "loved" her Dukane projector.

> My favorite technology is the Dukane projector. You can use it to show PowerPoints, to show an Internet website if you cannot get computers to the students, it can be used to show notes on Word, it can show *unitedstreaming* videos, and you can show CD-roms. A Dukane is on my wish list for supplies for my future classroom. (ezboard 14)

By the end of the semester, she liked the Dukane so much that she said that she would purchase one, if the school she worked with next year did not have one:

> If they don't have a Dukane at the high school, where I am going, and I already asked and they said that you can check them out. If I can't get one, I'm going to end up buying a used one. I'm going to buy a used one if I have to, cause that's just too nice of a way to do things. (Interview 3)

At the end of the semester, April was interviewed for a job with another school district. At the end of the interview, the interviewer asked her if she had any questions for her:

> That was one of the first things I asked the interviewer for my job, "Do you have Dukane projectors?" She said, "Yeah, you just have to check them out from the library." I said, "Good. That's all I wanted to know." (Interview 4)

From my perspective, I feel that the fact that April purchased a digital camera with her own money and was prepared to buy a digital projector, provides strong evidence of technology becoming an integrated part of her teaching beliefs and strategies.

Finding a balance. April did not only use a digital projector to display Power Points and *unitedstreaming* videos. She found a balance between using instructional technology and conventional instructional methods that do not utilize technology. She found that a teacher must not rely on one type of technology or presentational method. April felt that it is important to present the material using different methods so that students would not get bored.

> I know you don't consider this technology, but to me, the overhead is technology. I've been using that a lot, because you can't use the PowerPoint everyday cause they

get bored with it, at least my kids do. They get bored with it. (Interview 2)

I also know that there are times when you don't need it (technology). Cause if you use it too much, the kids get really bored. Really bored. But if you vary it, like use the PowerPoint one day, then use the chalkboard the next day, use the transparency, then use a video, a streaming video, and then you... Actually, I probably prefer to use PowerPoint two or three days a week. But the variety, technology is wonderful for breaking up the monotony. It keeps the kids more, I don't want to say interested cause some of my kids are not interested in anything, it keeps them awake. It keeps them a little more interested, which is real good, and I appreciate that a lot. I love my Dukane. I'll say that 50,000 times. I love my Dukane! I love my Dukane! (Interview 2)

She tried a variety of strategies using PowerPoint. On one occasion she asked the students to present the PowerPoint slides.

And yesterday we had... I have one class and Mrs. Denton has one class where we trust the kids to actually touch something. We had one of the kids do the PowerPoint and read it and everything. And that went pretty well (Interview 2)

April felt that it was important to have pictures and other visual materials to include in the PowerPoint presentations.

If I don't have a picture for it, for what it is, I don't want to do it, because the kids get bored with it. If there's a picture, they love it and they actually pay attention. That's what PowerPoint is for: to put pictures and diagrams up there. (Interview 3)

By alternating technology infused presentations with other non-technology instructional

strategies, April found a balance that was matched to the needs of her students.

Issues

Access. Access to the mobile laptop carts was an issue for April:

> Again we haven't been able to get the computers, because they are doing some sort of testing again. But when we do, we're going to do something! (Interview 1)

Laptop projecting. She also had a unique problem with her laptop, in that it was not able to show *unitedstreaming* on a digital projector:

> Yeah, you can't... the laptops will not show the streaming video to the Dukane, for some reason. It'll show Power Points wonderful, but you can't get the streaming to work. (Interview 9)

April's laptop could project other programs but not *unitedstreaming*. Initially, she asked the school's technology specialist to look at her laptop. After he could not diagnose or fix the problem she found a way to project *unitedstreaming* videos. Her mentor teacher, Mrs. Denton, would let her project *unitedstreaming* video's from her classroom computer:

> So, we've just gotten to the point where Mrs. Denton, if there's something I want, she'll download it to her computer and we'll just hook the projector back up to her computer and show it on the wall. With her room, since the walls are white, it works pretty well. (Interview 1)

FTP Process. During the second month of her internship experience, April had difficulty posting her website to the Internet. The process of posting a website to the Internet is called "ftp-ing." FTP (File Transfer Protocol; see Appendix I) is method of transferring files from ones own computer to the server that hosts websites. Clover

County's web server is configured in such a way that requires the presence of a couple of seemingly superfluous files. Apparently, April accidentally deleted these files and her website did not work. She took her problem to the Technology Department and they wiped her site clean and put the necessary files back up. April did not know what she did, "I did something. I don't know what I did, but I did something" (Interview 2).

Since she had a copy of her website on her laptop, all she had to do was post her website again—making sure not to delete any files. However, she felt certain that she had to completely redo her entire website:

> April - I have a copy on my disk and on my desktop. But, you know what? I'm just starting over... I'm just starting over. And it'll be easier that way. I'm just starting over.
>
> Lee - But I don't think you need to do that.
>
> April - Yes I do. I need to start over. I'm going to start over and one day next week, you're going to ftp it for me... cause you know how. (Interview 2)

Student Needs/Abilities. April found that using PowerPoint as a way to project notes for the class to copy, was not effective for all of her students. She realized that a few of her students were not able to keep up with the pace of the presentation, and either did not take down all of the notes or kept the class waiting for them to catch up. She decided to print her notes on Word and make them into transparencies, to accommodate one student in particular:

> For Catelyn, I mainly use the overhead because it gives more of a width, and everybody else can continue with their notes. Cause at the end, I just hand it to Catelyn, when everybody else is done, so that she can finish. Because, if not, it

slows down the whole class and they get ansy, ornery, and they get in trouble. If I have it up on the Dukane, with the computer, if it's on Word, it's too small space. But if I'm using a Powerpoint it usually works out good, because I don't have much on each page. The kids don't like it because I usually have maybe 25 pages. But there's not much on each page, so Catelyn can keep up. So, that's why I don't use Word on the Dukane, because of Catelyn. (Interview 3)

Attitudes

Laptop. Throughout her internship experience, April remained enthusiastic about using technology with her teaching. Initially, however, April did not feel comfortable with one technology application, her laptop:

April - I couldn't even figure out how to turn it on. I was totally illiterate with those. I could use a regular PC, but not one of those. But now, I couldn't hardly turn it on. I didn't know where to plug the power chord or anything. But after a little fiddling, I figured it out. And it was so nice!

Lee - What about them do you like?

April - That you can just put it up. Like, at our house, you know, we don't have any desk space, so you can just plop it up on the bed or the kitchen table and you can start working and throw your papers where you need. If you want to do it on the floor, do it on the floor, wherever you're comfortable, or just behind a desk typing. (Interview 1)

Expectations for technology use. Before she began her internship experience, she had a narrow view of how she might use technology. She did not expect to use technology on a regular basis throughout the semester:

Lee - How has your or has your perception of technology, and it's usefulness in the classroom, changed, since you've been here?

April - Yeah, I thought the only thing I'd ever use is maybe go to the computer lab once a month, or something, and use the overhead. I found out, they use a lot of stuff! It's nice. I hope it gets more in schools. One day maybe kids can have like 5 laptops per classroom or something. That would be nice.

Lee - So, it sounds like you see more possibilities.

April - yeah a lot more. I knew there were some, but it's opened a lot more possibilities. (Interview 1)

Knowing April's frequent use of diverse classroom technologies, this statement seems particularly interesting. She states that she only thought that she would use technology once a month by taking her class to the computer lab once a month. Instead she consistently used the Internet, PowerPoint, and her digital projector in her class. It is safe to say that her performance completely overshadowed her small expectations. This finding mirrors a similar study (Balli et al, 1997) that found that preservice teachers often have incongruous expectations of the nature of their experience with technology in K-12 schools.

Bandura (1996) described self efficacy as playing a major role in an individual's behavior. It appears that April's concept of self efficacy increased during her experience. Balancing her feelings of being overwhelmed by the introductory computer course, ECI 304, with her low expectations for technology use seems to indicate an individual who did not feel capable of proficiently integrating technology into her lessons. By the end of her experience, April demonstrated a personal confidence and positive attitude toward

technology that, according to Bandura's social cognitive theory (1996), may have influenced her use of it.

Preservice Training

Influence of methods professors. April stated that her methods class was "the only class I really have learned anything that was practical" (Interview 1). She continually praised her methods professor, Dr. Harrison, as being a major influence:

> April - But, my methods class showed us how to actually use it (technology). Dr. Harrison is a wonderful, wonderful, wonderful, wonderful woman. They need to clone her. They need to clone her. She is the only one who showed us how to use the stuff. She was wonderful.
>
> Lee - Showed you very practical...
>
> April - Yeah, she showed us simple little things, some not with technology, but a lot with technology, simple things you can do to help the kids. She made us get the laptops out and showed us how to use them... when they would work. That was one good thing cause they don't always work when they're supposed to. It's just really good.
>
> Lee - So, it sounds like she sort of modeled what it would look like.
>
> April - Yeah, she did. She was wonderful. If I had to pick a favorite professor there, she would be one of the top three out of the whole school. (Interview 2)

Dr. Harrison maintains a website filled with useful instructional technology teaching strategies for science teachers. April continued to check Dr. Harrison's website for updated material:

> April - I actually still check her page once in a while, in case she puts new stuff up.

> Yeah, I've checked it probably thirty times over the semester. I caught one or two new things. Like, I don't remember exactly what it was, but she had something on there and I went and looked it up and it was a website about earthquakes and it led me to a website that me and my teacher and Mr. Jones ended up using it in class all day. Oh yeah, I also found, on the National Science Teacher's Association page, a website for an SOL remediation test, from the Jefferson lab here in Virginia. And man we spent all day in class connected to that! We did that Monday.
>
> Lee - And you heard about that because of...
>
> April - Yeah because of her I joined the National Science Teacher's Association. Because that was one of her requirements, as science teachers, that we join it. I thought that that was wonderful, because if she hadn't made us join it, I wouldn't have joined it. And I've found all kinds of good stuff. I mean that website alone, we spent all day... It had the actual old SOL questions. We put it on the screen, cause they took our computers, so we couldn't have the kids couldn't do it on their own. We just hooked it up to the Dukane, showed it on the screen, and had the kids go through and answer them, and it gave us the scores and everything. And they actually paid attention... at least for the first 40 minutes! So, that was something. Hopefully it will show on their test scores tomorrow! (Interview 3)

April's regular checking of Dr. Harrison's website extends the findings of numerous studies (Schlagal 1996; Blanton, Thompson, & Zimmerman, 1993; Persichette et al., 1999; Delvin-Scherer & Daly, 2001), that highlight the positive influence telecommunications can have on internship experiences.

ECI 304. April also spoke about her computer class, "ECI 304: Instructional

Technology and the Classroom." She described feeling out of place in this class. She did not feel that she had the foundation of computer knowledge as many of the other students did. She later suggested that the University offer a two-tiered instructional technology course: one for beginners and one for novices.

> I wish (the university) would make a class for beginning idiots and one for the regular people. I need the beginning idiot class. But, I learned a lot about web creation stuff, but the stuff just went over my head. But I'm getting there. (Interview 2)

Future Use

At the end of the semester, April saw technology as being an integral part of her future as an Earth Science teacher:

> When I have my own class I plan to use technology at least twice a week if possible. I hope to be able to find exercises for the students to do on the internet. I plan to have students use the internet to research and explore topics on Earth Science. If time allows I would like an entire class to develop a PowerPoint presentation, each student contributing at least one slide that they have created.
>
> I plan to use PowerPoint presentations as a major part of my teaching. I hope that my school has United Video Streaming, that is one aspect of technology that I love. (ezboard 17)

Through her consistent use of technology throughout the semester, as well as her immediate connection with the digital projector, it appears that April made technology an integral and indispensable part of her teaching. With the help of a veteran, technologically literate mentor teacher, she attempted a variety of technology

applications and found a comfortable balance of conventional and technology infused teaching strategies.

Follow Up

April is currently teaching earth science at a suburban high school. Her school was not able to issue her a classroom and she describes herself as a "cart teacher, going from room to room." In her interview with this school district, she was told that she would have access to a digital projector. This was not the case, so she invested in a projector. Knowing that a used projector can cost around $1,000, this highlights how attached April became to teaching with technology. She described using the projector on a regular basis and in a variety of ways at her new school:

> I use the projector to show Power Points and to show united streaming videos, and I also connect it to a VCR to show movies. Being able to show the kids pictures on the subject helps them to understand what you are talking about especially since the textbook is not all that good. The school I am at does not have much of anything in the way of using technology with the kids, but I was able to grab the computer lab for one day and did a nice web quest on volcanoes and plate tectonics with the kids, they liked it and have asked for more.

Looking at the skills and expectations April brought to the STAT internship program, I am amazed at her transformation. Coming into the program, April thought she would use technology once a month. Instead she used it more than once a week. She also became enamored with teaching with a digital projector. In her first year as a teacher, she spent over a thousand dollars to ensure that she could continue teaching in the way she was accustomed to during her internship experience.

Case Study 3: Donald

Donald is a 23 year old intern who is getting his accreditation in secondary Social Studies. He was initially placed at the Townes Junior High School, teaching seventh grade Social Studies. He was given the responsibility of teaching two classes, of 28 students a piece. Each class period lasted an hour and a half. During his first few weeks of teaching, he spent most of his energy handling classroom discipline issues. He did not feel that his class was behaved enough to use classroom technology.

> I was too busy doing damage control to implement any technology. I wanted to establish a solid learning environment before I started dividing my attention between the students and the gadgets. If you can't control your kids before you start screwing around on a Dukane, don't get a Dukane and think that it is going to make them act better. (ezboard 13)

He also felt that the act of turning the lights off to project a digital image on the board might become an invitation for his students to misbehave.

> In this class, my two blocks—where throwing stuff is not that uncommon at all—It's very common place for stuff to get thrown, and when the lights go off, it becomes even worse, and even more dangerous. (Interview 1)

During his first few weeks at the junior high, Donald used technology once. Not only did he not feel that it was safe to use technology, but he did not feel that technology helped his students pay attention any more than teaching without technology.

> If all they are going to do is not pay attention with technology instead of not paying attention without technology, then we may as well not waste the school's limited resources. (Interview 1)

The large size and diversity of his classroom intimidated him from using technology:

> But our problem has been we just couldn't jump in there the first time. Five at a time, sure, but 25 at the same time? With you know, some people with A's, and some people with IEPs, it's just been difficult. (Interview 3)

After four weeks of teaching at the junior high school, Donald became overwhelmed by his classroom situation. He and his mentor teacher did not develop a positive relationship. As interns in one study (Moursund & Bielefeldt, 1999) stated, Donald did not feel that he was receiving sufficient guidance from his mentor, as he attempted to teach two groups of rambunctious seventh graders. His university supervisor, Mrs. Hammersmith, felt that Donald needed to be moved, immediately, to a different location, with a more supportive and veteran mentor teacher and an assignment where he was not given so much teaching responsibility. Mrs. Hammersmith organized a new placement for Donald at Welch Elementary School.

Donald felt grateful to be in his new placement. He was optimistic that his new placement would provide more avenues for technology integration.

> I had two large classes that were filled with kids who couldn't have cared less about any of our academic goals, technology-laden or otherwise. Now I have wonderful kids (Thank you Mrs. Hammersmith) who act well enough to use technology. Eventually, our class will be one long active learning project that we will display over the Internet. (ezboard 7)

Donald spent the first few weeks in his new school observing his mentor teacher and other teachers. Toward the end of the second week, Donald began teaching social studies to two sixth grade classes. Each class period lasted 30 minutes. Teaching for

only 30 minutes, twice a day, is a significant departure from his responsibilities at the junior high. Donald described how having such a small segment of time can be limiting with regard to what types of technologies one can use:

> It's kind of hard though, cause with only 30 minutes, you don't have lots of time for instruction… (Interview 2)

After a few weeks at his new school, Donald felt his technology use had progressed "tremendously":

> now I have a new school and I have access to a lot of technology. It is very accessible at this school, just because this schools is smaller than my last one, so, it has nothing to do with the schools but... we use the Dukane just about every day. And we're getting close to the point where we can take pictures with our digital camera. (Interview 2)

Using the Dukane projector "almost every day" was a significant change from his one time use in his four weeks at the junior high school. Donald seemed much more excited about his new placement and the teaching and instructional technology opportunities that lay ahead.

Observations

First observation. I observed Donald nine times throughout the course of the semester. On three of those occasions I witnessed him using technology. The first time I observed Donald use technology, he used the digital projector to show images of British schooner ships:

> The lesson began with Donald reviewing some previous material with the students. After 15 minutes of review, he passed out a handout and then projected

a painting of a ship on the projector screen. He then began to review something with them. He did not make reference to the projected image for a few minutes. He then described it as a schooner and talked a little bit about it. Something else, that I could not discern, was projected. I think it was the word contents of the webpage. This stayed up for some time as he talked about mercantilism. During this time, around 3:00, students on certain busses were beginning to be dismissed. Donald started working on the class computer. Afterward, he shared with the class that he was looking on the Internet for pictures of schooners. He said that he could not find any more. So, he then turned on the overhead projector and projected some transparency copies of schooners. At this point the students ceased listening. They were preparing to leave.

On the online discussion board Donald made the statement, "I wish to be more organized… I can't afford to be disorganized, but I am." In this observation, Donald's lack of organization seemed apparent. He did not appear to be completely prepared for this lesson. I am not sure why he would need to use instructional time to look for more pictures of schooners. This is something that can and should be done before a lesson is started. Perhaps, he could have asked a student to look up schooners for him, as he taught the lesson. I was also puzzled by how he projected images on the screen that did not relate to what he was teaching. For example, while he was talking about mercantilism, something indecipherable was being projected. He could easily have turned of the projector while he was talking about something else.

Second observation. The second time I observed Donald using technology, I was again puzzled by his teaching methods. This time, he used half of his class period for a water fountain break. Again, he did not seem prepared for the lesson:

> I entered the classroom before Donald began his lesson. His mentor was teaching and at 2:30, she closed her section and handed it over to Donald. The first thing he did was to turn on the Dukane projector. Everything was quiet as he prepared for his lecture. After turning on the projector, he went to his desk. While at his desk, someone asked to get a drink of water. He then asked the class if they wanted a drink of water. Some of them said yes. So, he asked them to stand up, led them out of the door, and to the water fountain. The excursion to the water fountain took 12 minutes from his 30 minutes of history. I was surprised that he did this, not only because it took away from his instructional time, but it also did not seem necessary. They did not seem to really need water. I wondered if he was unprepared. While he turned on the Dukane and went to his desk, about a minute elapsed, where all the kids were quiet as they waited for him.
>
> When they came back, he had everyone open their book. He then projected an image of one of the students onto the screen for a minute or so. It did not appear to have anything to do with history. Both during and after the projection of this student, and for the remainder of the class, Donald had different students read passages from the textbook. Technology was not used any further.

Although technology was used, it did not have any discernable purpose. The students read out of their books, while an image unrelated to what they were reading, was projected using a digital projector.

Third observation. Fortunately, the last time I observed Donald using technology, he projected an image using the digital projector that successfully connected with the content of the lesson:

> At 2:30 Donald entered the classroom. After saying "afternoon", he asked them to get out their books and to prepare to read. As individual students read out loud, he set up the digital projector (which was unconnected next to the wall). It appeared that by 2:36, the Dukane projector was successfully projecting the desktop screen from the classroom computer. He then projected a picture of a New England Patriots t-shirt and asked them why they were called the Patriots. He talked about this for a minute or two, then he turned back on the light and closed the picture file. He then had students break up into their groups and work together. Although he did not use the projector for the rest of the period, he kept the projector turned on. He turned it off at the very end.

Donald had to use class time to set up the digital projector. I am not sure if this is something he could have done before, or if this is impossible because his mentor teaches immediately before him.

I was particularly impressed with his use New England Patriots' football team symbol to connect to the history of the area. One only has to look at the garments many of the students in Donald's school wear to realize that they are familiar with a wide variety of sports insignias from many different teams. We discussed his use of the Patriot's symbol in our next interview. Donald said that he actively looks for these types of connections:

> It definitely helps the kids to see it, that the popular, modern day cultural connection to something we're learning in the past, it doesn't get any better than that for these kids. I mean, I look for those kinds of things, and they don't come by very often. (Interview 3)

I noticed, during the third observation, that he left his projector turned on after he finished discussing the projected image. I noticed Tammy do the same thing in two previous observations. I asked him about this, in our next interview and he explained his purpose behind leaving images on the screen:

> It's just one of those things... first of all, I only have thirty minutes, so I don't worry about stuff that I don't need to worry about. So, if it's on and it's not bothering anybody, then that's fine. But also, since it was a graphic and not a website, you can do that. If it was a website, stuff's gonna pop up, then you don't want to get into that. So, just for it to be up there... if they look up there and they see only what I want them to see, then that's not bad... and I wasn't doing anything on the overhead. I mean, at worst they're going to look up there and be like, "hey, that really does look like one of those minutemen!" And they're going be comparing. To me, it's like a projection of a poster at that point. It serves the same purpose. Little things like that get kids more comfortable with technology. (Interview 3)

Strategies for technology integration. In my observations, sometimes I saw technology being used purposefully and, on other occasions, without any apparent purpose or connection to the material being covered. In an interview, he mentioned the purpose for using the digital projector:

> They draw the students' attention. I could just talk up there until I'm blue in the face, but if I show them a picture, it keeps their concentration so much more effectively than talking. So, whenever I can find a good graphic I, you know, try to implement it. (Interview 2)

Donald also believed that technology could be used as a reward for good behavior. Toward the end of the semester, Donald took digital pictures of some of his students and sent them home as a reward and incentive for good behavior.

> I showed the students in the picture and my late class the end results. The interest in my late class is now officially sparked! Students are already asking can they be the ones in the picture. The Dukane makes the pictures bigger than life, and the printer allows me to send printed pictures with positive notes home for the students in the pictures. Today was the first time I tried this, but so far everybody is into it. I hope this can be a method of maintaining students' attentions in positive manner. (ezboard 11)

Issues

SOLs. Donald felt distracted by the end of school and SOL tests that the students were taking. This affected his use of technology during the last weeks of his experience. He reached a point where he realized that before, he was trying to find any way to fit technology into a lecture. At this point in his experience, he was doing the best he could to convey the information, which did not necessarily mean integrating technology into every lesson.

> Before, I was looking for the technological connection for the lecture, but now, time is so of the essence, unless it immediately comes to mind... like, you saw the

other day when I used the New England Patriots, I thought that was very important for them to understand the links to the past to our modern culture. But, the specific SOL we're doing now, doesn't readily come up with those type of connections. Unless it just jumps into my mind, you know... I'll look, but I not gonna look too hard for something that may or may not be there. (Interview 3)

Attitudes

From the beginning of the semester, Donald felt that his perception of technology was constantly changing. Just being in a class helped him to see the potential technology brings. He stated:

> Just the idea of being in 7th grade and having a computer that has a high speed Internet connection and the fact that there are Dukane projectors in the school for you to see it on the wall. You know I didn't see some of that stuff until I had been in college for a couple of years? You know, PowerPoint presentations, yes, but Dukane projectors or projection of the Internet as a part of the classroom and as an integral part of the lesson each day or at least the potential of that? I didn't see anything like that until I was well into college...
>
> So, it's not only changed my perception of technology in general, but it's definitely changed my perception of what education can be. Because there's so much technology now that the sky's the limit to any class. If any class has a high speed Internet connection and the opportunity to project the Internet up on the wall, with a machine like the Dukane, there is no limit to what they can do. Why at the end of each semester can't you have a website made or a web quest that the kids developed on their own, you know, anything? Just the amount each one can

learn... I mean, it's a lot more than I experienced in college, you know, all the way around. (Interview 1)

By the middle of his experience, Donald shifted from being encouraged by the unlimited technology possibilities to being overwhelmed by how much he needs to know and improve:

> But technology, it's like, where is it going to go next? They showed me these machines they used to use to project a regular piece of paper on a screen without making a transparency out of it. And this thing was a dinosaur! I mean, it made noise when they cranked it up and it was just a monster. And then they told me all these other stories of machines they used to use and things like this, like the old film strips. And it's just mind-boggling we now have little kids who probably know more about desktop computers than some of our professionals. You know, in 1990 no one knew what the Internet was. So, where are we going to be in 2010? That's the hill that's out there that you have to keep on climbing no matter what stage in the game you are. It's going to be just as big 30 years from now as it is right now, because technology is going to keep being added on and all of us are going to have to learn, over and over. (Interview 2)

During our last interview, I asked him about his perspective of technology, after experiencing two different schools and teaching for a semester. He described the importance of being prepared for technology failures:

> I still feel that it's very, very important, but now, the only major difference for me, is the understanding that something will probably go wrong, to always be prepared for it. But I realize what all can go right with it too. Once the kids

> really start to get into what you are showing, then all of a sudden you can get a lot of attention, you know? You can live by it or you can die by it. But even when it fails on you... as long as you try, it's going to go right for you eventually, it's going to help you do things you couldn't normally do without it. It can't make things much worse, you know, as long as you have enough of a back up plan, if it doesn't work at all, but that's the worse that could ever happen. It could, like, not work at all. Then you just teach regular. But if it works like a well-oiled machine, then the sky is the limit pretty much, as far as the students' attention, and what can go right, and what they can learn. (Interview 4)

Echoeing the findings of one study (Balli et. al, 1997), at the end of the semester, as Donald reflected on his thoughts about technology, he realized that he was not as intimidated by it as he was before:

> Once you hear about it, and hear what it does, that kind of frightens you, "It's the big, bad *unitedtreaming*! It's the big, bad Dukane projector!" or whatever. But you get in there and you toy around with it for a little bit and then all of a sudden, not only is it easy, but you feel good about it, "Wow, I can really use this, and it's fun!" So, they can really seem intimidating, at first, but once you start getting used to it--which doesn't take as long as I thought it would... I knew that I would get to the point where I could get to the point where I would be comfortable with each thing, but I didn't realize that it wouldn't be that hard for me to get comfortable with it, I just thought that I could drudge through it, but it wasn't as much drudgery as I thought, you know, which is something that I've really appreciated. (Interview 4)

In my first interview with him, Donald mentioned that he did not use technology with his students because he did not think they were well behaved enough to handle using technology in class. By the sixteenth week of the semester, his perspective regarding how well behaved and prepared students need to be for technology to occur had changed:

> Where my perspective has changed a lot is that, you know, I thought that you had to really have your class, like, really well prepared, or really well behaved and managed, in order to kind of use it. Um, but in small bits definitely. it's not as big of a jump as I thought it was. It's still not easy, cause, just like the film strips back in the old days, there used to be a time to sleep, talk, pass notes. That still holds true. But if you have good enough content, you know, something that's interesting enough and will grab their attention, they don't have to be angels and be focused enough to appreciate what you are doing up there. So, I think, that has been the biggest difference in my perspective: is that they do have to be kinda prepped for it. You can't have a classroom of 6th graders doing cartwheels and throw technology at them and think that they're going to act right, but it's not as big a jump as I thought it was. (Interview 3)

Preservice Training

In general, Donald stated that his preservice training gave him “direction”. It gave him a history of “the evolution of technology” (Interview 2). Initially, however, Donald was afraid of his perceived lack of technology skills and how much technology he would be expected to use in the future.

> It's funny because you know, here and even before when I took ECI 304 and other computer science courses at Old Dominion, I became more and more, not afraid,

> but just apprehensive to how much technology I would be expected to use, how much was out there, and how much could be used. Like I was saying, I'm not extremely technologically advanced or anything. So, I was kind of afraid, you know, that I would not be able to keep up, in a way, or move them along in the way that they need to go with technology. (Interview 1)

He felt relieved upon entering his junior high classroom, knowing that he was not expected to integrate technology beyond his capacities.

> Then I've been faced with the classroom realities. So, I feel so prepared now because we haven't even gone through to what I know I could do with them easily. We haven't even gotten to the part to stuff that I wouldn't have known as well and would have had to my refresh myself, and get more ideas, and talk with people. (Interview 1)

He mentioned a fear of not living up to the example of technology integration being taught in his university classes.

> You know, because, when you are in the class you learn all of these things you can use. You feel like they expect you to use these things in every class you go to and "Are you going to be the weak link that holds back your class and doesn't prepare them well enough or doesn't use technology? Then you get in the reality and it's like, well, you know, you can hold off on giving your seventh graders that CS degree right now. (laughs) (Interview 1)

Facing the realities of the classroom, Donald realized that he was sufficiently prepared to use technology with his students. Knowing that he was sufficiently capable of using technology with his student increased his desire to use it:

> And even if they (students) were miles ahead of where they are now, I still feel with my training, that they would have never outpaced what I could teach them. There wouldn't have been days where I would come home and like, "how do I teach them and keep them interested, they know too much of the technology." It would be a long time before we got to that point, no matter where I taught, you know. So, that's just a good feeling me. It makes me want to learn technology more; it makes me more comfortable with technology. (Interview 1)

Future Use

By the end of the semester, Donald pondered his experience with technology and shared his thoughts on his future use of it, on our online discussion board:

> I feel a lot less threatened by some aspects of technology now. I was not necessarily afraid of some software applications and computer accessories, but I was a bit wary of trying to use them in the classroom. It seemed hard enough for me to just teach in the beginning, but now I feel like I can use some of my favorite toys (the Dukane, the digital camera, PowerPoint, *unitedstreaming*, etc) with much success. I fully intend to use them all again. What I found inspiring about this internship is that after I got into a more comfortable zone, and the students got use to me, I was able to get Clover County kids to pay attention and even want to hear and listen to my technologically infused lectures. I guess the next big test I will have is teaching information rich students without having them laugh at my lack of tech skills. (ezboard 17)

Donald is an intern who came from a limited technology background and an admitted characteristic of being disorganized, and attempted to integrate technology into

his lessons. My observations indicated a new teacher using technology awkwardly. Sometimes his use of technology fit the purpose of the lesson. Sometimes, it did not. Although he did not always get it right, I feel that Donald has learned a sufficient amount about a few technology applications that he can rely on in his future endeavors as a teacher.

Case Study 4: Rhonda

Rhonda is a 21 year old intern who taught tenth and twelfth grade English at Clover High School. Like the junior high, the Clover has a four bell schedule—each bell lasting an hour and a half.

Rhonda brought a creative perspective to how she integrated technology into her lessons. Whereas April and Donald used a digital projector at least once a week to project pictures or notes, Rhonda used technology less frequently but with more originality. For example, to teach irony, she used files from popular songs on the Rock and Roll Hall of Fame website. Also, to demonstrate the gruesome nature of some of the scenes of Macbeth, she found and shared a website that describes, in medical terms, the true extent of the injuries depicted in the play.

With regard to integrating technology, Rhonda stated that it's "one of the most important things about education for me" (Interview 3). One of the reasons she expresses is that she feels technology is the future and she wants to prepare her students for the future:

> I was always really upset in high school because I didn't think we were properly prepared for the years beyond high school. I think, like the old cliché, "It's the new wave." I think everybody needs to know how to use technology, like, all aspects of it. And so, I wish I could be that teacher to help them out. I try. It's hard. (Interview 3)

Observations

I observed her teaching eight times throughout the semester. On three of these occasions, I observed her teaching with technology. In each of these visits, I saw rich

displays of the kinds of issues and obstacles teachers face when they attempt to use technology with their students for the first time. Two of the times, I observed her use a mobile laptop cart with her class, while the other time, she demonstrated a website with a digital projector.

First observation. On the fifth week of the semester, I observed Rhonda's twelfth grade English class use a wireless mobile laptop cart to perform a web quest on the writing process. This was her first use of technology in a classroom setting. She never used the laptops before and described being apprehensive.

> I was really scared. Because, like I said, I didn't know how to use the laptop. You know, I haven't used this stuff yet. I was just waiting for something to happen. And I also didn't know how my students were going to respond. (Interview 1)

I arrived in the class before the class began, and observed Rhonda setting up:

> When the class bell rang, Rhonda entered the classroom with the librarian, wheeling in a mobile laptop lab. I sat in the back of the class. She came to the back, holding the wireless router in her hand. A wireless router (see "wireless router" in Appendix I) needed to have two connections made: hooking the Ethernet cable to an outlet and plugging in the power chord. While plugging in the Ethernet cable, she explained to me that the librarian had forgotten that she had reserved the wireless lab at that time (so that's why she was late).
>
> Rhonda then looked for a power outlet. She walked up and down the back of the classroom trying to find a place to plug it in. After spending about a minute looking around for one, I decided to assist her. I looked behind one of the

computers, where there are usually extra power outlets, and found one. Once it was plugged in, she introduced the lesson to the class.

After about 5 to 7 minutes of introducing the activity, she invited the whole class (nine students) to come to the front and pick one. I thought that this might not be the best idea because nine students coming up at once might lead to classroom management problems. Even one of the students said, "Aren't you supposed to call us by rows?" In the end, the students were able to get their laptops in an orderly fashion that was not disruptive.

Once each student had a computer, they began booting up their laptops. Once the laptops were booted up, students began to try to go on the Internet. No one had any success. Rhonda asked them to keep trying. After a while, she looked to the back, where the wireless router was, and wondered if that was the problem. Since I had my laptop, which has a wireless connector that was not detecting a signal, I knew that the wireless router was not connected properly. She said, "We'll have to call the librarian."

At this point, since I had an idea of how to fix it, I volunteered to help out. I connected the Ethernet cable to a different outlet and then unplugged the power source to the router and plugged it in again so that it could boot itself up with the new connection. She asked the students to reboot their computers, but I said that they should try connecting again, before they do. When they did, they finally got connected. The students and teacher seemed relieved to be connected.

I chose this point in the lesson to interfere with the plan of the lesson because I saw that fixing the problem immediately would save the intern time as well as maintaining my

welcome in her classroom. I was able to take sufficient notes of what strategies she used in her attempt to solve the problem. She basically asked the students to "keep trying." Asking the librarian to help was her last option. The librarian, if she was not teaching a class, would have come to the class and, most likely, solved the problem in the manner I did. My assistance allowed the lesson to continue at its intended pace, and gave me more time to observe her teach a class as they interacted with Internet:

> Once connected, the students began their work. Each student had their own laptop and were seated at their own desk. At different times throughout the lesson, I scanned their laptops. Since I was in the back, I was able to see most of their laptop screens and observe what they were looking at. At any time, at least six of the nine students were looking at sites related to the assignment. At least three others were looking at music and merchandise websites. Rhonda did little to stop this, other than occasionally asking one or two students if they were on the right site.

The problem of students not looking at the appropriate websites would be a lingering problem for Rhonda throughout her efforts to integrate technology into her lessons. Rhonda mentioned the problem on the discussion board, "I have had a little trouble with a student using it for music and whatnot, but on the whole, they learn a lot." However, other students continued to work on the assignment:

> One student asked if it was OK to listen to music. She said that it was OK, if they had a CD, but no one had one. One of the students in the back began to play streaming music videos at a variable level (sometimes low and other times louder). He seemed consumed by this. Watching him closely, I rarely noticed

> him looking at websites that were related to the assignment. He mostly looked at entertainment related sites. Although the music he was playing was not from a CD, as the teacher requested it to be, he was not asked to stop playing it.

In our interview, after this observation, I asked Rhonda about this student. She described him as someone who refuses to do any of the work in class and is never on task. She told me that she often allows him to do what he wants, as long as it is not too disruptive.

At this point in the lesson, a student had a problem with his laptop losing its battery charge:

> The student came up to the front of the class and took out, what appeared to me to be his battery. Rhonda thought that he was taking out his A drive, instead of his battery, and told him that that would not work. I could not confirm whether he took out the A drive or the battery. They look the same. I think it was his battery, because taking out the A drive would not make any sense. Although he did what Rhonda told him, and put the battery back into the laptop, he said he regretted telling her he had a problem.

These types of laptops have batteries that look exactly like the A drives. They are removable cartridges that are housed in similar slots within the laptop. I think the student, who, probably having more experience with these laptops than Rhonda, and was accustomed to exchanging batteries between laptops. If Rhonda were aware of this, she may have realized whether or not he was taking out the battery or not, and would have been able to help him assist.

After school, I interviewed Rhonda and she commented on her first use of technology:

> Today, I had no idea how to use the laptop carts. No clue. I had no idea of what I was supposed to do. I just had a general overview. Luckily, within ten minutes we got things worked out. (Interview 1)

Second Observation. Rhonda became proficient at finding interesting ideas and in class Internet activities for her students. She said that there's "just more fun stuff… that you can't really find in a book" (Interview 2). Sites on the Internet have more interesting information for her students to explore that augment what they are learning in class with their textbook.

On the eighth week of the program, I observed Rhonda teach a lesson on Macbeth using her laptop, a digital projector, and PowerPoint:

> For the first half of the class (forty five minutes), the students read Macbeth aloud—each student having a different part. After the reading stopped, Rhonda displayed a website on the digital projector from the Internet about Macbeth. The site gave a synopsis of the gruesome nature of the play. In informal language, the website highlighted some of the interesting aspects of the play that may have been overlooked by a casual reader. Rhonda read some of the contents of the website. The website was created by an autopsy specialist who gave knowledgeable descriptions of the macabre parts of the play.
>
> The students seemed both interested in reading the play and looking at the website. Throughout both parts of the lesson, about three students, out of seventeen, had their heads down. Other than the three students who did not pay attention, the other students seemed to be consistently engaged from the

introductory part of the lesson, where students read Macbeth, to the technology part of the lesson.

Rhonda then switched to a different website from which the students were to take notes from. This website gave background information about the true historical figure of Macbeth. The students received a handout that coincided with the webpage. They took notes to fill in the parts that were missing. They continued, in this manner, for the rest of the class period.

I thought that the site on Macbeth was fascinating and made the content of the play more real. Rhonda described why she used it:

> There's nothing in the book that talks about the dirty, disgusting things that go on—like the bloody stuff. And I found out that a lot of the kids were like, "I liked reading Macbeth. I really liked that one." And they remembered the story line. (Interview 2)

The above case is an example of an interesting strategy of using technology in a way that could not have been done through conventional means. Rhonda uses technology as a way to engage her students. She feels that the present generation of students understand and appreciate using the Internet and computers to do research rather than doing research using textbooks.

> Yeah, a lot of my preparation is done with the Internet. A lot of it. I've found a lot of great worksheets and handouts, you know more fun stuff that I can't find in the textbook—packages and stuff like that. For the class, because they live in this age of the Internet, to them it is much easier for us to say, "why don't you check this on the Internet?" And they're like, "Yeah yeah yeah! Ok, I want to do that!"

> They're excited about using the computer because they know how to. I tell them to research the same thing in one of those books, and they're completely lost. They don't know what to do. And, because it's something they already know, they say, "oh yeah, that's no problem." And they love helping other kids do it. And it takes away from the actual "we're learning about the renaissance" from it. You know, because they are getting to use technology. The best thing about it is that it has my kids more engaged whenever they get to use it, which I'm trying to make more often. (Interview 1)

Perception of technology. Midway through the program, I asked Rhonda about how she felt her perception of technology had changed. She described her thoughts at the beginning of the semester and how they had changed. Similar to above statement about what technology skills, knowledge, and perspectives Rhonda brought to the program:

> I had no idea how in the world I was going to integrate technology in English setting. All I could think of was science and math. What on earth can I do in English? And it wasn't until I got here and saw all of the different ideas, I was like, "Hey!" I had never heard of a web quest until I had gotten here. And so, I know that there are hundreds of millions of other things I could be doing that I am trying to find and trying to open up my options a little bit. But, my perception hasn't changed since last time, but its definitely changed, big time, in the past couple of months. (Interview 2)

Preservice training. I was surprised that she had not heard of a web quest before coming to Clover County. I asked her about her training at the university. She said that her

preservice training in technology was more directed towards those students teaching math and science:

> In the technology classes that I took, it was mostly math and science kids. So, when we had to do group work, it was how we would do a webpage for the math people. All the applications that we learned were never ever, ever for English or even for social studies. Um, I learned a lot of stuff in there, but I didn't learn how I could necessarily apply it to English. (Interview 1)

She discussed how she discovered the web quests, websites, and online scavenger hunts for her class. For her, this process started at the beginning of the semester.

> Well, when I first worried about using technology, in general, because I didn't know how I was going to integrate it into the English classroom. Um, because I considered it more of a math/science type of deal. So, once I did a lot of searching on the Internet, I found other PowerPoint presentations, and I found a lot of web quests and interactive like, worksheets and quizzes and stuff like that. I feel more comfortable and I'm more excited about getting to use it. Like, today was the first day that I used technology, other than the music. And now, I feel like I want to do it everyday. It was such a springboard, like I just have more and more ideas, left and right, of stuff that I want to do. (Interview 1)

Third Observation. Toward the end of the semester, I observed Rhonda using the wireless laptop carts again. This time, instead of using a web quest, she had her students perform an online scavenger hunt. She explained her purpose in using a scavenger hunt:

> It was something that I stumbled upon about two weeks ago and I really liked it. It's a little different than a web quest because these kids can't work in groups and

a lot of web quests ask you to. These kids can't really handle that. That's what I like using: making them find information on their own. (Interview 2)

An online scavenger hunt is similar to a web quest, but, like Rhonda stated, students can perform it individually. Usually students are given a sheet of paper with Internet addresses on it or a website with links to relevant sites. The students are supposed to go to these sites and find bits of information that will form a cohesive whole. The students, on this day, were going on an online tour of the New York City landmarks that the main character in the book *The Catcher and the Rye* visited.

When I entered the classroom, a few minutes after the bell started, the students were sitting in their desks, Rhonda was at the front of the class with the laptop cart. I immediately walked to the back of the class, next to the two classroom computers (where I sat during my previous observation). I noticed the wireless router and a laptop sitting next to me. As soon as I sat down, Rhonda came back and started doing something with the laptop. She said that it was not connecting to the Internet. She said that the network had been giving her students problems. I opened up my laptop and looked to see if it would connect to the router. It connected immediately.

Instead of telling her that I was connected, I waited a few seconds to see what she would do. She went to one of the classroom computers and tried to connect to the Internet there. She was successful. She concluded that the network was up. At that time, I said, "Yes, mine is connecting fine."

Instead of telling her that the network was up and running, I allowed her time to find out for her self, which she did successfully. She continued to attempt to connect the laptops to the Internet:

> Then she went back to her laptop and tried to connect it to the Internet. It still would not work. She appeared to close her laptop up and attend to her students. When she came back, one minute later, she opened it up and said, "it's working now." I asked her what she did. I was not sure what she had done to make it work. Her answer was not clear to me, but I think all she did was close the laptop and then open it up again. Perhaps closing her laptop put it to sleep. Opening it again could have reset the settings and automatically found the Internet.
>
> Once she found it was connected, she went to look up the web quest she planned to use. She found that the links were not working. She stated to me that they worked fine last night. I asked her if this was a web quest she created or if it was someone else's. She said that it was one that she found. I'm not sure why the original web quest was not working. That did not make sense to me.
>
> She told me that she had a plan B, which was a scavenger hunt on the Internet. She then shifted to that plan. She called students, by rows, to go up to the laptop cart and pick out their computer. She wrote the http link on the board and, as soon as they logged on to their computer, they were to begin the assignment of completing the scavenger hunt.

I thought it was interesting that, on her first use of the laptops, she had all of the students come up to the cart and grab a laptop. Even one of her students, on that occasion, said, "aren't you supposed to call us in rows?" This time she called her students in rows.

While the students' laptops were booting up, she walked around the class, through the rows, making sure that the students were going to the right sites. She found that one student was downloading something. She immediately asked, forcefully, "Why are you downloading?" The student stopped what he was doing.

As I was sitting in the back of the class, I could see the computer screens of all of the students' computers. I could tell that they were looking at various entertainment websites. I thought to myself, that perhaps they were merely looking at things of their own interest.

At this point in the lesson, I copied the link on the board and began looking at the scavenger hunt myself. The scavenger hunt is a tour of the New York City sites that the main character goes through during his visit to Manhattan. Clicking into the different sites listed in the scavenger hunt, I noticed that these were the same entertainment sites that the students were using.

After initially thinking the scavenger hunt was unnecessary, knowing the context of *The Catcher in the Rye*, I could see how useful it could be. It really gave the participant a tour of New York City and the places the character visited. I was impressed by the pictures and sites listed.

Throughout the class, the students seemed engaged in the scavenger hunt. Looking at the students' computer screens, it appeared that all of the students were working on the task. I was surprised to see some of the students, who did not participate last time, were actively involved in this one.

> Throughout the class, Rhonda walked around the class, helping students trouble shoot and finding things that were hard to find. She walked up and down the rows.

Her behavior, as a teacher, on this occasion was quite different than the first time I observed her using laptops for the first time, 5 weeks ago. This time, she was much more proactive in the way she passed out the laptops and engaged with students who were not on the right sites. The way that she continually walked up and down the isles, monitoring her students' progress and assisting those who needed help, was demonstrably different than her first use of it. I felt that her actions as a teacher, and the interesting nature of the activity, contributed to her students' engagement in the scavenger hunt.

On the online discussion board, Rhonda explained why she used the Internet scavenger hunt, which she called her "invention."

> I loved my invention I like to call the Internet scavenger hunt. Before I read *Catcher in the Rye* with my tenth graders, I had them do several scavenger hunts to help them understand the background of the novel. I sent them to different websites of subjects in the novel (like Central Park, celebrities of the time, the subway system, the museums, etc.), had them read about it, and then answer questions. To make things more interesting, I gave prizes to the people who finished first and who had all the questions right. They had a lot of fun with that and actually used the laptops and the Internet for what they were supposed to be using it for. (ezboard 14)

Not all of her technology infused lessons went as smoothly as I observed on this day. In an interview the following day, Rhonda mentioned her frustration with students not going to the correct website.

> They did not do a single bit of work today. I guess they spent the whole hour and a half looking at websites that they were interested in rather than doing the work they had to do that I had given them. Yeah, they spent the entire bell apparently doing absolutely nothing. One of them was the same one that did that during your last visit. That's been my big problem. (Interview 2)

Issues

Access. During the semester, the availability of technology was a major issue for Rhonda. Whereas many other interns had steady access to Dukane projectors, Rhonda had to ask other teachers if she could borrow their projectors. This required persistence, on her part, because the digital projectors were used frequently in the high school. This was frustrating for her (Interview 1).

> I want to try to use technology as much as possible for each new thing we do. It is hard, though, because every single Dukane has been checked out permanently and there is only one laptop cart in commission right now (because the piece broke off last time I used one of them). The other laptop cart is stuck on the second floor with no elevator working. I try, though. They seem to enjoy it, but they sometimes slip up and don't get work done. It can be a pain. But I am not going to stop using it at all. On the whole, it really adds to the class. (ezboard 7)

SOLs. After investigating a number of different instructional technology applications with her classes, Rhonda found herself at an impasse with technology. With

the end of the year distractions of standardized tests and prom, she did not feel that she could use technology. The unavailability of the laptop carts was also an issue that kept her from using technology with her classes:

> Um, well, the past month has been really tough because of the SOL's (standardized tests) and prom. And so, the attention of kids is nada. The best I can do with technology is the laptops. And they have been out of commission and we are not allowed to use them for the rest of the year. Apparently, they have been really abused. Which really stinks cause I was going to help my kids with their papers and kind of introduce them to the finer points of Microsoft Word. So, I don't really know what I am going to do with that. I have not been able to use a lot of it. (Interview 3)

Rhonda did not report using any new technologies, other than having her students use the Internet and Microsoft Word for their final papers.

Future Use of Technology

Reflecting on her experiences with technology and looking forward to her future as a teacher, Rhonda foresaw technology playing a solid role in her teaching strategies as a full time teacher:

> Technology played a big role in my student teaching experience, but I don't think it was too big. I wish I could have used more, but I think I used a good amount. The students seemed to be happy about it, so I am, too. Using technology is an ongoing learning experience because it is ever changing. I will continue to use technology the way I did this year, but adding new things or cutting out others to fit student needs. Every class will be different, so I can't say yet what I plan on

> doing with technology. All I know is that I am going to use it as much as possible without overdoing it for the students. (ezboard 17)

She reiterated her belief that technology is the future and how that plays into her purpose as a high school teacher preparing her students for a future:

> Because the one thing I hated about high school, and most of high school, is that I wasn't prepared for the real world, which to me, that is what computers are. I mean, they're everywhere now: cell phones, even my car is computerized, all that stuff. I think that they should be able to do all that stuff. So, I plan on using it as much as possible. Plus, it makes it more fun. They love it, cause it's new. (Interview 4)

Although Rhonda did not integrate technology each week, she exhibited an inventive and curious spirit that is necessary when working with technology. It appears that teachers who are flexible with the unknown, and are unafraid to explore, like Rhonda, are able to deliver quality and compelling technology integrated lessons that students relate to and enjoy.

Follow Up

In a follow up to my email to all of the interns, I learned from Rhonda that she did not finish all of her prerequisites to graduate. Because of this, she was not able to accept a job as a certified teacher. She is waiting to apply for teaching jobs for the following year. Rhonda described her thoughts on the internship experience:

> I do want you to know how much the Clover County experience meant to me and all the school systems. If I had known five years ago what I know now, I would

have gotten my classes out of the way earlier and done an entire year of student teaching. I learned so much.

Case Study 5: Ryan

Ryan taught Geometry and Algebra at the high school. He entered his internship experience with a basic awareness of instructional technology strategies to be used in the classroom. He learned this from the required introductory course in his undergraduate training at the university.

> Well, my preservice training was basically my only training with technology. You know, at (the university) I never knew what a web quest was until I took that class, ECI 304 or whatever it was. I never knew what that was. And I mean it opened my eyes to the idea that schools were trying to push technology in the classroom, which I didn't know was that big of a deal until I learned about it at (the university). I didn't know really anything about technology. So, I guess my preservice training taught me pretty much everything I know about technology. (Interview 2)

Out of all seven interns in the STAT program, Ryan used technology the least. Where all of the other interns used the digital projector, laptop carts, and the Internet on a regular basis; Ryan did not find ways of integrating those applications in meaningful ways in his classroom.

> I didn't want to include that kind of stuff, while we're trying to get ready for SOL's, 'cause I feel that it takes away from the time they could be using to really buckle down and get ready for this exam. Yeah, I have been looking, but I haven't found anything that can really do a lot better job that I can do. (Interview 2)

Ryan was honest regarding his infrequent use of technology. As he stated above, if he believed that he could teach it better without technology than with technology, he would not use technology. He "refused to use technology for technology's sake."

Interviews

Because Ryan did not regularly integrate technology, the progress of Ryan's experience and thoughts regarding technology, can best be explained through the context of his interviews, rather than my observations of him.

First Interview. By the first time I interviewed Ryan, during the sixth week of the program, he had not used any technology up to that point.

> It's not like I'm turning a blind eye to all this technology. And I'm not trying not to use it in my class. You know, I'd like to use it, I'm just trying to think of ways to. (Interview 1)

Although he did not use it regularly, Ryan felt that, through his experience as an intern, he was exposed to technology applications that he was previously unaware of:

> I'm becoming more aware of it. You know, when I was in high school, there was the calculator. that was the technology part of the class. We learned the TI 82. And now, its like I'm aware of all these different ways to use it. I might not know how to use it for my math class, but I'm definitely aware that, you know, the Dukane projector, and people are using laptops and computers. I haven't seen that before: how people use it... haven't seen that before, where you just wheel a laptop cart into a class. That seems really cool. (Interview 1)

Second Interview. The main piece of technology that Ryan used was a set of Texas Instrument graphing calculators (TI-83). His classroom was supplied with twenty TI-83's. His students frequently used these calculators as they prepared for the state's Standards of Learning (SOL) exam. In this state, students are allowed to use graphing calculators, such as the TI-83's, on the exam.

One of his two classes took the state's standardized test at the end of the semester. The pressure he felt to make sure his students were well prepared for the test was the biggest influence in making decisions regarding lesson plans. More than any other intern, Ryan regularly described feeling the pressure of the SOL tests: "everything is about the passing the SOL tests." He stated, repeatedly, that he was not able to find appropriate technological applications that would help prepare his students to pass the SOL tests.

The day before my second interview with Ryan, he had received a new overhead projection kit for his calculator. The device sits on top of a regular overhead projector and projects the exact image that is on the teacher's TI-83 calculator. Ryan felt confident that the projector would make his job of teaching students to perform mathematical functions on the calculator much easier.

> Like I said before, I was having lots of problems with my students being like, "Oh! What'd you do? I don't get it!" and "I don't have that on my screen!" (Interview 2)

When this occurred, Ryan would have to go to each student and troubleshoot his or her problems individually. The projector helped him out.

And now I'm like, "Do this and do this...alright hit this button. Do you have this on your screen?"

"Yeah."

And I'm like, "Next. Hit the next button. Do you have that on your screen?"

"Yeah."

"OK, good. Well, you're doing it right then." (Interview 2)

As soon as he received the projector, he used it in both classes the next day.

And like I said, we were doing sin's, cos's, and tan's in my geometry class today. So, I was really able to use it well with that. And like I said, for my algebra class, it's really going to work well, especially when we review for SOL's. Cause, like it said, we do almost everything on the calculator. It's almost like they want you to teach to the calculator, with all these worries about the SOL scores. (Interview 2)

It should be noted that Ryan's mentor teacher, Mr. Jefferies, was instrumental in acquiring the overhead projector. It was Mr. Jefferies idea to get it, and he found the appropriate funding to make the acquisition possible. Having a mentor teacher like Mr. Jefferies, who is capable of providing useful guidance on instructional technology is rare (Moursund & Bielefeldt, 1999). Ryan described how he received the projector:

Yeah, he came up with it and told me about it. I think he mentioned it to me before, but it didn't even occur to me. I didn't realize how much of a help it would be, you know, I didn't realize how big of a tool it would be. I'm pretty happy about having that one. (Interview 2)

On three occasions, I observed Ryan teaching, using the graphing calculators. Each student was able to use a calculator on his or her own. Once, I observed him

teaching, without the overhead projector calculator. On this occasion, he had to move around the class to attend to each student. When the projector arrived, he did not have to move around the class as much he did on my previous visit. He was able to demonstrate, step by step, how to solve problems using the calculator on the overhead projector.

The calculators appeared to me to be extremely reliable and useful instructional technologies. I did not see any problems arise during the times I saw them being used. Ryan never said that he had any problems with them working or not working. In fact, one time, I observed Ryan teaching using the chalkboard. A student asked to use a calculator. He said, "Yeah, good idea!" and immediately walked over to the closet, where the calculators are housed, and began passing them out to all the students. The transition was both spontaneous and effortless.

During this interview, I asked Ryan about how his perception of technology had changed. He told me that he was having a hard time finding technology that suited "the lessons they needed to learn" (Interview 2):

> They're on such a tight schedule. They're going to take the SOL's in two and a half weeks. So it's like such a, I'm not going to say its going to hinder my lessons, I feel like I'm trying to use technology for technology's sake, just to include it. I haven't found anything that's been like "Man, this is going to explain it to them better than I can!" (Interview 2)

When I asked him about what types of technologies he used, other than the calculators, Ryan talked about looking on the Internet for ideas. He stated that he did not have any success finding lesson plans that fit his curricular needs:

> I mean, there's great lessons out there, but they're so specific, it's just like one lesson. But I haven't found one that is specific to what I want to do, to the one I am doing at that time. They vary so much. Like, all the websites have lesson plans and stuff. It's like a really cool website, but its just not stuff that my students really need to know. It's more like a fun kind of thing. You know, like fun stuff... I mean they need to do fun stuff, but there's so much pressure for them to do well on the SOL's, that it kind of takes away from their fun time. (Interview 2)

Third Interview. Ryan mentioned, throughout the semester, that his main use of technology was using the Internet to research ideas that he could implement in his class. I asked him about how many of his lessons were influenced by his research on the Internet. He stated that he only recently started to implement ideas from the Internet:

> Honestly, not until recently, not since SOL's have been over. Since SOLs have been over, I've been doing projects, like 1 or 2 day projects that I found on the Internet. So, yeah, not until SOL's were over did I start researching on my own to find stuff. (Interview 3)

I asked him about whether or not his perception of technology had changed since the last time I talked with him. He replied:

> It hasn't changed. No. Nothing spectacular has happened to change my feelings. For me to change, like, something would've had to happen for me to change my feelings toward it. But, no. I mean, it hasn't changed. I mean, I still think technology is great. I definitely think it's going to be the wave of the future. (Interview 3)

At the end of the semester, during the final interviews, I asked each of the interns whether they thought that student teaching was a good time to be emphasizing and learning about instructional technology strategies. Everyone, except Ryan, said that it was a good time to learn about technology. Ryan explained:

> It's just too much. It's so much. You're top priority is being in the classroom and getting the kids to learn. And then trying to learn new stuff is just kind of overwhelming. "Overwhelming" is a really good word (to describe it). So, I think the best way to do it would be, after student teaching, through workshops, maybe. Something like that. (Interview 4)

On the online discussion board he made a similar statement:

> I used it less because I felt overwhelmed in this situation. Don't get me wrong, I feel this was one of most valuable learning experiences I could of ever had as a new teacher. If I would of already felt comfortable in the ways of integrating technology into the classroom I would of used it more but trying to plan for these different classes took time away from learning about technology to the point of integrating it on a regular basis. It was a little too much to think about all at once for this slow learner (ezboard 13)

Issues

At the end of the semester, Ryan wanted his students to take online tests using eduTest. He needed to use one of the wireless laptop carts for this activity, but they were unavailable. He stated:

> Yeah, they stopped checking them out, I think, maybe two weeks before the SOL tests were given. I don't know if maybe teachers were playing games on them or

> something, I don't know. I don't know why they stopped checking them out... which I thought was weird because I wanted to do eduTest with them which I thought the school would like. But no, no such luck. (Interview 3)

Because a number of interns at the high school brought the issue of the lack of availability of laptops to my attention, I talked with the Director of Educational Technology for Clover County Schools, Ms. Dupont. She informed me that her department had to put a "freeze" on the use of laptop carts for two reasons: 1) there were reports that some laptops were not being handled properly and, consequently, the number of broken laptops was prohibitively high, 2) so that they could be set up and ready for the students to take the SOLs on them. Because there were only a few weeks left in school, Ms. Dupont decided to forbid the use of the laptops till the end of the school year, so that no further problems would arise. In the end, Ms. Dupont made exceptions so that a few of the interns at the high school could use the laptop carts.

Preservice Training

Ryan felt that his required class, Instructional Technology and the Classroom, introduced him to a number of instructional technology strategies he was unaware of. He stated:

> The technology class I had, I think it's ECI 304 or something, we did web quests. and I do want to do a web quest in my class. So, that will—learning how to do a web quest—that prepared me for using it with my own. I had never made a PowerPoint presentation until I took that class. So, it got me very familiar with PowerPoint and also with spreadsheets and stuff. There was a lot of cool stuff involving math and spreadsheets, you know cause it's all formulas and numbers

> and stuff. But geometry, you know, is kind of different, like in that it is all drawing shapes and stuff . So, you can't really use spreadsheets, that's more for like statistics and probability and stuff. Yeah, but without that preservice training, I wouldn't know how to do it. So, I would say it was very helpful in getting me ready, introducing me to all the applications the computer has on it. (Interview 1)

Future Use of Technology

Although Ryan did not use much technology, apart from his work with the calculators, he maintained an optimism with regard to instructional technology. He expressed a desire to use the summer break to research ways of using technology with his students:

> Now that I somewhat have my feet under me, I plan on using this summer break to research some great ways on integrating technology into my class for next semester. This internship was great for introducing me to all the different uses of technology that are out there. Now it's up to me to continually build on that. (ezboard 17)

Case Study 6: Anne

Anne is one of two interns who taught Social Studies at Clover High School. Both she, and the other social studies intern, Tripp, entered their internship experience anxious to use technology in as many ways as they could. They were extremely proactive in their approach. For example, both Anne and Tripp arrived in Clover County a few days before they were required to so that they could get a head start on planning, setting up their rooms, and investigating some of the technologies they would have access to.

Anne, in particular, used technology on a regular basis throughout the semester. The main instructional technology application she used was PowerPoint. Because she taught history, she used it to present notes for her students. At one point in the semester, her students created their own PowerPoint projects, covering a certain section of World War II, and presented it to the rest of the class. They used the computer lab in the library to do Internet research. Her students also completed a web quest on communism that she created during her preservice training.

Anne taught two periods at the Clover High School. She taught Virginia and United States History to two eleventh grade classes. Each class had a small number of students. One class had seven students and the other had eleven. Because of the limited space at the high school, Anne taught in two different classes. This created an extra challenge for her when she wanted to use technology. She had to set up everything between bells. She became proficient at accommodating the inconvenience of having to set up technologies between classes or during a lecture. When there was time, in class, while setting up the Dukane projector, she might give the students a task or assignment,

relating to the lesson, which would keep them occupied while she set up the technological application.

Observation

I observed Anne teaching eight times over the course of the semester. Technology was integrated into seven of these lessons. These observations provide a window into the student teaching experiences of an intern who is interested in having technology be an integral part of her classroom environment.

First observation. The first time I observed Anne teach, she gave a PowerPoint presentation on the Spanish-American War. She used PowerPoint as an accompaniment to her lecture. Notes were displayed as well as a number of pictures. I noted:

> For the PowerPoint presentation, all of the students quietly took notes. There were no interruptions. However, the teacher used one-way communication during her lecture. She did not engage in dialogue or discussion with the students. She lectured and the students took notes.

This observation shed light on the Clark and Kozma debate, between whether technology enhances the lesson or is merely an alternative medium for presenting content. From my perspective as an observer, it appeared that Anne's lesson presented the notes in a visual way. However, I felt that technology enhanced the lesson, because pictures, maps, examples of newspaper clippings, were used. Reaching the same conclusion as Kozma (1994), I concluded that notes given orally, or on the blackboard, could not convey the material as vividly as her PowerPoint because of the visual material it included.

Looking at her Technology Log, PowerPoint is the most consistently mentioned technology application. On the discussion board, when asked what instructional

technology application she used most often, she stated that she uses PowerPoint more than any other technological application:

> I use mostly PowerPoint presentations, because it forces my students to take notes. My theory is that if they are taking notes, then they are absorbing and more likely to retain the information. (ezboard 8)

These presentations regularly included pictures, graphs, maps, and political cartoons culled from the Internet. Creating such a presentation was a time consuming endeavor for Anne. She stated:

> It's very cumbersome and time consuming and it takes a lot of time to prepare a PowerPoint presentation for every day's lecture, but the benefits, to the students, I think, outweigh what I have to do to prepare. (Interview 1)

After only using PowerPoint for one week, she noticed that her students started taking notes, when they had not before.

> I don't know why they all of a sudden decided to take notes. in fact, I find it a little annoying, because they want to copy every single word when what I prefer them to do is copy the general idea. (Interview 1)

Anne described using technology as a presentational tool and as an enticement:

> I use it as a tool, but at the same time, I use it as a hook. (Interview 1)

Second observation. On the sixth week of the semester, I observed Anne introduce a technology integrated research project to her students. Working in pairs, her students were to research a particular aspect of World War II and create a PowerPoint presentation to show to the rest of the class.

> After introducing the assignment to her class, Anne brought the class down to the library. During the introduction, a few of the students tried to disrupt the lesson by protesting (“I hate going to the library”, “I ain’t gotta do nothing”). Anne ignored some statements and responded to others by assuring them that they would do the work.

Once they were in the library, the students were allowed to use all of the resources of the library (which included books, encyclopedias, and a computer lab of ten computers). Without looking at any other sources, the students immediately went to a computer and began researching and developing their PowerPoint presentations. I thought it was interesting that they did not even look at any of the books or encyclopedias. All of the students went to the computers. At one point the teacher and the librarian encouraged the students to utilize the books, but no one moved from their computers. Towards the end of the lesson, she even found some reference books from off the shelves and distributed them to some of the students:

> Anne spent a lot of time walking around and keeping the students on task. She required students to get information from at least three different sources. They were also reminded not to plagiarize (It’s easy to copy and paste material from the Internet to a PowerPoint presentation).
>
> I went around, towards the end of the period, and looked at what each student was doing on the computers. Eleven students were situated with eight computers. Out of these students, only one was looking at something that did not relate to do with the assignment.

Third observation. One week later, I came back to Anne's class to observe her students presenting the PowerPoint presentations I saw them working on during my previous observation:

> The lesson started with Anne briefing the students on the plan of the class period: one student would present his PowerPoint presentation and afterward they would look at a video. Some students expressed that they were tired of watching videos.
>
> The first student made a 15 minute PowerPoint presentation. With coaching from Anne, he presented about fifteen slides on the Battle of Stalingrad. His slides typically consisted of notes he took on the subject. A few pictures were used, as well. After his presentation, he passed out a self made study guide handout to the rest of the class.

In a subsequent interview, Anne shared her perspective on the lesson I observed. She felt that my presence in the room had an affect on the students being well behaved:

> Lee - First of all, I've got a question regarding the class I saw the day where you had a student presenting their own PowerPoint presentation they created last week. The student did a 15 minute presentation. From what I saw, all of them were paying attention to what he was saying. All of them were taking notes. A few of them asked questions about... you know, clarifying what they were taking down. What are your thoughts on that? What do you think about that?
>
> Anne - Well, first off, I think that because you were there, is the reason they were doing that, to be honest with you. Secondly, that student was purposefully drawing out everything to lengthen his time, because everything he said was on

> the study guide. He just wouldn't hand out the study guide until he was finished. It was a bit of an underhanded strategy.
>
> And I think they were a lot more attentive because you were there. I don't know because yesterday we had a lot of problems with one student who didn't want to present. (Interview 2)

Fourth observation. The next day, I returned to observe the students finishing their presentations. This time, I observed Anne encountering a few problems with technology:

> Before class started, Anne realized that she didn't have a big white sheet of paper she normally carries with her. She had to improvise by taping up sixteen pieces of white sheets of paper on the board and projecting onto them. This cost her about four minutes of time. She had to start the class a few minutes later than she would have if she wasn't using the projector. This was caused because the room she teaches in: a) is not her own, she only uses it for this class and b) does not have a pull-down screen.
>
> It appeared that Anne had problems downloading the students' PowerPoint presentations in time for them to present at the beginning of class. Therefore, she gave them all a handout of an article from Fox News.com that described an aspect of the war in Iraq. Each student received the handout and were given 10 minutes to read it and be prepared to summarize the contents.

Even though not having a pull down screen cost Anne instructional time, she anticipated the problem by having a handout ready for the students to complete.

Reflections on the PowerPoint assignment. In our interview, Anne stated that her students complained repeatedly about the PowerPoint assignment. She was discouraged by what she felt was low student motivation.

> They definitely don't like this way, but I don't think they really like any way. You know, if they are not complaining about one thing, when we are doing another thing, they are complaining that I am not letting them do it like this. You know what I mean? (Interview 2)

Low student motivation seemed to be too powerful a force to be overcome by this hands-on technology project:

> I'm kind of at my wit's end with whether it really makes a difference with their learning curve, if I use technology or not. If they don't want to learn, it doesn't matter what I do. They're just going to go to sleep. I mean, I think it helps for them but I think it could be a lot more productive if the kids were more proactive with school, in general. Cause I thought this was a fun project. I felt like this was, "Hey, it's your time, you're going to get up there. You're going to be the teacher." I mean, but they are up in arms. I mean, they are like rioting about "How dare you make us do all this work!", "this is too much", "how dare you take a picture of me!" (Interview 2)

Not only did her students complain about the project, Anne stated that the instructional strategy of having her students create and present PowerPoint presentations took at least four instructional days longer than it would have, if she had simply presented the information on her own. She continued:

> So, I would say we are spending four days on presentations, three days on research and development. I mean, that's a total of a seven day project, which originally in my lesson plans, was only supposed to go for six days. And I would say, if I were doing this by myself, I could probably do all of this information in two to three days. Yeah probably two to three days. (Interview 2)

Because this strategy took four extra days to cover the material, I asked Anne if she thought she would attempt one of these projects again and whether or not it could be refined so that students do not take extra time. She replied:

> Well, honestly, this is as tight as it probably can be done. I have really cracked the whip on them and have really been sort of a slave driver. Like, "I know you guys want five days to do this stuff." I know that, realistically, if they keep on task, they can do this. But, because of suspensions, detentions, I am trying to offer everybody the same opportunities. And that is what added to the extra day of research and development. Plus, the other students were whining and complaining. So, more of an appeasement act, as well. (Interview 2)

A few weeks later, on the online discussion board, I asked the interns to describe their favorite technology application they used. Anne described the project as her favorite application and shared a more positive perspective on its usefulness:

> My favorite tried application was the students creating their own PowerPoint presentations on the battles of WWII. It meant less work for me, but I also think they retained more. Unfortunately, they retained mostly from their own presentations rather than those of their peers as well. (ezboard 14)

Reflections on personal technology growth. At the midpoint of the semester, I asked Anne if she felt that her technology use had progressed during the few weeks since our last interview. Curiously, she stated that she felt she used technology to its fullest potential.

> I don't see what more you could truly do. I mean, I use the projector and PowerPoint in ways to show maps, maybe, graphs and charts. I feel like I am really using technology to its fullest extent in the classroom, given the time issues that we have. (Interview 2)

By the middle of the semester, she felt she was using technology to its highest potential. This outlook contrasted with some of the other interns, such as Donald, whose thoughts of the potential use of technology increased during the semester. Anne saw herself using technology to its fullest, whereas some of the others saw new possibilities.

Fifth observation. Towards the end of the semester, Anne needed to prepare her students to take the SOL's. At this time she reported using technology less than she had before, "I've used it less, because we've been reviewing" (Interview 3).

On the fourteenth week of the semester, I observed her class taking an online test, similar to the SOL's at the computer lab, in the library. The students seemed particularly focused on taking the practice test. No students talked to each other during the 40 minutes they were in the library. In our subsequent interview, Anne was delighted with how the test worked and how her class behaved. She described why she liked the online test:

> There were no technical difficulties. That's why it was spectacular. And they were quiet and they paid attention. I wouldn't say that their performance overall

> was spectacular. But all and all, the majority of my students did very well. (Interview 3)

The test asked questions that covered the standards her class was responsible to know. At the end, the program gives the student a graph indicating which questions were answered correctly and the corresponding content standards that apply. Because Anne had her students take this test one week before they took the SOL's, I asked her if she would be able to use the information to shape her instruction and remediate those areas that the students scored poorly on. She did not think that she would be able to make significant use of the data. However, she indicated that she would review the problems of the two students, who did not pass the online practice test, and use that information to remediate them. She regretting not having access to this application at the beginning of the semester.

> The only thing is that I wish we could've taken it at the beginning of the semester to kind of gauge how much they've grown or not grown. (Interview 3)

Sixth observation. At the end of the semester, after the students completed taking the SOL exams, Anne had her students go through a web quest she created during her preservice training at the university. This web quest was focused on communism, a subject not covered in her class' content standards. Because of this, she introduced it at the end of the semester, when SOL testing was over.

The students worked in groups of three to four. There were six groups. Their assignment was to review two communist dictators each and to produce a short one-act play that demonstrates their history and philosophy. The students seemed relaxed and excited to be working on something without the pressure of being graded or tested on it.

Issues

Access. Overall, Anne felt comfortable using technology and the issues that arose from its usage. Her biggest issue with technology was access. She did not feel that there was enough access to technology for her students, their parents, and the community at large. Even though Clover High School has 28 digital projectors, Anne stated that they needed more:

My other problems that I've had with technology is, um, there aren't enough Dukane projectors in the school. And the one, particularly in my third period, Mrs. Buckley's projector, is damaged. The complete left side it projects, but the left side, it distorts it. (Interview 1)

SOLs. Anne felt that the pressure of the SOL's influenced her choice of technology applications. She wanted to do more hands-on, interactive technologies, but, because of limited time and the amount of material she needed to cover, she felt that PowerPoint was the most practical tool to convey the material. She explained

> For me. you know, I hope to be more involved with having them do PowerPoint presentations and integrating web quests or virtual fieldtrips. Something to that extent would be good. The problem with that, with all these days we are losing [with weather], the SOL test is getting so close. I don't, you don't want to hear this, I just don't have time to do this before the SOL. I would say on record that the SOL's impede the teacher's ability to be creative and really integrate technology into the lesson. There is so much pressure to... we need to get through this information. That's why you will probably see this semester, that going to be

my major infusion of technology is PowerPoint presentations. It helps them. (Interview 1)

Setting up. The fact that Anne taught in two separate classes created some complications for her with technology. One class she used did not have a pull down screen. She had to find an alternative way of projecting images in a classroom without a pull down white screen.

> The way I've addressed that problem, mainly, is I go down to the teacher workroom and rip off the long paper, like a white piece of paper, and tape it up to the chalkboard. That's kind of an innovative way to fix the problem, I wouldn't say fix the problem, but amend the problem for the time being. (Interview 1)

Often, a teacher, learning to integrate technology, encounters problems that waste class time, but learns, through experience, how to troubleshoot. One common problem that teachers have when using digital projectors, is making sure that the projector is properly receiving the message from the computer. If it is not reading the signal, a blank screen appears. When this blank screen appears and one is attempting to teach a class of students, a frustrating encounter is imminent. One simple way of troubleshooting this problem, is hitting the "ALT" and "F5" keys together. Anne was not aware of this shortcut and wasted time in class. Because of this problem, her class was not able to complete a planned assignment.

> This is probably my part, not anybody else's, just my ignorance of how to make it work properly, was not knowing how about the ALT - F5 function. You know, it was saying "no signal". And it really disturbed my class and I would've liked to have known about this ALT- F5 because I wasted about 15 minutes, which cut

> into their time, and they didn't get to do everything that I wanted them to do, an enrichment activity, a remediation activity, which way you want to look at it, before taking a quiz on the information presented. (Interview 1)

Preservice Training

Methods class. In our first interview, Anne reflected on the training she received at the university. She had particularly constructive comments on the practical technology applications she was exposed to in her methods courses. Her teacher, Dr. Parker, provided her class with a handout of content specific websites.

> I would say, Dr. Parker did a really good job of getting us to integrate technology in the classroom. She gave us a handout of probably about fifty pages, double-sided, of just websites for social studies people. I think, in my opinion, though when I looked at it, it was so overwhelming, that I didn't want to look at it. you understand. but she did a lot of projects with us that really forced us to use technology and helped us to understand how to get our students to use technologies as well. (Interview 1)

Dr. Parker demonstrated a number of student centered technology projects and web quests. Anne liked that the class had to perform them as their students would. She explained:

> One thing I enjoyed that she did was: these projects that we did, are really for our students to do, but she had us do them, so we would know what kind of problems or you know obstacles to overcome doing this project. So you would have an understanding and be prepared for that for your students. You know, the web quests, obviously, although that was only the last 2 or 3 weeks of the semester.

> But, I learned a lot more about technology, in doing that, than I had before. And it opened up something for me cause I never knew anything about these web quests. (Interview 1)

Echoing the sentiments of other preservice teachers (Willis & Mehlinger, 1996; Topp, 1996; Strudler, McKinney, Jones, & Quinn, 1999; Hargrave & Hsus, 2000), Anne doubted, whether or not she was prepared for her first day of teaching:

> So, technology speaking I felt like she did a pretty good job. pretty on top. The whole other "preparing you for your first day": no, I don't think Old Dominion... I don't think any school, any institution for higher education, prepares their students teachers for that. Of course, most student teaching experiences are not first year experiences. But, in an urban school system, within a rural community... I don't know if there is any type of preparing for it other than enforcing the need to have discipline in the classroom. You are required to take a class, but it really is not embedded in you that you need to be on top of discipline. (Interview 1)

Follow Up

During her experience, Anne demonstrated a consistency in her method of technology integration. Her focus being on SOL performance, she used PowerPoint presentations to provide a visual method of presenting notes and lecture material. Looking into her immediate future, as a full time teacher she commented that she hoped to integrate more technology and have her students "learn and create their very own web pages."

Six months after her internship experience, I spoke with Anne, in a telephone interview, about her experience as a full time teacher. Anne is currently teaching at a poor, urban school district. She is teaching seventh grade social studies in a school of about 1,500 students and 125 teachers. She said that technology at her school is "nonexistent." The one computer lab in her school is reserved for computer science courses and there are two digital projectors for 125 teachers to share. She described receiving "no support or encouragement to use technology." Anne considered herself as one of possibly three other teachers who regularly use technology at her school. Anne reported using a digital projector "once or twice a week" and continues to use the PowerPoint presentations and PowerPoint Jeopardy review games, which she developed and used during her internship experience. It is clear from her statements that Anne continued to regularly use technology, as she did in the STAT program. It appears that the skills she developed during her internship experience, with regard to instructional technology, stayed with her as she took on the greater responsibilities of being a full time teacher.

Case Study 7: Tripp

Tripp taught two bells of tenth grade World Geography at Clover High School. Both of his classes were small in size—having six to eleven students in each class.

Technology Use

PowerPoint. More than any other technology application, Tripp used PowerPoint, rich with pictures, to give his students a compelling window into the lives of people in other countries and regions. Whereas many of the other interns used PowerPoint to present notes, Tripp described using PowerPoint as a visual slideshow. He filled his PowerPoint slides with unique pictures of people and landscapes from all over the world to captivate his students' attention and stimulate discussion of the cultures behind the pictures. Initially, he used PowerPoint to show interesting pictures and accompanying notes. Eventually, he concentrated more on presenting pictures and streaming video clips to stimulate fruitful and serendipitous conversations on the regions displayed in the presentation. This gave him the flexibility to stay on one slide for as long as necessary and skip others. He talked about how his students enjoyed this method:

> They do enjoy the pictures, because we can stop and talk about them and, if not, we can zoom right by and go on to the next one. If they are interested, we'd talk about it, if they weren't, we didn't. I used it to get onto different topics a lot. So, we'd talk about irrigation or something like that, based on the PowerPoint presentation. And, like I'd have a map of the area, and we could go back to the map and go backwards and forwards between the different pictures. You know jumping back to the ones before. (Interview 1)

Tripp's method for teaching World Geography was using pictures to entice his students into a broader view of the world. This appeared to be for two reasons. First of all, Tripp felt that his students, coming from a rural county, were not exposed to a great deal of diversity. This was made apparent when Tripp, who is Indian, was asked if he was "mixed" (between black and white). Only one of his students knew he was Indian. Tripp later found out that the reason this student knew this was because he lived in a nearby town with two Indian doctors. This experience influenced Tripp's decision to present class material in a way that relates to their own environment.

> I showed them a picture of an elephant dressed up, because it was going on a parade. a couple of them were highly amused, they couldn't stop laughing, "you mean they dress up elephants?" it was just really funny, and I know that it will stick with them, because they thought that that was a crazy thing to do. And that's kind of the way that they are gonna learn, by seeing things that they think are crazy and saying "Ah, that's related to such and such..." (Interview 1)

Another reason he emphasized presenting pictures from other cultures was because of the nature of the textbooks the students were supplied with. He felt compelled to use technology because the textbook he was given to use, was over 14 years old. Tripp felt that the textbooks not only gave an outdated account of World Geography, they produced a limited window into the varied richness of other cultures. He explained:

> If they just see a lot of developing countries as like "the guy with the bull trying to plow this field", that's just a little fraction of what it is and that's what a lot of the textbooks show, because that's what defines how they act in that particular area. you kind of lose the whole globalization idea. (Interview 1)

> You can't explain cultural geography in words. You have to show them pictures… it is just impossible to tell them. and pictures and textbooks are good, but their textbooks are old. and so, I basically don't use the textbook, most of the time. there's no point, it has the Soviet Union in it. I mean, we have one chapter on the Soviet Union. I told them the stuff in the textbook we'll use, but don't worry about it, you can use it for some of the maps, but we can't totally rely on it. (Interview 1)

By my second interview with Tripp, at the midpoint of the semester, he had made changes to the way he gave his PowerPoint slideshows. He found that some of his students were not sufficiently compelled to take notes during his lectures with PowerPoint. He decided to introduce handouts that corresponded to the pictures he introduces during the presentation, "so that they have to pay attention, and they're writing something down so they get something out of it" (Interview 2).

His method of presenting the material gave flexibility to explore areas that the students connected to. If the students found one picture particularly interesting, Tripp would explore it further. Often, a picture would stimulate conversations that would lead to questions that the class would explore together. In an interview, Tripp described showing a picture of a unique oilrig owner who wanted his oilrig to become an independent country. His students found that particularly interesting and humorous. Even though he had not planned on exploring this topic, he was able to explore topics "related to geography in terms of territorial limits and things like that, and that was all because they were interested in it and they asked me questions about that." Experiences

like these, helped concentrate Tripp's lesson planning in a way that is guided by the students' interests.

> And so what I found was that when you have the pictures and you get the students to talk about it a little bit, you end up teaching them more about the subject, not necessarily in the order that you're thinking, but maybe in the order that they're thinking. So that they can plug it in into certain places. and it's not nice and neat, but it's good because they remember. They say, "oh yeah, I remember the story about the oil rig and this guy!" and so they remember where the places are. You know, cause they say, "oh yeah this is the place where they put the oil well and he was over here..." And that, I think, makes it a lot more interesting and easier for them to remember this stuff.
>
> So, what I've found that, with my class, it's helped them get enthusiastic about the material and kinda interested. (Interview 2)

Tripp went into further detail regarding the conversational nature of his classroom when projecting PowerPoint slides in his geography class:

> I think one of the biggest things that I've found is that, with using PowerPoint or something like that, the words kind of get in the way. And if you just have pictures and you explain the pictures and you use the pictures as a starting point to kind of start a conversation on what it is, you know, who is doing what and why, that is much more interesting to the students than having, you know, a small picture and having notes for them--where you kind of read through the notes. They just don't like that at all. It just kind of bores them. Cause they just read it and hear you say it back to them and it doesn't go in at all. Whereas, if they get to

> see a picture, and then they analyze, you know, "why do you think they do this?" You kind of get into different conversations to help you get a lot of information in the students' minds and also help them realize that certain things happen because of culture, or because of location, or because, you know, of different factors in each area. (Interview 4)

At the end of the semester, Tripp described his method of teaching as a "conversation" instead of a lecture. He said that his students, "enjoy it a lot more, because they feel that it is a conversation as opposed to a teaching environment" (Interview 4).

unitedstreaming. In two other intern's classes, I observed them using *unitedstreaming* videos. I noticed in Tammy's class, for instance, that after about eight minutes of watching a video, her second graders became increasingly restless. For April's seventh graders, the time span was shorter. Tripp found that he could keep the attention of his tenth graders on a video for a maximum of 3 minutes:

> You can use videos, but what I have found, with these students is that if you have something that is really long, they tend to fall asleep. Having the 2 to 3 minute clips is great because you can do that for a couple of minutes, and as their brains are slowing down you can "Stop! All right, let's talk about what we just learned. Here's a handout and we're gonna try to go through it and try to figure out from what we just watched." Kinda keep them moving. Keep their attention going to different places. I think that's the only way of doing it. That's basically where technology is useful, because the older ways of doing it are not quick enough. You can't switch around quick enough to be able catch them. (Interview 1)

By the second time I interviewed him, during the ninth week of the semester, he had described using *unitedstreaming* more, particularly for music. He said, "the biggest thing that gets to them is music from different places"(Interview 2). Tripp used music, from all over the world, to introduce different cultures to his students. Much like his use of digital pictures to stimulate class discussion, music provided an alternative segue way into deeper discussions of the cultures from which the music originated.

For the first three weeks, all of the interns were without access to their laptops. The only technology immediately available to Tripp was his classroom computer and a digital projector. With just these technology tools, Tripp decided not to use technology.

> Well, right at the start, I didn't use technology that much. Really, because the computer that is in the classroom is not set up in a good place for use of technology It's at the front of the class, away from... kind of in a corner. You can't really move it around because it's a desktop. And all the wiring that's hooked up, won't let you move it. And the printer is there. So, you can't really move the computer. And the screen, if you want to use PowerPoint or use the computer in any way, is right by the computer really. So, I decided I wasn't going to use that computer for anything other than taking roll, and maybe getting on the Internet if I need to find something, and printing out my lesson plans, and things like that. (Interview 1)

I thought that his comment was particularly interesting because, even though he was without a laptop, he had more technology in his classroom than many other teachers do. Almost every classroom in the United States has a classroom computer, however, few have constant access to a digital projector. In other words, Tripp had more technology at his disposal than most new teachers and he decided not to use technology. I feel that his

comments give a compelling reason why many new teachers, without access to a laptop, would choose not to use technology.

His comments also highlight the stationary nature of the classroom computer: its "in a corner", "you can't move it around", there is "all the wiring that's hooked up", and "you can't really move" it. Because of these reasons, he chose not to use technology during the first three weeks. This raises a question: do many other student teachers, given only a classroom computer, choose not to use technology for the same reasons?

Observations

First Observation. The first time I observed Tripp teach, using technology, was during the fifth week of the program. This particular lesson consisted of introducing the seven continents and reviewing old material:

> He started off the lesson with the students doing individual work. After giving them about seven minutes to work by themselves, he began the lecture. His 20 minute lecture consisted of drawing a rudimentary map of the seven continents and discussing the oceans and their currents. I thought it was interesting that he chose to draw the map by hand, instead of using a map found on line or somewhere else.
>
> After the lecture, he transitioned to game of Jeopardy that would be projected using the digital projector. All of the connections were made before the class began, so all he had to do was turn both the laptop and projector on. It took 2 to 3 minutes for the laptop and projector to boot up. The Jeopardy game was assembled in webpage format. The front page was a blue screen split into five categories, with corresponding money values, resembling the Jeopardy screen

used in the television game. The students were divided into two teams, while the teacher played the role of game show host (i.e. Alex Trebek). When a student asked for a category (e.g. "'Resources' for 300, please"), Tripp clicked on "300" which was hot linked to the corresponding question found on another page.

The class became extremely loud during the game. Midway, the game broke up because the students felt that the teacher was being unfair. The teacher apparently relaxed some rules, and some students refused to continue [I view this as an effort to sabotage the game instead of producing a real complaint]. The intern asked the students if they wanted to do something else. No clear answer was given. After the complaining students calmed down, the intern continued the game.

Throughout the game, there was one loud team that talked together a lot. The other team did not seem to interact at all. The rules of the game were blurred. The teams were indecipherable to me. Although they were divided, they did not necessarily sit together.

Close to the end of the game, Tripp asked the class, "Do you want to keep going?"

One student responded, "no one wants to keep going but Jaime."

Tripp said, "Fine, we can do something else." However, he continued the game. At this time, one student asked to go to the bathroom [Although she may have had a genuine need to use it, I took this as a sign that she was not interested in the game]. Over the next fifteen minutes, four students asked to use the bathroom and were given permission to do so.

> He asked if they wanted to continue three different times throughout the game. The entire first round of the game, consisting of twenty five questions, took twenty five minutes to complete.

It seemed obvious to me that the students did not fully appreciate this activity. Although the activity seemed to be fun and engaging, it did not appear to engage the students. Most of them found ways to distract themselves from the game. It is something to consider whether or not this is worthwhile for the students. Perhaps giving them a practice quiz, on paper, would have accomplished the same thing in less time. On the other hand, if presented differently, it may have been successfully engaged the students.

Second observation. On the seventh week of the semester, I observed Tripp using the digital projector and PowerPoint software to present a visual tour of Antarctica and Australia. The presentation was a pictorial tour of the two continents that he made from digital images he found using the Internet:

> As the students entered the classroom, he had an assignment for them that they were to immediately complete. As they were working on their assignment, he set up the data projector and the laptop. He seemed quite confident and at ease during this time. He did not appear rushed or flustered.
>
> As soon as the students were finished, he described what they would be doing for the rest of the class period: seeing a PowerPoint presentation on Australia, taking a test, and then watching some music videos from around. After that, he turned the projector on and the first slide appeared (it was already cued).
>
> The PowerPoint presentation elicited a lot of active response from the students. All 11 students watched the slide show. More than half of the students

made comments throughout the presentation. Many of their comments were meant to be silly or humorous (to make others laugh). The students were also loud at times. However, their comments, although meant to be funny at times, were about the pictures projected on the screen.

During the test, which the students completed on paper, Tripp had one multiple choice question that required him to project four images. These were projected during the test for the students to see.

After the test, he turned off the PowerPoint slide and turned on a *unitedstreaming* clip. The first clip lasted about 2 minutes and seemed to be something that grabbed their attention. However, when the second streaming video was played (lasting about 10 minutes), 4 of the 11 students put their heads on their desks and did not pay attention. However, the class was quiet during this time, with the exception of a few outbursts or comments by some students. After the presentation was over, Tripp turned off the projector and entered a different part of his lesson, where he discussed what was viewed, with the students.

This observation was particularly interesting because Tripp used technology in three different ways and in separate sections of his class period. At the beginning, he showed the students a PowerPoint slideshow of Australia. After discussing the slideshow, his students took a test, which included one item that required the projector to display four digital images. He ended the class period by showing two online streaming videos.

Influence of the SOL tests. Towards the end of the semester, Tripp reported using technology less because of SOL's. Because of the SOL tests, his purpose for using technology shifted. Tripp began transitioning from technology as an enticer—an

introductory element to present new ideas and concepts—to concentrated review. Tripp stated how he did not find useful resources online that would have helped his students in their studies:

> Before, when I started using it, a lot of the reasons for starting to use technology was to try to bring new things; to bring different experiences to the students. With the SOL tests, that has become a lot more focused. And so a lot of the things I have been doing have shown how I am right with it (SOL guide). Because of that, I have used a lot less technology. And the big reason for that is because, with the test, a lot of the practice tests and things like that, we don't have them on-line. We have a lot of those things on paper. (Interview 3)

Tripp described using technology to break up the monotony of conventional teaching:

> You know, you hit them with work sheets or, you know, tests that they have to be doing all the time, they really get tired of it quickly. But if you start off and you give them, you know, a couple of tests here and there and you give them some worksheets, but you also give them a lot of Internet use, you give them, you know, some stuff where they have to do research, you know, new things that they haven't really done before. When you do have to end up going to basic, boring review, they take it a lot better. (Interview 3)

Perception of Student Abilities

Towards the end of the semester, Tripp began noticing, to his surprise, that most of his students had their own web pages. This completely altered his previous perception of his students' technology abilities:

I'd say at least 80% have web pages. And even today, one of my students came into my class and they had a digital camera in another class and she wanted to take pictures and she wanted to know if I had a disk. Cause they wanted to take some pictures for their webpage. So, a lot of the students, even though if it's not directly through the school, a lot of the students are learning about technology. It was kind of amazing to me that almost everyone has a webpage. Like, you might finish early or something and someone says, "Oh, can I get on the computer?" And I say, "OK." And they get on the computer and they want to make their webpage. And I wouldn't let the same person go on every time, it would be a different person. And after a while I was like "every person has a webpage?" They are all using email. They all know the technology. So, I thought about it, if that many students in this county have web pages, know how to use the Internet and know how to basically create stuff on the web, most places it's going to be that or higher. What's kind of scary is that most of the teachers are probably not up to that level. I don't think 80% of the teacher can create their own web pages. (Interview 3)

Tripp also found that his students had a familiarity with the normal functions of the laptops and PowerPoint software. This, coupled with the revelation that many of them created their own web pages, changed his perspective on their abilities. This revelation brought about thoughts about how novel his and other teachers' technology-infused lessons are to students who are more technologically advanced.

You know, they know how to use PowerPoint. Like, I had maybe two students out of twenty who didn't know how to use PowerPoint. Everyone else knows how

> to use it. They know how to do the transitions. And that really surprised me 'cause I wasn't expecting them to be that far ahead. So, kinda looking back at what I was doing, it wasn't that amazing for them, because they were right there! (laughs). I thought, "Oh, I'm going to show them all these cool and interesting things." Well, it's pretty cool and interesting for me, it's not really cool and interesting for them. And so, I think that as we go on, a lot of the stuff that the teachers are going to find cool and interesting a lot of the students will have already seen or know how to do. It's interesting because there is this little gap building, where the teachers are going to be like, "I've got this neat way of doing it!" and the students are going to be like, "yeah yeah". You know, they won't be all that excited, but the reason is because they already know how to do it. (Interview 3)

After realizing that his students' technology skills were far above his initial expectations, Tripp began to feel the importance of getting an understanding of the interests and technological level of his students so that he will know what type of quality work to expect. He described the importance of understanding student abilities and interests:

> And, I mean, I'm thinking that the technology can really be used to help the teaching in a lot of ways, because the students know about it already. And so, if you can find out, from the students, what the students are interested in, which is sometimes kind of hard because they like to hide their knowledge of high-tech things and technology because they think that, if you know that they know, then

you will expect them to do more things... which, of course, you will! (laughs) (Interview 4)

You know, if they know how to make a website, then you are not going to give them time to learn how to make a website, you're just going to expect them to do it. And there will be less time given for them to learn and more time for their content to be better. And so, a lot of students don't want to tell you that they know how to do it. Or they might say that they know how to do it but they don't want to tell you just how much they know it. They'll say, "Well, we kind of know it a little bit." then they won't have an excuse for why their's isn't as good. Cause if they say, "Well, we really don't know how to use it, " they'll get a little extra time, a little extra help, and they can do other things while you're giving them extra time. They're pretty sneaky, so you kinda have to watch them.

And the hardest thing is to figure out which level they are at because some of them really do know it well and others don't. You know, there is maybe 10-15% who don't know that much about technology just because they are not interested. And the hard thing is trying to realize that it is a small percentage, not a big percentage, because the other students don't want to show that they know all about it, because then they'd have to end up helping their friends and everyone would have to do more work. And so they don't want to have to be the person who said, "Oh yeah, let's do more." That's, I think, the biggest challenge: is being able to figure out which level the students are. (Interview 4)

Preservice Training

ECI 304. In our initial interview, Tripp discussed the required instructional technology course he took at the university. He felt that the training he received during this course was "kind of like a refresher." Unlike other interns, such as Tammy and April, who were overwhelmed by the computer course, Tripp did not feel like he learned anything new or that applied to his area of concentration:

> The computer class was OK. Most of what we did was web-based and I had seen a lot of that before. So it was kind of like a refresher, in a way. It had a lot more to do with using the web or using computers to help the teacher, rather than using it for instructional purposes. So, I don't really use it that much, because a lot of the stuff that I learned in that class...well, I used some of it cause I used it's basically for my professional portfolio and stuff like that... but you know we learned things like Inspiration, a lot of programs, ftp-ing, mostly software based, and you know, PowerPoint, Excel--some of them I knew already. But how to use them in the classroom? But more about how the teacher could use to make the teacher look easier, rather than how can we use them to make this exciting for the students? We talked a little bit about that, but it wasn't... I mean, I'm not saying we didn't talk about it: We talked about science, for instance, about how you can use probes and how you can use the internet to correspond with scientists, working on certain projects and have the students interact with them.
>
> But for geography or history? (laughs) You know the stuff you can do with that is limited because there is no big historical expedition that take off these days. But it was helpful in terms of showing me that what I knew already would

be very useful in the classroom, in terms of what I would be able to do. It reassured me in that way: that OK "I know how to use this stuff and this is how I'm going to use it as a teacher." (Interview 1)

Methods class. Tripp described receiving more useful technology training in his methods class:

> On the other side, the methods class, we did a lot of stuff. We did the web quest, you know linking it. We talked a lot more about how to get students working. (Interview 1)

Tripp would liked to have experienced more practical applications of technology in his methods courses, such as simulating lessons in front of other students, so that one might be more aware of what type of response to expect from students. He described what he learned in his methods course:

> We read a lot of ideas, you know, "we could do these things..." but we didn't necessarily put them into practice. I think part of it might be that every class is different. And so that may be the reason that we didn't go the next step. But, I kind of feel that, if we had done that, that it would at least not be the first time we'd done it. It would at least be like the second time. And we'd know about how it should go and whether or not it bombed. (Interview 1)

In general, Tripp felt that the method courses gave him options and showed him a number of applicable websites and instructional technology applications, "this is what you can do", but stops short of telling you what you should do and how you should do it. He was not certain whether this strategy was effective or not:

> So you don't work through all the steps, it's just like, "this is there." And it's kind of left up to you to go pull it up, and bring it down, and choose what you want. I'm not at the point where I know if that's good or whether it would be better to do it a different way. I mean, I can see the plusses and minuses of both. (Interview 1)

Tripp also felt that preservice training often concentrates on the technology skills of preservice teachers, but leaves out anticipating the abilities of the students they will be encountering:

> You know, when you are going to school and you are learning, in college, how to be a teacher, and you see all this stuff about technology. I think the biggest problem is that it is not based on your students. It's kind of general information of what you could use. And you really need to know the level of your students, what they are interested in, which areas you think that they can do stuff in, before you can allow them to really do stuff. And if you don't do that during student teaching, the big problem with technology is that it is not a "must." You know, it is not something that you have to have. You know, ten years ago people taught without technology. Twenty years ago people taught without laptops or PowerPoint. (Interview 4)

Conclusion

Tripp left the program successfully creating an online professional portfolio, an individual web quest, and experimenting with a number of technology applications. Looking at Tripp's experience over the semester, two themes seem to play a prominent role in his experience. First of all, he was able to develop and improve his skills in

teaching social studies using digital projections of photographs as a way of sparking the students' attention and encouraging dialogue about the cultures and regions depicted. Secondly, Tripp's discovery of the high level of technology skills his students exhibit hardened his resolve to get to know his students' skill levels before assigning any class work, so that they correspond appropriately with their abilities.

Follow Up

Currently, Tripp is teaching in high school world history at a rural school district. It appears that his school has a number of different technology applications available for teachers. Not only does Tripp describe using PowerPoint regularly, he has had his students make videos for presentations—something that he did not attempt during his internship experience:

> Most of the time I use PowerPoint. My students have made presentations of different important people throughout history. A couple of my students have also worked on a movie on the Second World War (with them in it) it was about 15 minutes long and quite interesting.

In addition to having his students make a movie, Tripp has incorporated a number of other technology applications into his repertoire. He teaches one course for the Governor's School, which requires that he use video conferencing and Blackboard—an online teaching environment for distance education. Not only has Tripp continued using PowerPoint, as he did during his internship experience, he has added different technology applications to meet the needs of his students. It appears that Tripp, as opposed to Anne and April, is in an environment that nurtures his use of technology, as he described learning about new technology applications from fellow teachers.

Cross Case Analysis

The cross case analysis provides an overview of the themes common across individual cases. In this section, each research question is treated individually. Themes associated with each research question are explored.

Research Question 1

How do interns use instructional technology during their student teaching experience?

Interns described using a wide variety of technologies throughout their participation in the STAT internship program. A close analysis of their reported usage of technology through their technology logs, interview statements, and ezboard posts, reveals a core group of technology applications that were frequently used. All interns reported using applications such as PowerPoint, digital projectors, *unitedstreaming*, and Internet research, with their students, at least once during their experience. Other applications, such as the wireless laptop carts, online testing, and web quests were used by some, but not all, of the interns (see Table 7).

Table 7

Technology and Instructional Strategies Used by Interns

	Technology Application	Instructional Strategies	Number of Interns who reported using
Software	PowerPoint	Used for presenting notes, often with accompanying digital pictures.	7
Hardware	Digital Projector	Used to project PowerPoint presentations, online videos, and websites.	7
	Laptops	To type lesson plans, search Internet, display visual presentations with the digital projector.	7
	Wireless Laptop Carts	Used for students to conduct web quests/scavenger hunts, Internet research, and PowerPoint construction.	5
	Digital Cameras	Used to take pictures for PowerPoint presentations and web pages.	2
Internet applications	*unitedstreaming*	Online videos for a wide range of topics.	7
	Web Quests/Scavenger Hunts	Used for giving students a deeper "tour" of historical events, literary settings, or real-life simulations	4
	Online testing	Using online tests, such as eduTest, to assess student progress.	3

Software

PowerPoint. One of the most popular software applications used by the interns was PowerPoint. Every intern in the STAT program reported using PowerPoint at least once during the semester. Some interns, like Rhonda and Ryan, used PowerPoint a few times throughout the semester. Others reported using it more frequently. April, Anne, and Tripp reported using PowerPoint at least once a week.

The interns employed different methods of instruction using PowerPoint. Some interns used it as a way to project notes. Anne, in the early stages of the semester, used it exclusively as a way to project her notes for her students. During my initial observation of her, I noticed that she appeared to use one way communication during her lecture. She did not engage in dialogue or discussion with the students. She lectured while the students took notes. This appeared to be indicative of a traditional approach to teaching, where the teacher provides verbal and written information and the students passively receive it.

Tripp took a different approach to PowerPoint. He saw it as a chance to stimulate interest in world geography. He relied heavily on slides made mostly of pictures, which he culled from the Internet and digitized pictures from magazines. Most of his presentations concentrated on visual images intended to spark interest or dialogue about the cultures and geography displayed. Tripp encouraged two way dialogue between his students and himself:

> If you just have pictures and you explain the pictures and you use the pictures as a starting point to kind of start a conversation on what it is, you know, who is doing what and why, that is much more interesting to the students than having, you

> know, a small picture and having notes for them—where you kind of read through the notes. They just don't like that at all. It just kind of bores them. (Interview 4)

A number of interns had their students do research on the Internet and create a PowerPoint presentation to be taught to the rest of the class. Anne described this technique as being her favorite technology application:

> My favorite tried application was the students creating their own PowerPoint presentations on the battles of WWII. It meant less work for me, but I also think they retained more. (ezboard 14)

Ryan and Tripp stated that their students seemed to enjoy creating PowerPoint presentations. They also found that some of their students knew more about PowerPoint than they did. Ryan described how his students competed with one another on the quality of their presentations:

> The technology I did use, the students liked the Power Points the best. They really got into trying to outdo the others presentations and came up with some really impressive stuff, better than I could do. (ezboard 11)

Tripp saw his students' work with PowerPoint as a learning experience for his students and himself:

> They enjoyed this as they got to use technology. The best part of the project was when a couple of the students showed me how to better use the laptops. Some of them really know how to use technology while others need some help (with PowerPoint, etc...) (ezboard 11)

Hardware

Digital projector. All seven interns used a digital projector with their students with different frequencies throughout the semester. The Dukane digital projectors, supplied in Clover County Schools, provided a simple and easy way of projecting digital images, PowerPoint presentations, and Internet sites for classroom viewing. Three interns had not previously used a digital projector. Ryan, in particular, stated that he had never seen a digital projector until he came to Clover County.

Four of the seven interns used Dukanes on a weekly basis. April, in particular, was outspoken in her "love" of the Dukane digital projectors:

> My favorite technology is the Dukane projector. You can use it to show Power Points, to show an Internet website if you cannot get computers to the students, it can be used to show notes on Word, it can show *unitedstreaming* videos, and you can show CD-Roms. A Dukane is on my wish list for supplies for my future classroom. (ezboard 14)

When interviewing with the school system she is currently employed with, the interviewer asked her if she had any questions, April had one question: "Do you have any digital projectors?" He said that he believed they did and she accepted the job. In a follow up interview with April, I found that, during her first semester at her new school, she reported that her school did not have digital projector. She stated that she purchased her own digital projector and uses it regularly.

Laptops. Dupagne and Krendl (1992) noted that whether or not a teacher owns a computer is positively correlated with their attitudes toward technology. In the STAT internship program, every intern is assigned a laptop to use for the duration of the

semester. All of the interns used their laptops for searching the Internet, writing lesson plans, and making their websites. Very few interns commented on the laptops in interviews or on the discussion board. However, from my observations and interactions with them, laptops appeared to be a vital element of their experience. For the weekly technology seminar, I consistently saw five of the seven interns bring their laptops with them to work on their web pages or web quests. When projecting PowerPoint presentations and Internet sites with a digital projector, most interns used their laptops.

Because the technology department was extremely busy at the beginning of the semester, they were not able to set up the laptops for the interns to use until the third week of the program. Looking through the technology logs, only three interns used technology during the first three weeks of school. Tripp described waiting until he received the laptops to begin using technology with his students:

> Well, right at the start, I didn't use technology that much. Really, because the computer that is in the classroom is not set up in a good place for use of technology. (Interview 1)

As soon as Tripp received his laptop, he began using technology on a regular basis. The fact that Tripp and three other interns waited until they received their laptops to begin using technology, provides an indication of the importance of the laptops in helping the interns to begin using technology.

Not all of the interns felt immediately comfortable using the laptops. Initially, April did not like her laptop because she had a “hard time” with the mobile laptop lab she was exposed to while taking classes at the university. She explained:

> The laptops: I've never used one before. I hated it the first week I had it. Now I like it. It's wonderful, you can just plop it wherever you need it, and do what you have to. It's wonderful. I didn't think I'd ever like laptops. (Interview 1)

After one week, it appears that April changed from being leery of laptops to fully embracing them in her teaching.

Wireless laptops carts. Although the two interns teaching in the elementary schools did not have access to wireless laptop carts, all of the secondary teachers had access to laptop carts and used them with their students at some point in the semester. In other words, all the interns who had access to a wireless laptop cart, used it at least once during the semester. The laptop carts were generally used to allow the students to perform a web quest or scavenger hunt, conduct Internet searches, or create PowerPoint presentations.

Digital Camera. Donald, Tripp, Anne, and April reported using digital cameras during the semester. Donald used a digital camera to take pictures of his students' work, print out the pictures, and send them home with students as a reward for good behavior. Anne and Tripp used the digital cameras to take pictures of their students for their PowerPoint projects. Tripp also used the digital camera to digitize pictures from National Geographic so that he could use them for his own PowerPoint slideshows. April liked the digital cameras so much that, midway through the semester, she used her "tax money" to pay for a digital camera of her own.

Miscellaneous applications. Because of the subject areas they were teaching, some interns used technology applications specific to their area of study. April, for example, used a Palm Pilot lab with pH probes to allow her students to test the acidity of

different substances. For this lab, every student is equipped with a Palm Pilot PDA and a pH probe that connects to the Palm Pilot. For his Geometry class, Ryan regularly used TI-83 calculators, along with an overhead projection devise that connected with his calculator, to teach geometrical applications on graphing calculators.

As Britt's (2002) study found, Microsoft Word was also used by most of the interns to type their lesson plans. April used it to type notes, which would be printed out, and later turned into transparencies for her overhead projector, to accommodate for the needs of students who could not take notes quickly enough during a PowerPoint presentation. Rhonda taught advanced applications, such as formatting and adding footnotes, for her seniors, as they approached the completion of their final research papers.

Internet Applications

Interns used the Internet for a variety of applications. All of the interns reported using the Internet to prepare for lessons. For the Social Studies teachers, this often included searching for historical pictures and photographs of people and places to display using a digital projector and laptop. Other interns, such as Ryan and Tammy, searched the Internet to find ideas for their lessons. Rhonda, in particular, had success finding interesting websites that corresponded to the texts her tenth and twelfth grade English classes were studying. For example, she found that the Rock and Roll Hall of Fame has online class activities that introduce English concepts. She described how she was going to use it:

> To teach my students irony, we are going to listen to "Born in the USA" and "Rockin' in the Free World". (Interview 2)

unitedstreaming. An extremely popular online application for the interns was *unitedstreaming*, a site that houses a large supply of instructional videos that may be watched online in the classroom. Five of seven interns reported using *unitedstreaming* during the semester. Two interns described liking being able to show applicable parts of longer videos and cutting out unnecessary segments. April, in particular, liked this feature:

> I love that *unitedstreaming*. You can show little sections, or if you have a nine minute section of a half hour movie, you can just show that. And we'd even show, like, one minute sections before. But it's really, really nice. I love that. (Interview 2)

My observations of Tammy concluded that any video that lasted longer than 8 minutes was too long for her second grade students. After 8 minutes, talking seemed to increase and the students became more distracted from the video. Tripp found that his high school students could only sit still through a video for 2 to 3 minutes. Because of this, he made sure that he cut *unitedstreaming* videos to fit within these parameters.

Web quests/Scavenger hunts. Some of the interns had their students use the Internet for research, either through a guided activity, such as a web quest, or simply doing research for a specific topic. Two interns, Anne and Ryan, had their students perform web quests at the end of the semester, after SOL's, as "fun" activities (activities not specifically related to the curriculum). Rhonda, however, used at least two scavenger hunts. I was able to observe both. She described how she used a scavenger hunt to give contextual detail to Catcher in the Rye:

> Before I read Catcher in the Rye with my tenth graders, I had them do several scavenger hunts to help them understand the background of the novel. I sent them to different websites of subjects in the novel (like Central Park, celebrities of the time, the subway system, the museums, etc.), had them read about it, and then answer questions. To make things more interesting, I gave prizes to the people who finished first and who had all the questions right. They had a lot of fun with that and actually used the laptops and the Internet for what they were supposed to be using it for. (ezboard 14)

Online testing. Two interns used online testing sites to assess the progress of their students. Tammy had her students take assessments using eduTest (see Appendix I) on four occasions throughout the semester. The week before the SOL tests, Anne took her students to the computer lab to take an online world history test. Anne was particularly impressed that she was able to receive a diagnostic graph listing which items her students had the most problems with. Tripp wanted to find suitable online practices tests for the SOL's, but could not find any that were directly related to the learning standards he was teaching.

Themes Regarding Technology Use

In analyzing the data, there appeared to be three themes regarding the technology the interns chose to use and the manner in which they used it (see Table 8). First, the interns chose technology applications based on the interests of their students. They found that technology applications are generally interesting for the students, but an overuse of one application becomes boring. Second, as the SOL tests approached, the use of technology decreased. Each intern reported using technology less in the weeks preceding

the SOL tests. Lastly, the availability of technology played a significant role in what the interns chose to use and how often they used it.

Table 8

Themes Regarding Technology Use

Themes	Description
Influence of perception of student interest	A reason interns often cited to support their use of certain technology applications was student interest.
Influence of standards based tests	Use of technology declined during the weeks preceding the SOL tests, at the end of the semester. After tests, interns described using "fun" technology applications
Influence of available technology	Clover County provided the interns with a significant amount of technology tools to use, without which, the interns would not have been able to attempt what they did with technology.

Influence of Perception of Student Interest

When choosing instructional technology applications for their lessons, it appeared that the interns placed a high value on what they thought their students would enjoy. When discussing their use of technology, many interns paired statements about what types of technologies they used with saying how students "liked it":

> April - I've shown three Power Points to the kids and they seem to really like them. (Interview 1)
>
> Tripp - When I used *unitedstreaming* it went pretty well. They liked the short clips. (Interview 1)
>
> Tammy - They like it. They liked me putting the short notes up: the term, or vocabulary word with a few short, you know, key points. (Interview 2)
>
> Rhonda - For the class, because they live in this age of the Internet, to them it is much easier for us to say, "why don't you check this on the Internet?" And they're like, "Yeah yeah yeah! Ok, I want to do that!" They're excited about using the computer because they know how to. (Interview 1)

Similar to the findings of Novak and Knowles' (1991) study, the knowledge that students liked technology-infused lessons influenced how the interns planned what technology they would use. Keeping in mind the interests of their students became increasingly important. Tripp stated:

> Many of the students talked about PowerPoint and Internet projects. This encouraged me to use technology as soon as possible as many of them were extremely interested in it. (ezboard 13)

Even though students seemed to like lessons with technology, many of the interns found that it is important to use variety in the types of instructional strategies they use, so that their students would not get "bored":

> A variety of instructional technologies works best with my students. The key is keeping it fresh! (ezboard 11; Anne)
>
> Like if I hit them with too much, they get bored of it. Like the last few days, I've given them handouts, and they're getting tired of it. So, I need to do something different. (Interview 1; Tripp)
>
> I did three Power Points in 3 days. A word of advice: don't use PowerPoint more than 1 or 2 days a week. The kids get so bored with it. My kids seem to respond to Power Points as a treat for once and a while, not everyday. (ezboard 11; April)

Influence of SOL tests

For each intern who taught a class taking the SOL test at the end of the semester, their technology use decreased during the weeks leading up to the test. Anne said that, "the SOL's impede the teacher's ability to be creative and really integrate technology into the lesson" (Interview 3). Some interns described a need to, as Ryan said, "buckle down" and focus on reviewing the material:

> Unfortunately, there will be little use of technology up to SOL test, just hard-core, straight up review. However, after the SOL, I plan on doing my web quest cooperatively with my mentor's third bell. (ezboard 12; Anne)
>
> And with the kids being distracted by SOL's and other things going on, you know, sometimes you have to get in there and just give them notes, just straight up lecture. (Interview 2; Donald)

> But I feel that, after these SOLs are over, I'll have more freedom to do like web quest kinds of things, that still relate to math, and relate to algebra, or geometry, but don't have anything to do with SOLs. So, I didn't want to include that kind of stuff, while we're trying to get ready for SOLs, cause I feel that it takes away from the time they could be using to really buckle down and get ready for this exam. Yeah, I have been looking, but I haven't found anything that can really do a lot better job than I can do. (Interview 2; Ryan)

To me, these statements may be indicative of a view of technology as something that adds an element of fun, at the expense of real learning. To truly review learning standards, many of the interns did not turn to technology. Instead, they abandoned technology applications until after the standards tests were over, where they could use technology for "fun" activities. Tripp described why many teachers chose not to use technology before standards tests:

> The closer you get to the end of the year the less likely you are to use resources that aren't aligned with what's going to be on the test. So, it really affects you. I think at the start you can use a lot more and you are freer to experiment and do a lot of the fun things but as you get closer you realize, "if I don't go through all this material, they are not going to remember and they're going to end up missing a section." You know, not do well. And so, in order to get through that material, we have to focus exactly on that material and not have any distractions. (Interview 3)

The interns did not completely abandon technology applications during the weeks their classes prepared for the SOL's. Anne used a Jeopardy-type review game on PowerPoint. Donald also mentioned using PowerPoint presentations for review.

Although Tripp's use of technology decreased during the weeks before the SOL tests, he expressed a desire to use technology applications that were unavailable to him. He wanted to use technology, particularly online tests, but he was unable to find tests online, that fit his subject area:

> With the SOL tests, that has become a lot more focused. And so a lot of the things I have been doing have shown how I am right with it {SOL guide}. Because of that, I have used a lot less technology. And the big reason for that is because, with the test, a lot of the practice tests and things like that, we don't have them online. We have a lot of those things on paper. (Interview 3)

In addition to Tripp's desire to use a program that was unavailable, three interns wanted to use the laptop carts before the SOL tests, but were unable to do so. The laptops were being serviced and prepared for students to use them to take SOL tests. Therefore, a belief that technology is "fun" did not stop some interns from attempting to use it in the weeks before the SOL tests. Some wanted to use technology, but were unable to use it because of factors that were out of their control.

Influence of Technology Available in Clover County

It should be stated that without the wealth of technology available in Clover County Schools, the experiences the interns had with technology would be entirely different. Four of the seven interns had daily access to a digital projector that was permanently assigned to their room. All seven interns were given a laptop computer throughout the entire semester. The technologies that the interns reported using most: PowerPoint, Dukane projectors, *unitedstreaming*, and mobile laptops, were used because Clover County Schools provided them. Online services, such as *unitedstreaming* and

eduTest, are available upon subscription. Clover County Schools had a subscription to these services, which gave the interns complete access to them. Each school in Clover County has 20 or more digital projectors. Each secondary school has two or more mobile laptop carts. The amount of technology available to teachers in Clover County is not standard in other school districts across the United States and many of the interns capitalized on the amount of technology available to them (Roblyer, 2000; Stuhlmann & Taylor, 1999).

Research Question 2

What issues do interns face as they use technology during their student teaching experience? In what ways do they respond to these issues?

Throughout the semester, interns faced numerous challenges that influenced their use of technology. Cross case analysis of the data indicated that student behavior, access, time, set up, and intern preparedness were significant issues interns faced with regard to technology (see Table 9).

Table 9

Issues Interns Faced While Using Technology

Issues	Description
Students	Student behavior, interest, and motivation were problems interns faced during instruction and influenced their decisions as to whether or not to use instructional technology.
Access	Although Clover County schools have more technology than most schools, some interns reported needing more access to technology.
Time	Interns did not always feel they had enough personal time to accomplish all of their goals with technology

Setting up	The extra effort required to set up technology presentations was not always worthwhile for all interns.
Intern preparedness	Interns facing unanticipated problems with technology that may have been avoided with better training.

Students

Behavior. Interns faced a number of issues as they attempted to use technology during their student teaching experience. As previous studies (Hamilton & Riley, 1999; Delvin-Scherer & Daly, 2001) have shown, student behavior appeared to be the largest issue they faced when using technology in the classroom. In interviews, conversations, and ezboard postings, interns frequently discussed student behavior, interest, and motivation. The interns repeatedly mentioned disruptive behavior in the classroom, such as talking, disrespect, and even neglect of school property. Although the interns felt that students were generally interested in technology, they described the students they encountered in Clover County as being academically unmotivated and unconfident. The characteristics and behaviors of their students influenced which technologies they used and how they used them.

Student behavior was a major issue for Tammy throughout the semester. By the end of the semester, after trying a handful of technology applications, Tammy felt that her students acted worse when technology was used:

> Even though I had taught before, I was not ready for the challenges I discovered in Clover County Schools. I do not use technology because they go crazy if they see any kind of technology in the classroom. I am just too frustrated to try it anymore. I really don't see the positive outcomes that one should get with this method of teaching. I would really like to use it more, but it is not worth the hassle to have to keep stopping and discipline them. They do much better with writing or seat work when they are responsible for their own learning. (ezboard 13)

April encountered problems with her students, as well. She claimed that one of her students in her third bell class "sabotaged" her digital projector, rendering it unable to project the presentation she prepared for the day. On another occasion, she found gum on the lens of her digital projector. Despite these behaviors, she continued to use technology with her two classes. For her third bell, she placed technology out of the reach of her students before she introduced it. She also found, like Tammy, that her third bell class tended to behave better taking notes using the overhead projector, instead of the Dukane:

> I have found a trick that works with my small class of nine students, I use the overhead instead of the board or power points. They respond better and they are actually answering my questions and taking notes, before then I could never get them to answer my questions. Fourth bell likes power points more. So I am in a catch twenty two, I am going to try Power Points more with them and less with third bell.(ezboard 9)

Many interns described their students as talkative. Rhonda mentioned how talking obstructed learning in her class:

> But that's the only headache, with the students so far: keeping them quiet, so they can learn. I've had kids come up to me and say, "Ms. Tyler, I really like you, but I hate this class, because we just can't get anything done." And, like I said, on a bad day, they'll make me feel like I am a total failure—like I can't do anything. (Interview 1)

Attention span. Interns also mentioned the low attention spans of many of their students. Tripp described how he can "see" his students shutting down when a presentation runs too long. He discussed the importance of shortening an overly long video from *unitedstreaming*:

> I know for my students, you have to be really quick... their attention span... if you don't finish a new idea within 5 minutes, you've lost them. If you talk more than 5 minutes a stretch, you lose them. So you have to keep switching things around a lot. So, they have the short 1 minute videos. they take a minute to say what you could say in 15 seconds. So they go into all this detail, and it's like, that's all nice, but they don't need to know all this detail and it's not really going to help them. it's detail that is kind of embellishments on the central themes. It's not really in depth. It's just "if you're looking at a map, it looks kinda like this, and if you turn it, it looks like this". It's like it's in slow motion and I'm like, "c'mon let's go!" you know? and the students, already, are not super motivated. They don't think they can succeed and if you show them something that is slow for them, they sort of get insulted. Well, it's not that they get insulted. They don't tell you, but you can see them kind of shutting off... because they'll pay attention, but as soon as it's like, "yeah, we've seen this before", they just go "ah

> yeah, this is like really slow, it's so easy", while they're listening to it. You, basically lose them for however long the video is and then you have to try and bring them back afterwards, which is not easy. you have to, like, snap your hands, and snap your fingers, and say, "C'mon, let's go!" (Interview 1)

Motivation. In the statement above, Tripp describes his students as being unmotivated and not confident in the possibility of being successful at school. Ryan described one of his biggest challenges was "just keeping them from getting discouraged":

> We'll do something real easy and they get excited cause they know how to do it, cause it's real easy for them to do. But then we'll do something else where they'll actually have to study, you know, and they just hate it. So, it's hard to keep them interested, cause they want to just go to sleep. If they don't know how to do it they just want to go to sleep. If they haven't seen it before and something is brand new, its like they don't want to even look at it. (Interview 2)

Ryan and Tripp portrayed their students as individuals with little confidence in their academic ability and low expectations for academic success. When faced with a difficult or challenging concept, problem, or activity, many of the students shut down. They did this by distracting other students through talking or by going to sleep. The end result is bad behavior, but the antecedent, according to Ryan and Tripp, is the students' lack of belief in their own abilities.

My reflections, from numerous observations of their classes, are consistent with Ryan and Tripp's portrayal of their students. Repeatedly, during my observations, I noticed students "shutting down" or using tactics to distract the teacher from teaching.

On one occasion, Tripp had created a Jeopardy game on his laptop, filled with 30 review questions. He divided his class into two groups and they competed against each other. Midway through the game, the students began to disengage. Both sides succeeded in ending the game prematurely by arguing over an alleged breaking of a rule, which, to this observer, seemed ridiculous. Clearly, no rule was broken. From my perspective, I sensed that this episode was meant to sabotage the activity. As soon as the argument broke out, four students immediately put their heads down on their desk. Three more students asked to be excused to "go to the bathroom." For some reason, the students did not want to participate in the review, and the whole class, through arguing, sleeping, or excusing themselves, succeeded in stopping it.

On another occasion, I observed Anne introducing a PowerPoint project, where her students were to research a battle of World War II, create a PowerPoint slideshow, and present it to the class. On their way to the library, the students seemed to try to refute this activity by protesting: "I hate going to the library" and "I ain't gotta do nothing." Anne ignored most of these protestations, and refuted others. However, reactions such as these from her students forced Anne to contemplate the usefulness of instructional technology:

> But I don't know, I mean, I'm kind of at my wit's end with whether it really makes a difference with their learning curve, if I use technology or not. If they don't want to learn, it doesn't matter what I do. They're just going to go to sleep. (Interview 2)

A culture of learning, where students bring a spirit of self direction and motivation did not appear to be present in many of the classes I observed. Instead, I

found a culture that aspires to be "cool", at the expense of academic effort and achievement. Ryan noticed this at the beginning of the semester:

> My biggest frustration has been the students not understanding the importance of a high school diploma. It seems like they live in a fantasy world where everyone can make it as a rapper and live like a king, without an education. (ezboard 5)

Motivating students to learn became an extra challenge for the interns as they shaped their lesson plans to fit the needs and interests of their students. Often, they turned to technology to assist them in gaining their students' interest and attention, with varying success. Although technology assisted in grabbing the students' attention, the task of motivating their students to remain attentive was a challenging obstacle for many of the interns.

Access

Access to technology became a factor for two interns. Rhonda and Anne were not satisfied with the access to Dukane projectors. Both interns taught at the high school, which has 28 projectors, which are checked out to individual teachers. Because of this, they were forced to borrow projectors from individual teachers, as Rhonda states:

> My biggest problem: I went to the librarian yesterday to get a Dukane, and I asked her how many projectors there were and she said "28". "Are there any available?" She said, "They're on permanent reserve." So every Dukane in this building is permanently reserved by a teacher already, which poses a problem. And she would not tell me who had them. Luckily, I know some teachers who do and would be more than willing to share. But, since them I've been thinking, "you know, I'm here to be using technology, and I can't?" I didn't think it was

fair that you could have it on permanent reserve. I didn't like that at all. (Interview 2)

Toward the end of the semester, as the SOL tests approached, the Technology Department pulled the wireless laptop carts from use, so that they could be repaired and prepared for the SOL tests. After the test, instead of making them available for use again, the technology department kept them locked up. Three of the interns at the high school had specific class projects that required the use of the laptops. Through my interventions, on behalf of the interns, and their direct requests to the head of the technology department, we were able to negotiate their use for the interns. Without my help, I doubt they would have been able to use the laptop carts. One wonders if an intern, in a conventional student teaching program, would have someone to advocate for them in similar situations.

Time

An internship experience is a particularly intense and active time in a preservice teacher's life (Novak & Knowles, 1991). April and Tammy described how there was not enough time for them to implement technology to the degree they had hoped:

> Tammy - It's just not enough time. I know it seems like, "Well, golly, you know you've been here 4 months!" But you know yourself, having gone through it, before you realize it the time has slipped away. And you finally get the hang of writing lesson plans. (Interview 4)
>
> April - There's no time. Well, you know. that, you've done it before. There's no time. You don't even have time to sleep! You don't. Sometime you don't even get to bed until 12:00 cause you're doing stuff. (Interview 2)

It should be noted that even though April described not having enough time to use technology, she still was able to use technology 29 days out of the semester. She also stated that, because she was not able to spend significant time developing technology strategies, she would concentrate on it during the summer:

> I just wish it had not been so crazy at school so that I could have spent more time on web quests, I am going to try to work with that this summer. (ezboard 15)

Setting Up

Setting up for a technology infused lesson takes time. Projecting a PowerPoint presentation, for instance, requires a number of chords, parts, and connections. First of all, the digital projector must be positioned at an appropriate distance from a pull down screen. Often, this is in the middle of the class, which may require that students adjust their desks to accommodate the projector. The projector must sit on something elevated. Sometimes there are overhead carts, with wheels that make positioning the projector into place easier. Some interns had this luxury. Others did not. Tripp and Anne had to place the projector on a students' desk. After the projector is in place, it must be plugged into a power source and connected to a computer (usually the intern's laptop), which also has to be plugged into a power source.

Chords. One of the first problems interns faced, when they started using technology, was the shortness of the Dukane projector's power chord. Anne described this as being not only a nuisance but it also made maneuvering around the class difficult:

> The power chord is probably four feet long. And that's just not long enough. You understand. Especially when you need to pull the projector back more than 4 feet from the wall to get a proper projection. I think that's an issue as well as the

> serial port cable. That is a little bit longer than the power cable, but not by much! So, what I have experienced with that is I may be standing in a student's way. You understand. So, I'm constantly having to move. (Interview 1)

Not only were chords an issue for Anne when setting up a digital projector. The room where she taught her third bell class was not equipped with a pull down screen. Each time she used the projector, she had to tape white sheets of paper on the chalkboard before the beginning of class. This became another nuisance for her. However, even though she had to go through a tedious set up process at the beginning of class, she did not seem to let this affect her use of technology in the classroom.

The chords were an issue for Donald, as well. He felt that too many chords caused a safety hazard and necessitated that the teacher set up before class:

> You know, you have so many wires running across the front of the room which makes it dangerous because those kids have to cross over to the other side of the modular unit and they have to walk past those chords. So you have to have those chords up and down within a certain span of time before and after class. And it's not something that you can do very quickly. I mean, it doesn't take too much time, but it takes time. You know, it's just the logistics sometimes with it, just securing your technology and then putting it on and off. (Interview 2)

Although the hassle of chords did not seem to prohibit Anne and Donald's use of technology, Tripp found that short technological presentations were not worth the effort to set up. If he wanted to show a short online video, he often chose not to, because it was not worth the time it would take set everything up. The classrooms in Clover County are

not set up so that Power Points can be shown with the click of a button. It takes significant set up time. Tripp explained:

> The projector is a bit of a hassle. If it was overhead, attached to the ceiling, it would probably be a lot easier, because everything is wired in and you don't have to worry about it. And you can do a 5 minute presentation, but because you have to set everything up, you don't want to do something for just 5 minutes, because that's a lot of hassle to take 5 minutes in an hour and a half class. So, it reduces the amount of time I use it. When we are going through different topics, I might want to put a picture up there, but I don't want to set up the projector for just one or two pictures. That just seems kind of silly to me, cause you hook everything up and you get everything ready and you open it up, and your like "well here's the picture. Oh, we're done." It makes very little sense. Whereas, if it was already hooked up, you could have everything and just go through one and just turn the lights off and turn the lights one, and go through a couple of quick flashes. But because of the way it's set up, I end up having to have longer presentations of at least 15 to 20 minutes. Because if they're not that long, it doesn't make sense to put everything together and... because you have to put a table in the front of the class and I usually walk all over the place, so I trip over the wires and that's no fun. (Interview 2; Tripp)

In order to keep he and his students from tripping over the chords, Tripp described keeping the digital projector hooked up in the corner of the classroom, so that he could pull it out only during the times when technology was needed.

Intern Preparedness

I noticed, during some observations, that problems appeared while the interns used technology that they did not anticipate and were not prepared to solve. For example, the first time I observed Rhonda, she had never used a mobile laptop cart before and did not anticipate the kinds of issues she had to face when connecting a wireless router to the Internet. Luckily, I was able to help her successfully connect the wireless router.

When I observed Ryan use the wireless laptop lab, at the end of the semester, he did not anticipate that his students would need to save their work. His assignment required his students to create a PowerPoint presentation. Because the assignment took two days to complete, his students needed to save their work. He did not have any disks with him and was unaware of how to save it on the network. Another intern, who happened to be in the classroom, showed him how the students could save their work.

Anne described a time when, during one of the first times she used the Dukane projector, she had problems with it projecting the image on her screen. No matter what she did, it would not project. She became frustrated and was not able to use technology that day. When she asked her school's instructional technology specialist about the problem, he told her that all she had to do was press "ALT + F5" and the image would appear. She was surprised by how simple a solution this was and how she wished she had known about it earlier.

> And it really disturbed my class and I would've liked to have known about this ALT- F5 because I wasted about 15 minutes, which cut into their time, and they didn't get to do everything that I wanted them to do, (Interview 2)

Rhonda mentioned using the Dukane projector with her students one day and the projector only projected half of the image and one of her students solved the problem:

> We had a little bit of trouble with the Dukane today because it was only showing one little portion of my slide. Luckily, I have a very technology proficient student in this class, who got up there and typed in some stuff and everything was better. Everything was wonderful. If I didn't have him, I probably would've been stuck. (Interview 1)

Rhonda's example highlights the valuable help students can bring to troubleshooting classroom technology problems.

These examples demonstrate that the interns were not always fully prepared for their technology infused lessons. Their spirit of exploration seemed to help them overcome their limited expertise with certain technological applications. Through their mistakes, many interns learned how to integrate technology more successfully the next time they attempted an application. However, it appeared that many of the problems they had with technology could have been avoided with more practical training. Simple "tricks of the trade," such as knowing that pressing "ALT + F5" can often solve connection problems between a laptop and digital projector, could easily be demonstrated to preservice teachers.

Research Question 3

What are their attitudes and beliefs toward technology and how do they change throughout their internship experience?

Inspired by Bandura's (1996) concept of self efficacy and its influence on behavior, this research question was initially limited to an almost dichotomous response. It was meant to elicit data on how interns felt about technology at different times in the semester: Did interns believe technology was an important component in classroom instruction? Were they excited about its possibilities or were they growing tired or frustrated with it? Using Bandura's (1996) social cognitive theory as a theoretical framework, I assumed that intern attitudes toward technology influence their use of it. Through regular interviews, I gained a deeper understanding of how interns perceived instructional technology in the classroom.

Instead of yielding dichotomous responses ("Yes, I still think technology is important", "No, I do not think technology is important"), the interns naturally offered their constantly evolving thoughts on the use of instructional technology. An internship experience is a period of intense learning, practice, and reflection. As the interns learned, through practical experience, more about their own teaching styles, their thoughts on the importance of instructional technology, and the manner in which it should be used in the classroom, changed. According to social cognitive theory, "what people think, believe, and feel affects how they behave" (Bandura, 1986). Serendipitously, this research question turned into a more compelling and rich exploration into intern perceptions of technology as it related to their usage of it.

In answer to the initial purpose of the question, each intern maintained a positive attitude toward technology. When asked about how their perspectives had changed throughout the course of the semester, they either responded that it had not changed, from its initial positive outlook or that it had become more positive. The following discussion covers the five themes (see Table 10) that emerged from interns' statements regarding their attitude toward technology.

Table 10

Intern Attitudes, Beliefs, and Perceptions Towards Technology

Themes	Description
Low Initial Expectations	Interns reported expectations of technology use lower compared to their actual usage
More Comfortable with Technology	Interns felt more secure in their use of technology as the semester progressed.
Perception of Technology and the Future	Interns shared their perception of how technology has changed the landscape of teaching.
Maintained Enthusiasm for Technology	Even though they participated in a program that emphasized technology integration, no intern reported being "tired" of technology.
Expectations of Students' Technology Skills (Outlying category)	One intern realized his students' technology skills were far above his expectations—completely changing his view of technology.

Low Initial Expectations

As they entered the program, each intern brought different expectations with them. Some did not know how they would integrate technology during their experience. Rhonda, in particular, was uncertain how she would be able use technology with her English classes:

> I had no idea how in the world I was going to integrate technology in English setting. All I could think of was science and math. What on earth can I do in English? And it wasn't until I got here and saw all of the different ideas, I was like, "Hey!" I had never heard of a web quest until I had gotten here. And so, I know that there are hundreds of millions of other things I could be doing that I am trying to find and trying to open up my options a little bit. But, my perception hasn't changed since last time, but its definitely changed, big time, in the past couple of months. (Interview 2)

For someone who ended up using technology on a weekly basis, it is interesting to note that April held low expectations for her technology use. She projected the extent of her technology use would amount to taking her class to the computer lab once a month:

> Yeah, I thought the only thing I'd ever use is maybe go to the computer lab once a month, or something, and use the overhead. (Interview 1)

If April used technology once a month, as she projected, then she would have used it five times. Instead, she reported using technology twenty nine times during the semester, far exceeding her initial expectations.

More Comfortable with Technology

As the semester progressed, some interns reported feeling more comfortable with technology. I interviewed each interview four times throughout the semester. During each interview I asked them how their perception of technology had changed since the last time we talked. Three interns stated that they felt more comfortable with it:

> Rhonda - I feel more comfortable using it and I am more inclined to use it. I just want to use it more and more. I find it easier to integrate it in the classroom. And I'm finding some different ideas for it. (Interview 2)
>
> Tammy - I feel more comfortable with it now. I can use the Dukane without any help, which is a big step for me. (Interview 3)

In addition to feeling more comfortable with technology, Donald described feeling less threatened by technology and inspired by some of the positive behavioral results he saw in his students as a result of his technology infused lessons:

> I feel a lot less threatened by some aspects of technology now. I was not necessarily afraid of some software applications and computer accessories, but I was a bit wary of trying to use them in the classroom. It seemed hard enough for me to just teach in the beginning, but now I feel like I can use some of my favorite toys (the Dukane, the digital camera, PowerPoint, *unitedstreaming*, etc) with much success. I fully intend to use them all again. What I found inspiring about this internship is that after I got into a more comfortable zone, and the students got used to me, I was able to get Clover County kids to pay attention and even want to hear and listen to my technologically-infused lectures. I guess the

> next big test I will have is teaching information rich students without having them laugh at my lack of tech skills. (ezboard 17)

Perceptions of Technology and the Future

During the first few weeks of their experience, two interns acknowledged how technology is changing the landscape of teaching. Seeing the possibilities that various technology applications brought seemed to be an enlightening experience for Ryan and Donald. Ryan compared what he saw in Clover County Schools with what he experienced as a high school student:

> You know, when I was in high school, there was the calculator. That was the technology part of the class. We learned the TI 82. And now, it's like I'm aware of all these different ways to use it. I might not know how to use it for my math class, but I'm definitely aware that, you know, the Dukane projector, and people are using laptops and computers. I haven't seen that before: how people use it haven't seen that before, where you just wheel a laptop cart into a class. That seems really cool. So, yeah, I mean, I'm definitely noticing it. (Interview 1)

Donald, in particular, was encouraged by what he saw as limitless possibilities that instructional technology brings:

> So, it's not only changed my perception of technology in general, but it's definitely changed my perception of what education can be. Because there's so much technology now that the sky's the limit to any class. If any class has a high speed internet connection and the opportunity to project the internet up on the wall, with a machine like the Dukane, there is no limit to what they can do. Why at the end of each semester can't you have a website made or a web quest that the

kids developed on their own, you know, anything? Just the amount each one can learn... I mean, it's a lot more than I experienced in college, you know, all the way around. (Interview 2)

Donald also reflected on past technologies, which brought more questions and speculation about what future instructional technology applications will look like. He explained:

> The thing with technology is, like, I can talk to a professional about how things used to be, or what all they've learned in their 20 or 30 years. You know it's like, I've learned this and this and this over the years. And, the human condition changes and kids are different, generation to generation, and people still have ten fingers and ten toes at the end of the day. But technology, it's like, where is it going to go next? They showed me these machines they used to use to project a regular piece of paper on a screen without making a transparency out of it. And this thing was a dinosaur! I mean, it made noise when they cranked it up and it was just a monster. And then they told me all these other stories of machines they used to use and things like this, like the old film strips. And it's just mind-boggling we now have little kids who probably know more about desktop computers than some of our professionals. You know, in 1990 no one knew what the internet was. So, where are we going to be in 2010? That's the hill that's out there that you have to keep on climbing no matter what stage in the game you are. It's going to be just as big 30 years from now as it is right now, because technology is going to keep being added on and all of us are going to have to learn, over and over. (Interview 2)

Maintained Enthusiasm

Part of the reason for including a research question on the interns' attitudes was to investigate whether or not, after participating in an internship program that emphasizes technology, the interns grew tired of using it. With 3 weeks remaining in the semester, I posted the following question on our online discussion board:

> With all the emphasis that is placed on technology in this program, are you getting tired of it yet? (ezboard 15)

In response to this question, no intern described being tired of technology:

> Tripp - As long as we keep using technology to enhance the learning experience, its use by teachers will never be considered tiresome or a hindrance. Therefore, I plan to keep using technology and, if possible, increase its use as time goes on. (ezboard 15)
>
> Ryan - One in the education field should never get tired of talking about technology, and if they do, they picked the wrong field. (ezboard 15)
>
> Rhonda - I never got tired of technology. It's an ongoing learning process because it is ever changing. There are still a lot of applications that I never used that would be great for future projects. I would also like to center more on the students creating projects rather than me doing it and showing it to them. I would like to have them create web pages, databases, Power Points, et al. I know there is a lot out there that I don't know about yet, so I can't possibly be tired of it. (ezboard 15)

Expectations of Students Technology Skills (Outlying category)

During the second half of the semester, Tripp came onto a realization that was profound to him. Before he started the internship program, he expected that his students would be impressed by his use of technology (particularly PowerPoint). After observing the quality of his students' PowerPoint presentations and finding out that many of his students had their own web pages, Tripp realized that he had misjudged his students' technology skills. Tripp explained:

> I did not expect many of my students to have technology skills that would enable them to work effectively with technology given the low income nature of the county. However a number of the students surprised me as they had created their own web pages and had active websites that they worked on. I would estimate that about 70-80% of the students had web pages with e-mail accounts. The few students who were not proficient with technology were able to learn very quickly and created outstanding PowerPoint presentations with graphics and sound. I would say that after my teaching experience I believe that many of the students are able to work with most new technology that is put in front of them and are able to learn new technology much faster than us teachers who may have past experience with technology. (ezboard 16)

This realization completely changed his perspective on how teachers should implement technology with their students. Knowing his students' technology skill level became an essential element of successful technology integration for Tripp. Tripp found that his students had the tendency to not make their skills known in order to avoid being held accountable for a higher quality of work:

> You know, if they know how to make a website, then you are not going to give

them time to learn how to make a website, you're just going to expect them to do it. And there will be less time given for them to learn and more time for their content to be better. And so, a lot of students don't want to tell you that they know how to do it. Or they might say that they know how to do it but they don't want to tell you just how much they know it. They'll say, "Well, we kind of know it a little bit." then they won't have an excuse for why theirs isn't as good. Cause if they say, "Well, we really don't know how to use it, " they'll get a little extra time, a little extra help, and they can do other things while you're giving them extra time. They're pretty sneaky, so you kinda have to watch them.

And the hardest thing is to figure out which level they are at because some of them really do know it well and others don't. You know, there is maybe 10-15% who don't know that much about technology just because they are not interested. And the hard thing is trying to realize that it is a small percentage, not a big percentage, because the other students don't want to show that they know all about it, because then they'd have to end up helping their friends and everyone would have to do more work. And so they don't want to have to be the person who said, "Oh yeah, let's do more." That's, I think, the biggest challenge: is being able to figure out which level the students are. (Interview 4)

I was immediately struck by Tripp's epiphany. He experienced a significant shift in his view of teaching with instructional technology by "discovering" that his students were far more technologically savvy than he expected. After interviewing Tripp, I wanted to explore whether or not other interns held a similar perspective on student

ability as Tripp. In order to explore the other interns' perceptions of their students' technology skills, I immediately posted the following question on ezboard:

> Lee - Now that you have used computers and technology with your students for almost a full semester, you are in a position to reflect on their skills with technology. Did their technology skills fall below or exceed your expectations? How would you describe your student's level of proficiency with computers? How would you compare their technology skills with yours? (ezboard 14)

Ryan and Tammy echoed Tripp's sentiments on the students' proficiency with applications such as PowerPoint:

> Ryan - Seeing where some of the students come from, you would think they wouldn't know how to turn a computer on. This program has gotten these kids not only familiar with computers, but proficient in certain applications. My students actually taught me things on PowerPoint presentations and also graphing calculators that I had not learned. (ezboard 14)
>
> Tammy - They were far above my expectations as far as proficiency. My technology skills were well matched to theirs. (ezboard 14)

April was less impressed with her students' technology skills. She described her students as being mediocre with technology:

> April - In general most of my kids are okay with technology, the majority of my problem has been laziness on the kids part. (ezboard 14)

Although acknowledging their students' abilities with technology, Donald and Rhonda spoke about how they helped improve their students' proficiency in certain software applications:

Donald - My use of technology has familiarized the students with applications like PowerPoint and Photo editor. The kids are quite resourceful when it comes to using the computers. They can surf the net and printout images almost as well as I can. They know the basics, but not all of the tricks. (ezboard 14)

Rhonda - Both of my classes were already pretty good with the Internet. I think just about everybody between 25 and 10 knows how to work with the web. But my seniors came a long way with Microsoft. I was so proud of them. For days we went over Word, and I was scared of what the end results would be when they turned in their papers. But they did an excellent job, and almost everyone had a perfectly formatted paper. I didn't get to use all the Microsoft applications with them, so I don't know about their skill levels in those areas. I don't think they ever used Excel or anything like that, so I think I may know more than most of them. But, boy, did they learn a lot! (ezboard 14)

Anne had a unique impression of her students' technology skills. She felt that her skills were superior to her students':

Anne - All in all, I think my student possess working proficiency with computers. I don't think I broke any ground with them. Today, I was showing them my online portfolio, and one of my students expressed a desire to learn and create their own web page. So, for the future outlook, I think I will definitely have my students learn and create their very own web pages.

I am way ahead of them in my use and application of technology in my personal life and in the classroom. (ezboard 14)

The difference in perspectives between Anne and Tripp deserves more thought. Tripp was more familiar and comfortable with technology than Anne was. However, Tripp felt that his students possessed a far greater familiarity with technology than he had imagined and admitted that his students knew more than he did about some applications. Anne, possessing less technological expertise, felt her students' skills were far below her own. Although a comparison between Anne's and her students' technology skills is impossible at this time, it is interesting to note the differences in the two perspectives. Observing in a number of different classrooms in Clover County, I tend to agree with Tripp's assessment: the students know more than we think.

Research Question 4

What role does pre-service training seem to play in the interns' use of technology?

During each interview, I asked the interns to reflect on the influence preservice training, before their internship, had on their use of technology. They generally spoke about two types of classes: the required introductory class on educational technology (ECI 304) and their methods classes (see Table 11). Their reflections indicated that the methods classes made the most impact on their use of instructional technology.

Table 11

Themes Regarding Influence of Preservice Training on Intern Technology Use

Preservice Training	Themes	
Methods Classes (Two cases)	Anne's experience in Dr. Parker's class	Professor had preservice teachers use technology from their students' perspective
	April's experience in Dr. Harrison's class	Professor's instructional strategies as well as a constantly updated class website had an enduring influence on April as she planned her instruction

ECI 304	Overwhelming Pace	Some interns, with limited technology proficiency, were overwhelmed by the pace of the class.
	Provides Basic Introduction	Other interns, who were more familiar with technology, felt the class provided a basic foundation and overview of various technology applications.
	Limitations	Interns described how the class did not concentrate on content specific applications or adapt to different abilities/needs of students.
	Suggestions	Some interns suggested offering two separate classes.
Student Teaching	See Research Question 5	

Methods Classes

Only two interns, Anne and April, described specific strategies their teaching methods professors used to prepare them to use technology. Although they were the only two, their descriptions give an indication as to the powerful and enduring influence methods classes can have on the instructional choices their students make.

Dr. Parker. Anne's methods professor was Dr. Parker. She described how Dr. Parker introduced various instructional strategies for integrating technology in Social Studies:

> I would say, Dr. Parker did a really good job of getting us to integrate technology in the classroom. She gave us a handout of probably about 50 pages, double-sided, of just websites for social studies people. I think, in my opinion, though when I looked at it, it was so overwhelming, that I didn't want to look at it. You understand. But she did a lot of projects with us that really forced us to use technology and helped us to understand how to get our students to use technologies as well. One thing I enjoyed that she did was: these projects that we did, are really for our students to do, but she had us do them, so we would know what kind of problems or you know obstacles to overcome doing this project. So you would have an understanding and be prepared for that for your students. You know, the web quests. Obviously. Although that was only the last 2 or 3 weeks of the semester.
>
> But, I learned a lot more about technology, in doing that, than I had before. And it opened up something for me cause I never knew anything about

> these web quests. So, technology speaking, I felt like she did a pretty good job. (Interview 1)

A significant strategy that Dr. Parker used was having her students experience instructional technology as their students would. This gives them a deeper understanding of how their students might view technology. Anne particularly appreciated this strategy.

Dr. Harrison. The training April received in her methods class continually influenced her instructional decisions throughout her internship experience. April stated, "My methods class, and I hate to say this, is the only class I really have learned anything that was practical." Before discussing why she felt so strongly about her methods class, April spoke about what she learned in her required technology class.

> When I took the computer classes I had to have, I knew nothing, and the teachers were having to teach kids who, like, knew a ton of stuff. And only a couple didn't—me and a few others. So, we kind of got left behind. (Interview 2)

April went on to say that she learned "a lot" in the class, but that they were not able to spend sufficient time on individual applications. She then said that what differentiated the introductory computer class from her methods class was that "my methods class showed us how to actually use it." She described the specific methods her professor, Dr. Harrison, employed:

> She showed us simple little things, some not with technology, but a lot with technology, simple things you can do to help the kids. She made us get the laptops out and showed us how to use them... when they would work. That was one good thing cause they don't always work when they're supposed to. It's just really good. (Interview 2)

April described repeatedly checking Dr. Harrison's website, where the professor regularly posts new instructional technology sites related to science:

> She always leaves all this extra information on her webpage. If some of her students tell her something, she writes it down and I just check it out and sometimes I find something. I actually still check her page once in a while, in case she puts new stuff up. (Interview 3)
>
> I've checked it probably thirty times over the semester. I caught one or two new things. Like, I don't remember exactly what it was, but she had something on there and I went and looked it up and it was a website about earthquakes and it led me to a website that me and my teacher and Mr. Jones ended up using it in class all day. Oh yeah, I also found, on the National Science Teacher's Association page, a website for an SOL remediation test, from the Jefferson lab here in Virginia. And man, we spent all day in class connected to that! We did that Monday. (Interview 3)

By maintaining a continuously updated website, Dr. Harrison extended her influence and guidance on April's teaching. April reported checking her website over 30 times during the internship experience and found technology ideas and applications that she actually used with her own students. In fact, Dr. Harrison's class requirement that her students join the National Science Teacher's Association (NSTA), was beneficial to April as she attempted to find new ways to integrate technology into her lessons. The NSTA gives members access to their website, which includes useful instructional technology applications. April explained Dr. Harrison's influence:

> Because of her I joined the National Science Teacher's Association. Because that was one of her requirements, as science teachers, that we join it. I thought that that was wonderful, because if she hadn't made us join it, I wouldn't have joined it. And I've found all kinds of good stuff. I mean that website alone, we spent all day... It had the actual old SOL questions. We put it on the screen, cause they took our computers, so we couldn't have the kids couldn't do it on their own. We just hooked it up to the Dukane, showed it on the screen, and had the kids go through and answer them, and it gave us the scores and everything. And they actually paid attention... at least for the first 40 minutes! (Interview 3)

April's experience with Dr. Harrison displays one way a methods course had an enduring influence on a preservice teacher. This example reveals the potential influence methods faculty can have on the instructional choices and practices of their preservice students.

Introductory Computer Course

In 2000, seventy three percent of all colleges of education offered an introductory course on instructional technology (Hargrave & Hsu, 2000). Interns who talked about Old Dominion University's required technology course, ECI 304: Educational Applications of Computers, described it as laying a foundation and providing a basic introduction to instructional technology. The broad scope of the class, which groups preservice teachers of all concentration areas into one class, makes it impossible to cover specific concentration applications. Some applications that are taught will be useful for some students and not useful for others.

The class, taught by a number of different professors, many of whom are adjunct, attempts to teach the broad base of technology applications. The course catalog at the university describes ECI 304 as a "project based course in which students study the relationship between contemporary learning theories and SOL related classroom computer use."

Overwhelming pace. For three interns, who were unfamiliar with technology, completing all of the assignments for the course was difficult. Tammy felt overwhelmed by the assignments:

> I felt like it was such a crash course and everyone would get in the lab together. And everyone was stressed out because no one knew how to do it. And we were all scrambling together, you know, trying to do it. Now I find myself, 5 or 6 years later, scrambling with ftp-ing. I mean, I did it back then, and I did OK, but I've forgotten how to use it. I haven't use it all along. And it's like anything else, if you don't use it you lose it. So, I need to stay abreast of technology. (Interview 3)

April described feeling "left behind" by the speed of class:

> But the regular computer class is fine for most kids. If you are under 25, in college, it's fine. But if you are over 25, and you don't have too much computer experience, it's not good. I mean, they try to work with you. But when they have 25 kids in the class, they can't hold your hand through it and I understand that. It's just that it was hard. I mean, I pulled an A- in there, but I don't know how I did it. I think she took pity with me.
>
> I did learn a lot, I just didn't learn about web pages or anything. But I learned a lot about Word. I didn't really learn anything about PowerPoint. I

learned about Word and Excel mostly. I learned a lot about Excel. She was really good about Word and Excel. (Interview 3)

Donald described taking ECI 304 added to his apprehension of using instructional technology in the classroom. Fortunately, once he entered the classroom, during his internship experience, he felt more at ease:

> It's funny because you know, here and even before when I took ECI 304 and other computer science courses at the university, I became more and more, not afraid, but just apprehensive to how much technology I would be expected to use, how much was out there, and how much could be used. Like I was saying, I'm not extremely technologically advanced or anything. So, I was kind of afraid, you know, that I would not be able to keep up, in a way, or move them along in the way that they need to go with technology. Then I've been faced with the classroom realities. So I feel so prepared now because we haven't even go through to what I know I could do with them easily. We haven't even gotten to the part to stuff that I wouldn't have known as well and would have had to my refresh myself, and get more ideas, and talk with people. But we would have done those things too. I would've trained myself or retrained myself as long as the kids showed they could do it. But we just never got to that point. It is nice to know that if we just scratched the surface or if we even get into it for, you know, on what I have known, no matter what class it would have been, I would have been straight for the first half of the semester, at least, as far as offering the kids things to do on the computer and over the Internet. (Interview 1)

Provides Basic Introduction. Interns described ECI 304 as providing a basic introduction to instructional technology. The value of the introduction varied with each intern. The most technology proficient intern, Tripp, felt that the class was "pretty basic" and did not significantly add to his technology skills. The least technology proficient interns, Tammy and April, described the class as being overwhelming in its scope and pace. April explained:

> It laid a lot of foundation, even though I still don't know how to do a webpage real good or a web quest, I'm learning it! I'm learning! (Interview 1)

Limitations. For some interns, ECI 304 provided a useful introduction to technology applications relevant to their content area. Ryan described the introductory training he received in ECI 304 as being useful. He learned new technology applications, such as PowerPoint, that he was unfamiliar with. He also was shown strategies and applications that he could use to teach math:

> The technology class I had, I think it's ECI 304 or something, we did web quests. and I do want to do a web quest in my class. So, that will—learning how to do a web quest—that prepared me for using it with my own. I had never made a PowerPoint presentation until I took that class. So it got me very familiar with PowerPoint and also with spreadsheets and stuff. There was a lot of cool stuff involving math and spreadsheets, you know cause it's all formulas and numbers and stuff. But geometry, you know, is kind of different, like in that it is all drawing shapes and stuff . So, you can't really use spreadsheets, that's more for like statistics and probability and stuff. Yeah, but without that preservice training,

> I wouldn't know how to do it. So, I would say it was very helpful in getting me ready, introducing me to all the applications the computer has on it. (Interview 1)

Although Ryan described ECI 304 as introducing him to instructional technology strategies applicable to his concentration area, Rhonda mentioned that it did not concentrate on her subject area:

> Well, in the technology classes that I took, it was mostly math and science kids. So, when we had to do group work, it was how we would do a webpage for the math people. All the applications that we learned were never ever ever for English or even for social studies. Um, I learned a lot of stuff in there, but I didn't learn how I could necessarily apply it to English. (Interview 2)

Suggestions. Some of the interns made suggestions on how to improve the preservice instructional technology training. Tripp suggested that preservice training concentrate on the types of students preservice teachers will be encountering when they begin teaching:

> You know, when you are going to school and you are learning, in college, how to be a teacher, and you see all this stuff about technology. I think the biggest problem is that it is not based on your students. It's kind of general information of what you could use. And you really need to know the level of your students, what they are interested in, which areas you think that they can do stuff in, before you can allow them to really do stuff. (Interview 4)

Donald suggested breaking the one all encompassing technology course into two separate courses:

> It helps that there are, you know, the earlier computer classes—the ECI 304 or whatever, at least that's what I took. And there definitely needs to be more emphasis. There needs to be two of those classes. Maybe they need to be broken up or maybe tailored for the secondary teacher or the elementary teachers. I wouldn't want to discourage them from trying to develop more and more "using computers in curriculum" classes earlier. (Interview 4)

Where Donald thought the class should be split between elementary and secondary teachers, April felt that the classes should be split according to ability level:

> I wish the university would make a class for beginning idiots and one for the regular people. I need the beginning idiot class. But, I learned a lot about web creation stuff, but the stuff just went over my head. (Interview 2)

Question 5

What kinds of patterns emerge from the data indicating a shared experience with technology amongst the interns?

This question was intended to gather the previous four research questions into a holistic picture of the interns' shared experience with technology. In most cases, the question has already been answered in the cross case discussions above. However, within the context of the fourth research question, regarding the influence of preservice training, I felt it beneficial to extend the scope of this question to include the influence of the STAT internship program on the interns' use of technology.

The interns' experience in the STAT internship program is the final stage in their preservice training. One overarching purpose of this study was to gain insight into whether or not emphasizing instructional technology during the student teaching phase is worthwhile. The STAT internship program is unique in its objectives, structure, and organization. I was curious as to whether or not the interns felt this program was beneficial and timely in their quest to become technology proficient teachers.

To assess the interns' perception of the value of emphasizing technology during their student teaching experience, I asked them about their thoughts on the emphasis placed on technology integration in the STAT program. During the final week of teaching, I asked each of them the following question:

> One thing that sets the STAT internship program apart from standard student teaching programs is its emphasis on technology integration. Do you think that student teaching is a good time to be learning about and emphasizing technology integration?

Six of the seven interns stated that they believed it was an appropriate time to emphasize technology integration. Even though April felt overwhelmed by the workload of teaching, she felt it was worthwhile to learn about technology during her experience:

> Yes and no. It just depends. If you don't have really, really bad kids, it's wonderful. But if you have rotten little stinkers, it can be hard on you. I mean, the first three and a half months I was here all I did was go home, start on the computer. I wouldn't get off until like ten o'clock at night before I would go to bed. It's only been the last month that I've been able to take it easy, but, I learned so much. So, it's like I said, it's worth it. Yeah, I think the technology needs to be there—the learning of it—even thought it puts more work on you. I think it's worth it. It really is. (Interview 4)

Rhonda also agreed that it was important to learn about instructional technology during student teaching. When asked why she felt this way, she said:

> Um, well I think it's just because of my age. This is the perfect time, because, pretty soon, my kids would know more than I do. Like, if I was any older and was doing this experience, my kids would know more than I did and I wouldn't—not that that is a bad thing—but I wouldn't be able to expand their horizons a little bit more.
>
> But seeing that how I am 21, and technology is like at its absolute highest, like everything is technologicalized... (questions herself) whatever. I think that this is the perfect time because the kids are just stumbling on it, and I can sort of head them in certain directions. And plus, as a student teacher, you haven't had any more experience. Like, you haven't had to do it in a certain way. Like, Ms.

> Shelby (mentor teacher), for instance, is not used to using technology and doesn't understand some of the stuff, but since I had never been a teacher before and there is no "right way" to do it, then I can just experiment with anything. And technology is perfect for that. (Interview 4)

Rhonda recognized that being young and inexperienced made her more predisposed to learning how to teach using technology. Interestingly, Tammy, twice the age of Rhonda, felt that her age became a strength as she approached integrating technology as a participant in this program. She did not feel that she had as many distractions as a younger person may have:

> Well, it was OK for me, because I had had a lot of prior knowledge and just being forty six, you know, I knew more than someone just getting out of college, being young. I think my focus was more on this experience, because I didn't have much of a life outside of this experience. I wanted it to be a success. And it was so important to me that, short of my spiritual life, this was bout number one. You know, unless there was a major thing going on, this had to be a success. And I think my feelings coming into it helped a lot. I think with somebody new coming right out of college, of course their brains are younger than mine. So that's a plus on their side. I think with a younger person, it could be a problem, depending on their position before they came. So, it really depends. (Interview 4)

Donald felt it was important to emphasize technology during student teaching. He described the student teaching experience as being "your last chance" to learn to use instructional technology:

> If, by student teaching, there is anything that hasn't been stressed, as far as technology in the classroom is concerned... I mean, it's a great time for it. You know, I hadn't heard of the Dukane and other applications and machines before I went here. And then learning about them has been great. (Interview 4)

He went on to list the benefits of the STAT program for the students and teachers in Clover County and for the interns from the university:

> I mean it's just a complete win-win situation all the way around. I mean, the county gets stuff that they otherwise couldn't get. The students get training they otherwise couldn't get. The school gets to offer courses that they otherwise couldn't offer. You know, they get to offer this really unique internship opportunity that they otherwise couldn't offer. And you get prepared for stuff that, I think, most schools don't have. As they are coming up to this level, you know, you are ahead of the game each time. And you can be looked on as an authority at whatever school you go to. I mean, I am just really impressed by the whole program. I think it is really good, especially the technology component, because, you know, it forces you to learn. And student teaching is a great time for that. In professional life, that's what they are going to do. That's the only way we are evolving, you know, going towards technology. (Interview 4)

Tripp appreciated the emphasis the program placed on attempting new technologies. Without which, he doubted whether normal student teachers would feel impelled to attempt using technology on their own. He described how, in normal student teaching programs, technology is not a primary concern:

> Yeah, it's not life or death. And so if you start out not using technology, the chances are, I think, that you won't bother with it, because it is extra stuff that you've got to learn. And your first few years you are going to be so busy just trying to keep up with the day to day things that there is no way you are going to learn about it, cause that's just so much extra work. And you are not going to do all that extra work, when you've got, you know, just the regular bigger classes, plus you may have some extracurricular activities, you know, some clubs or things that you are doing. You're going to be really busy. I think the best opportunity to get new teachers into using technology is during student teaching, when they are highly motivated, they are excited to be in there. They don't have the huge loads that first or second year teachers have. (Interview 4)

Tripp also pointed out the benefit of spending time, during student teaching, amassing a number of technological presentations, such as PowerPoint presentations, knowing that he was performing groundwork for future lessons:

> And the biggest thing with it is, you know, technology is, I guess, like most things: you put a lot of stuff into it, later on you don't have to worry so much. You make all of your presentations PowerPoint presentations. They take a lot of time to make up, but once you make them, you can use them forever. The chances that something changes are pretty small. You know, you might have to edit it a little bit every year but you can use the same thing right through. But the initial investment in time is pretty high. And I think the time to do that, really, when you are doing your student teaching. when you don't have the heavy workload, in terms of students and time. (Interview 4)

Ryan (Outlier). Ryan was the only intern who did not feel that emphasizing instructional technology was appropriate during student teaching. He described being too overwhelmed with the requirements of teaching to be able to give adequate attention to attempting to integrate technology in his classroom:

> It's just too much. It's so much. You're top priority is being in the classroom and getting the kids to learn. And then trying to learn new stuff is just kind of overwhelming. "Overwhelming" is a really good word (to describe it). So, I think the best way to do it would be, after student teaching, through workshops, maybe... something like that. (Interview 4)

It is interesting that Ryan, the intern who used technology the least, felt that student teaching was an inappropriate time to emphasize instructional technology. He was not successful at finding a greater amount of technology applications to suite his needs. His statements, throughout the semester, indicated that he saw technology as an "add-on" and not particularly useful for the elements he needed to cover.

NETS for Teachers

The National Education Technology Standards for Teachers (NETS-T; see Appendix E) provide a useful backdrop and context in which to place the instructional technology accomplishments of the interns. Discussing how the interns met each standard gives credence to the importance of their experiences with technology during their internship.

NET Standard One. The first standard states that "teachers demonstrate a sound understanding of technology operations and concepts" (ISTE, 2000). As participants of the STAT program, they were required to create a webpage, attend weekly technology

meetings, participate on an online discussion board, and integrate technology into their lessons. In their use of diverse technology applications in the classroom, interns demonstrated a sound understanding of technology operations. Through interviews and online discussion board posts (ezboard.com), interns demonstrated an understanding of the concepts associated with integrating technology into a modern day classroom.

NET Standard Two. The second standard requires that, "teachers plan and design effective learning environments and experiences supported by technology" (ISTE, 2000). This standard concentrates on the planning stage of instruction and emphasizes the importance of adequately preparing for a technology enhanced lesson. The interns spent much of their time planning for their lessons. Tripp, April, and Anne, for example, spent many afternoons creating PowerPoint presentations for their classes. With each lesson, they would also rethink their strategies according to how their students responded to their lessons. Anne, in particular, found that her students did not respond well to continuous PowerPoint presentations. Therefore, she found, through this process of discovery, that rotating PowerPoint presentations with other classroom strategies worked most effectively with her students.

NET Standard Three. The third standard says, "teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning" (ISTE, 2000). This standard concentrates on the delivery of a technology enhanced lesson and whether or not it has a positive influence on student learning. Tripp and Rhonda's creative use of technology with their students exemplify this standard. Rhonda found a few of web scavenger hunts that seemed to enhance her English students' understanding of the works they were studying. For example, while studying

Catcher in the Rye, her students used the wireless laptop carts to search the Internet for the New York City landmarks the main character visited. Tripp's use of digital pictures from different cultures, provided an enticing and memorable visual display for his students to draw from as they studying the diverse cultures of the world.

NET Standard Four. The fourth standard states that, "teachers apply technology to facilitate a variety of effective assessment and evaluation strategies" (ISTE, 2000). Three interns used online tests to assess their students' progress. Both elementary interns used eduTest to chart their students' progress in science and social studies. Anne used online tests to help her students prepare for the SOL tests and provide for her an indication of the areas of immediate focus for their review. Tripp wanted to give his students a practice test, but none were available for his subject of World Geography.

NET Standard Fifth. The fifth standard requires that, "teachers use technology to enhance their productivity and professional practice." Interns used Microsoft Word, the Internet, and e-mail on a daily basis. Microsoft Word was used to type lesson plans. The Internet was often used for getting lesson plan ideas. E-mail was used to communicate with school and STAT program administrators. Each intern used Netscape Composer, or in one instance, Macromedia Dreamweaver (see Appendix I), to construct a website. Each website acts as an online professional portfolio, showcasing each interns' teaching philosophy, student work, resume, and instructional technology experiences.

NET Standard Sixth. The sixth standard states that, "teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PreK-12 schools and apply those principles in practice." This standard is subdivided into five specific standards, which expand on the theme of the standard. Two of these standards

mention using technology to "affirm diversity." Tripp's use of PowerPoint slides seems to embody this standard. Using digital images from diverse cultures, Tripp aimed to highlight the similarities between seemingly different cultures and societies. His vivid PowerPoint slides moved his World Geography students beyond thinking of the world through stereotypic images, to the more compelling reality of unity through diversity.

Collectively, the interns met the requirements of each of the NETS Standards for Teachers. They used a variety of technology applications focused on enhancing student learning and continually explored new ways of using technology in their classroom. Through their individual experiences and lessons with instructional technology, we have gained a deeper understanding of the nature of a technology enhanced internship experience. The next chapter provides further discussion on the lessons learned from the instructional technology experiences of this group of interns.

CHAPTER 5: DISCUSSION

This study found a number of themes related to the five research questions. Further discussion of the themes, in relation to current research, provides an illuminating indication of the relevance of the findings. As in previous chapters, the five research questions are split up into four categories: technology use, issues, attitudes, and preservice training.

Technology Use

The participant interns in this study reported using the following applications most frequently: PowerPoint presentations, digital projecting, streaming video, and wireless laptop carts. Out of all the technology applications available to the interns, these four applications were used most frequently. This finding is inconsistent with the findings of a study of 216 interns who reported using word processing, Internet, and email most frequently (Britt, 2002). The interns in Britt's (2002) study used technology for lesson preparation, whereas the interns in this study used technology to prepare and deliver lessons. The Internet, email, and word processing software are primarily used for lesson planning and collaboration. Although the interns used these applications on a daily basis, these applications were rarely discussed in interviews, online discussions, or in their technology logs. Instead, the focus of interviews and online discussions centered on the technology interns used while they were teaching. This finding suggests that the interns moved beyond using technology for themselves, as the interns did in Britt's (2002) study, to using technology to enhance student learning.

For some interns, a significant growth in technology proficiency was observed. April, an intern with a limited technology background and low expectations for

technology use, became a regular user of technology. Technology became such an integral part of April's teaching that, when she took a full time position with another school system without the same technology availability as Clover County, she purchased her own digital projector. April's case highlights the potential effect of having an encouraging and supportive technology proficient mentor, solid preservice training, access to numerous technologies, and active participation in a program focusing on technology integration.

This study found that interns chose certain technology applications based on their perception of student interest. This theme is consistent with Novak and Knowles (1991) finding that new teachers' technology use is influenced by their students' interest. The participants in the Novak and Knowles (1991) study were not initially interested in using technology. They became motivated to use technology after acknowledging student interest in technology. The interns in this study were already motivated to use technology. Albeit to a lesser degree, student interest still played a role in the technology applications interns chose.

Technology availability. What technologies interns had access to also played a major part in what applications they used. The interns used what technology was available to them. Most interns took advantage of many of the numerous technology applications available to them in the school system. Without such a high access to technology, it is doubtful that the interns would have explored technology to the degree they did.

Regarding the availability of technology, the interns' laptops played a crucial role in facilitating consistent use of technology among all interns. Having a laptop seemed to

be their "passport to technology integration." Most of the interns carried their laptop around with them everywhere. Housed on their laptops were lesson plans, tests, PowerPoint presentations, digital photographs, and webpage documents. Having a laptop allowed the interns the flexibility to take their work with them anywhere. Often, when visiting the schools, I would go into the library or an empty classroom, and see an intern working on their laptop. At our weekly technology meetings, most of the interns brought their laptops and chose to work on them instead of the computers in the computer lab. They used their laptops regularly. The act of a school district supplying an intern with a laptop computer is a unique investment in an interns' potential and a significant gesture of trust. In turn, the interns used their laptops for lesson plan creation and delivery. From my perspective, providing laptops for all of the interns was a worthwhile investment for Clover County Schools and their students.

NCATE Standards. The interns exceeded the expectations found in the NCATE standards teacher training programs, that field experiences should allow student teachers "to use information technology to support teaching and learning" (NCATE, 2002). The interns were not only "allowed" to use technology, they were encouraged, supported, and expected to use it. By giving them their own laptop, providing training for them each week, monitoring their progress, and facilitating a climate of interaction and camaraderie, interns in the STAT program experimented with numerous information technology applications and, in turn, reached a higher proficiency with technology.

Issues

Student behavior. The biggest issue for the interns during their student teaching experience was student behavior and classroom discipline, confirming current research in

this area (Whitney, Golez, Nagel, & Nieto, 2002, Delvin-Scherer & Daly, 2001; Hamilton & Riley, 1999). For one intern, Tammy, student behavior became a hindrance to her use of technology. In the end, she decided against using technology, because she did not feel her students could handle it. Other interns faced similar classroom discipline issues, but continued to use technology. Even after one of her students put bubble gum on the lens of the digital projector, April continued to use technology on a regular basis. She only limited their personal access to it.

Time. Time was also a significant issue for the interns. This confirms a similar study of six elementary teachers who described not having enough time to accomplish all they are required to as new teachers (Novak & Knowles, 1991). Many interns described not having enough time to accomplish all of the goals they set for themselves during their internship experience. One intern felt that student teaching is not an appropriate time to emphasize technology integration and described being overwhelmed by all the responsibilities of an intern. However, some interns used their time to plan future technology integrated lessons. Two interns made numerous PowerPoint presentations that they could use again in the future.

Access. Even though the interns were placed in an environment with a high amount of technology, some interns were not always satisfied with the access they received. Some cases seem to indicate that, when interns are placed in a technology rich environment, they have the potential to push the limits of instructional technology possibilities. Both Anne and Tripp thirsted for more technology availability. Anne was disappointed that the high school did not have wireless Internet access, that the laptops in the wireless carts were unreliable, and that her students did not have sufficient technology

access at home. Tripp desired improved computer based practice tests in his content area. Even though they made regular use of the technology resources available to them, they wanted more.

To me, these cases are significant for two reasons. First, they provide an indication of a belief that increased technology access improves education and limited access is a barrier to education. For Anne, knowing that many of her students did not have computers at home, forced her not to use technology to the degree she desired. For Tripp, his students could have been better prepared to take the SOL tests on computers, had they been able to take useful practice tests on computers. Second, they indicate how interns have the potential to push the realm of possibilities with regard to instructional technology. Tripp and Anne were not satisfied with the high access to technology they received in Clover. They used everything that was available and still desired more access, because they believed it could improve instruction and have a positive affect on student learning.

Intern Preparedness. This study indicated that many problems interns faced during their use of technology in the classroom could have been avoided with better preparation. Simple skills, such as successfully connecting a laptop to a digital projector or strategies for successful projects using the wireless laptop carts, could have been easily taught onsite or during preservice training. These types of problems are quite trivial and easily fixed. However, each intern had to find out about them by giving a classroom presentation that did not work. It seems that this could be avoided by a different strategy toward instructional technology training. Courses at the university should include a simulation element where preservice teachers receive an opportunity to try out various

technology applications for themselves before they enter the classroom. Troubleshooting with common classroom technologies should be taught, as well, so that interns are more prepared to handle problems that arise. Student teachers should, at the very least, know how to connect a digital projector to a laptop and troubleshoot connection problems.

My purpose in asking this research question was to gain a sense as to whether or not the problems that arose with technology became insurmountable obstacles. It appeared that the interns were able to adequately face each of the problems they encountered. The problems they faced in the classroom did not cause them to dislike instructional technology. They learned from each mistake and were better prepared the next time they used technology. On the basis of this finding, it appears that the interns were resilient after being confronted with unforeseen technology glitches. These problems did not appear to stop them from using technology in the future.

Attitudes

Preconceived expectations. The interns entered the STAT internship program with expectations of their use of technology inconsistent with their actual usage of technology. For example, one intern thought she would only use technology with her class once a month, and actually used it almost 30 times. This finding is in alignment with Balli et al.'s (1997) study, which found that preservice interns entered field experiences with incongruous preconceived ideas of what educational technology in contemporary classrooms looks like.

Technology as a "fun" activity. Intern attitudes toward technology remained consistently positive throughout the semester. As the semester progressed, intern attitudes toward technology generally became more positive. However, evidence of a

residual traditional attitude toward technology was found in the statements some interns made. In a study conducted thirteen years ago, Novak and Knowles (1991) found that first year elementary school teachers viewed technology as something secondary or "extra." Although interns did not refer to technology as something "extra," many equated it with something "fun."

During the few weeks before the SOL tests, intern use of technology declined. One intern explained this by saying that "the closer you get to the end of the year, the less likely you are to use resources that aren't aligned with what's going to be on the test." This seemed to indicate that, for some interns, technology was not an integral element of curriculum based instruction. Technology was an extra element that, during an intense review period, should be discarded. Further evidence of this perspective occurred after the SOL tests, when two interns used technology activities, such as web quests with the laptop carts, as "fun" activities.

Preservice Training

Numerous studies have concluded that many preservice teachers do not feel sufficiently prepared to use technology in the classroom (NCES, 2000; Strudler et al, 1999; Solmon, 1999; Topp, 1996; AACTE, 1987). The current study did not concentrate on whether or not the interns felt prepared to use technology. Instead, it concentrated on specific ways in which their preservice training program prepared them to use technology. Through interviews and online discussions, the interns mentioned two ways their university prepared them to teach with technology: an introduction to educational technology course (ECI 304) and their methods courses.

ECI 304 was described as a decent introduction to classroom technology. However, some interns complained that ECI 304 was too general, not content specific, and for some, too quick paced. Three interns mentioned their methods professors. One intern, in particular was continually influenced by her methods professor throughout the duration of the semester. She reported checking her former professor's website over 30 times throughout the semester. From the website, she maintained a connection to the lessons learned in that class and received new lesson plan ideas that she implemented into her own class. This extends the findings of numerous studies (Schlagal 1996; Blanton, Thompson, & Zimmerman, 1993; Persichette et al., 1999; Delvin-Scherer & Daly, 2001), which found that telecommunications can provide a powerful link between preservice institutions and interns teaching in the field. Whereas, these studies highlight the use of e-mail communication between professors and interns solidifying that link, this intern's story suggests that a methods professor maintaining a useful and regularly updated webpage can preserve that link powerfully, as well. For this intern, the professor's website provided a powerful link to her preservice training that she continually drew upon during her internship experience. This finding highlights the potential of a regularly updated website to ensure that the link between the university and field experiences remains intact and beneficial to the intern.

Future Research

A significant finding in this study was the continual influence one methods professor had on one interns' technology choices throughout the semester. A more in depth study should explore the different strategies methods faculty use to introduce and model instructional technology in their classes. Follow up interviews with interns, in

various field placements, regarding their preservice training could provide an indication of which strategies were most effective and enduring. April's story is just one case of a method's professor using one strategy. There are certainly more successful strategies that should be recognized and documented, as well.

This study found that the interns' perceptions of student interest in technology influenced their choices of technology. One intern described being surprised when he found that his students knew far more about technology than he anticipated them knowing. This realization completely altered his perception of his students' abilities and the way he chose to use technology in the classroom. More research should be conducted to compare intern, or teacher, perceptions of student technology interest and proficiency, and data from students regarding their interests and proficiency in technology.

Strengths and Limitations

Perhaps the biggest strength of a case study lies in the rich detail and vivid descriptions inherent in the data. In this study, five research questions were asked covering a wide variety of aspects of an interns' experience with technology: their use of technology, issues that arose from using technology, attitudes towards technology, and the influence of preservice training in technology. A variety of sources and methods were used to collect a diverse array of data. Continuous interviews, observations, online discussions, technology logs, and the researcher's constant interaction with the interns provided a copious amount of data.

A limitation of this study is a limitation for all case studies: the results cannot be generalized to a broader population. This study examined the instructional technology experiences of seven interns participating the STAT internship program in Clover County

Schools. Other school districts may not have the amount of technology Clover County has in their schools. Additionally, other interns will not likely have the type of technology support these interns received by being participants in the STAT program.

Implications for the Future of Preservice Training and Internship Experiences

This study provides evidence of the potential of a diverse group of interns, with different backgrounds and technological abilities, to successfully apply a range of technology applications during their student teaching experience. In the process, they became more proficient with technology and prepared themselves for the responsibilities of being full time teachers. With the exception of one intern who felt overwhelmed by the emphasis on technology, all of the interns appreciated the importance placed on integrating technology during their internship experience. All of the interns experimented with technology applications that they had never attempted before, such as digital projectors, mobile laptop carts, and creating web pages.

The findings of this study suggest that the internship segment of preservice training is an appropriate time to emphasize technology integration. However, the study does not answer whether or not it is the most appropriate time. It appears that more emphasis should be placed on modeling practical and successful technology applications during methods courses. During methods instruction, preservice teachers should have the opportunity to experiment with technology from the perspective of their future students and their role as a teacher. Increased emphasis should also be placed on the importance of recognizing student skills and interests. Early practicum experiences may provide a preliminary avenue for preservice teachers to practice many of these skills and see technology integrated in the classroom.

Although most school districts do not have the same amount of technology available to teachers in Clover County, university faculty should work with school district administrators to ensure that the classrooms, where interns are placed, have sufficient access to technology, and when possible, a technology proficient teacher. This study indicated that when interns are expected to use technology, and are given proper training and access to modern technology, they have the potential to surpass their own expectations and push the boundaries of possibilities. Supplying this level of access and support is a challenge that most universities and school districts are now facing. Exploring the unique strategies of successful technology integration programs, such as the STAT internship program, provides alternatives that other preservice training institutions may wish to consider.

REFERENCES

American Association of Colleges for Teacher Education (1987). *Teaching teachers: Facts and Figures.* Washington, DC

Allen, D. W., & Leblanc, A. (2002). *Spirited teaching, coaching winning teachers with 2 + 2.* Scottsdale, AZ: Ed Media Press.

Allport, G. (1967). Attitudes. In M. Fishbein (Ed.), *Readings in attitude theory and measurement* (pp. 1-13). New York: Wiley & Sons.

Apple Classrooms of Tomorrow (1996). *Changing the conversation about teaching, learning, and technology: A report on 10 years of ACOT research.* Retrieved on January 13, 2003, from http://www.apple.com/education/k12/leadership/acot/library.html

Apple Classrooms of Tomorrow (2002). *ACOT Overview. A two-page overview of the program.* Retrieved on January 13, 2003, from http://www.apple.com/education/k12/leadership/acot/library.html

Baker, E., Gearhart, M., & Herman, J. (1990). *The Apple Classroom of Tomorrow 1989 evaluation study.* Los Angeles: UCLA Center for the Study of Evaluation.

Balli, S.J., Wright, M.D., & Foster, P.N. (1997). Preservice teachers' field experiences with technology. *Educational Technology, 37* (5), 40-46.

Bandura, A. (1986). *Social Foundations of Thought and Action.* Engelwood Cliffs, NJ: Prentice-Hall.

Berube, M. (1994). *American school reform: Progressive, equity, & excellence movements, 1883-1993.* Greenwood Publishing Group: New York. 168 pages.

Blanton, W.E., Thompson, M.S., Zimmerman, S.O. (1993). The application of technologies to student teaching. *The Arachnet Electronic Journal on Virtual Culture. 1*(7). Retrieved on January, 20, 2003 from http://www.kovacs.com/EJVC/Blanton.htm

Bogdan, R. C. & Biklen, S. K. (1998). *Qualitative research for education: An introduction to theory and methods* (3rd ed.). Boston, MA: Allyn and Bacon.

Britt, J. (2002). *Student teacher perceptions of technology integration during internship. A report of findings.* Unpublished manuscript. Retrieved on November 19, 2002, from Athens State University, PT3 Web site: http://www.athens.edu/pt3/5-4.html

Busch, T. (1995). Gender differences in self-efficacy and attitudes toward computers. *Journal of Educational Computing Research. 12*, 147-158.

Carter, K. (1990). Teachers' knowledge and learning to teach. In Houston, W. R. (Ed.), *Handbook of research on teacher education* (pp. 291-310). New York: Macmillan.

Christensen, R. (1997). *Effect of technology integration education on the attitudes of teachers and their students.* Unpublished doctoral dissertation, University of North Texas, Denton. Retrieved on December 12, 2002 from http://courseweb.tac.unt.edu/rhondac/research/dissert/index.htm

Christensen, R. (1999). *Teacher and student attitudes toward information technology in four nations.* Paper presented at the 10th annual conference of the Society for Information Technology and Teacher Education (SITE). San Antonio, TX 1999.

Christensen, R. (e-mail personal communication February 1, 2003).

Clarke, R. E. (1994). Media will never influence learning. *Educational Technology Research and Development. 4*(2), 21-29.

Clover County Industrial Development Authority (2003). *Major Employers in Clover County.* Retrieved on January 15, 2003 from the CCIDA website.

Clover County Public Schools (2003). *Percentages of students on free and reduced lunch* (January report).

Curry-Corcoran, D. (2002). *Spring 2002 intern exit report.* Unpublished manuscript.

Curry-Corcoran, D. (2002b). *Intern entrance interview report for the Fall 2002 semester: Progression of an intern's technology training.* Unpublished manuscript.

Curry-Corcoran, D. (2003). *Intern comments regarding Lee Vartanian.* Unpublished manuscript.

Devlin-Scherer, R. & Daly, J. (2001, Winter). Living in the present tense: student teaching telecommunications connect theory and practice. *Journal of technology and teacher education.* *9*(4), 617 - 635.

Drazdowski, T. A., Holodick, N. A., Scappaticci, F. T. (1998). Infusing technology into a teacher education program: Three different perspectives. *Journal of Technology and Teacher Education.* *6*(2/3), 141-149.

Dupagne, M. & Krendl, K. A. (1992). Teachers' attitudes toward computers: A review of the literature. *Journal of Research on Computing in Education, 24*(3), 420-429.

Dwyer, D. (1994). Apple classrooms of tomorrow: What we've learned. *Educational Leadership, 51*, 4-10.

Eisner, E. W. (1991). *The enlightened eye: Qualitative inquiry and the enhancement of educational practice.* New York: Macmillan Publishing Company.

Fang, Z., 1996. A review of research on teacher beliefs and practices. *Educational Research, 38*(1), 47-65.

Fairbanks, C. M., Freedman, D., & Kahn, C. (2000). The role of effective mentors in learning to teach. *Journal of Teacher Education, 51*(2), 102-112.

Franke, A. & Dahlgren, L. O. (1996). Conceptions of mentoring: An empirical study of conceptions of mentoring during the school-based teacher education. *Teaching and Teacher Education, 12*(6), 627-641.

Glaser, B. G. & Strauss, A. L. (1967). *The discovery of grounded theory: strategies for qualitative research.* Chicago: Aldine Publishing Company.

Gooden, A. (1996). *Computers in the classroom: How teachers and students are using technology to transform learning.* San Francisco, CA: Jossey-Bass Publishers/Apple Press.

Hamilton, A. C., & Riley, J. F. (1999). Shared perceptions: How interns and their

cooperating teachers view concerns facing interns. *Action in Teacher Education, 21*(1). 97-107.

Harris, J. (1988). *Teacher-LINK: An electronic culture.* Paper presented at the annual meeting of the American Educational Research Association, New Orleans, April, 1988.

Hoepfl, M.C. (1997, Fall). Choosing qualitative research: A primer for technology education researchers. *Journal of Technology Education, 9*(1). Retrieved on December 18, 2002 at the digital library and archives website at http://scholar.lib.vt.edu/ejournals/JTE/v9n1/hoepfl.html

Hofer, B. K. (1999). Teacher preparation and teachers' lives in the United States. In H. W. Stevenson, S. Lee, & R. Nerison-Low (Eds.), *Contemporary research in the United States, Germany, and Japan on five education issues: Structure of the education system, standards in education, the role of school in adolescents' lives, individual differences among students, and teachers' lives.* Washington, DC: United States Department of Education. p. 117-149. Retrieved on January 20, 2003 from http://www.ed.gov/pubs/Research5/UnitedStates/teacher.html

Hoy, W. K., and Woolfolk, A. E. (1989). Supervising student teachers. In A.E. Woolfolk (Ed.), *Research perspectives on the graduate preparation of teachers*, (108-131). Englewood Cliffs, NJ: Prentice-Hall.

Hoy, W. K., & Woolfolk, A. E. (1990). Organizational socialization of student teachers. *American Educational Research Journal, 27*, 279-300.

International Society for Technology in Education (2000). *National educational technology standards (NETS) and performance indicators for teachers.* Retrieved on November 12, 2002 from http://www.iste.org.

International Society for Technology in Education (2002). *Use of NETS by state: National educational technology standards (NETS) and the states.* Retrieved on January 17, 2003 from http://www.iste.org/standards/.

Kamens, M. W. (2000, Summer). Student Teacher Support: Collaborative Experiences in a Technology Training Partnership. *Action in Teacher Education. 22*(2), 39-44. (ERIC Document Reproduction Service No. EJ617172)

Kauffman, D. (1992). *Supervision of student teachers.* Educational Resources Information Center (Digest. 91-7). Retrieved on January 20, 2003 from http://www.ericsp.org/pages/digests/supervision_studentteacher_91-7.html

Knezek, G., Christensen, R., Gilmore, E., Haesun, K., Morales, C., Moonen, B., & Voogt, J. (1999, March). *Teacher and student attitudes toward information technology in four nations.* Panel session presented at the 10th annual conference of the Society for Information Technology and Teacher Education (SITE). San Antonio, TX 1999

Knezek, G., Christensen, R., Miyashita, K., & Ropp, M. (2000). *Instruments for assessing educator progress in technology integration.* Denton, TX: University of North Texas, Institute for the Integration of Technology into Teaching and Learning.

Kozma, R. (1994). Will media influence learning? Reframing the debate. *Educational Technology Research and Development. 4*(2), 7-20.

Kvale, S. (1996). *Interviews: An introduction to qualitative research interviewing.* Thousand Oaks, CA: Sage Publications.

Guba, E. G., & Lincoln, Y. S. (1981). *Effective evaluation.* San Francisco: Jossey-Bass.

Lemke, C. & Shaw, S. (1999). *Education technology policies of the 50 states.* Milken Family Foundation. Retrieved on February 2, 2003 from http://www.mff.org/

Lincoln, Y.S. & Guba, E.G. (1985). *Naturalistic Inquiry.* Newbury Park, CA: Sage Publications.

McIntyre, D. J., Byrd, D. M., & Foxx, S. M. (1996). Field and laboratory experiences. In J. Sikula, T.J. Buttery, & E. Guyton (Eds.), *Handbook of research on teacher*

education (pp. 171-193). New York: Macmillan.

McLoughlin, C. & Luca, J. (2001). *Cognitive engagement and higher order thinking through computer conferencing: We know why but do we know how?* Paper presented at the Teaching & Learning Forum 2000, Curtin University of Technology, Australia. Retrieved on March 8, 2003 from http://cea.curtin.edu.au/tlf2000/abstracts/mcloughlinc2.html

Merriam, S. B. (1998). *Qualitative research and case study applications in education* (Rev. ed.). San Francisco: Jossey-Bass Publishers.

Milbrath, Y., Kinzie, M. B. (2000). Computer technology training for prospective teachers: computer attitudes and perceived self-efficacy. *Journal of Technology and Teacher Education. 8*(4), 373-396. Retrieved on December 9, 2002 from http://www.aace.org/pubs/jtate/default.htm

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded Sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.

Moursund, D. & Bielefeldt, T. (1999). *Will new teachers be prepared to teach in a digital age?* A national survey on information technology in teacher education. Milken Family Foundation. Retrieved on February 2, 2003 from http://www.mff.org/publications/publications.taf?page=154

Mowrer-Popiel, E., Pollard, C., & Pollard, R. (1994). An analysis of the perceptions of preservice teachers toward technology and its use in the classroom. *Journal of Instructional Psychology, 21*(2), 131-138.

Nagy, N. M., Russo, T. (1998). Professional portfolio. *New Teacher Advocate.* Retrieved on March 13, 2003 from www.kdp.org/pdf/handout_f02.pdf

National Center for Education Statistics, (2000). *Teacher use of computers and the internet in public schools: Stats in brief. 2000.* Department of Education. Retrieved on February 2, 2003 from http://nces.ed.gov/pubs2000/2000090.pdf

National Council for Accreditation of Teacher Education (2002). *Professional standards for the accreditation of schools, colleges, and departments of education.* Retrieved on February 1, 2003 from http://www.ncate.org

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform.* Washington, D.C.: U.S. Government Printing Office.

National Council for Accreditation of Teacher Education (1997). *Technology and the new professional teacher: Preparing for the 21st century classroom.* Retrieved on February 7, 2003 from http://www.ncate.org/accred/projects/tech/tech-21.htm

National Council for Accreditation of Teacher Education (2001). NCATE's ten-year report: A decade of growth 1991-2001. Retrieved on February 1, 2003 from http://www.ncate.org/newsbrfs/dec_report.htm#technology

National Council for Accreditation of Teacher Education (2002). *Professional standards for the accreditation of schools, colleges, and departments of education.* Retrieved on February 1, 2003 from http://www.ncate.org

Nettle, E. B., (1998). Stability and change in the beliefs of student teachers during practice teaching. *Teaching and Teacher Education 14*(2), 193-204.

Novak, D. I. & Berger, C. F. (1991). Integrating technology into teacher education. *T.H.E. Journal. 18*(9), 83-86.

Novak, D. I. & Knowles, J. G. (1991). Beginning elementary teachers' use of computers in classroom instruction. *Action in Teacher Education, 13*(2), 43-51.

Osunde, E. O. (1996). The effect on student teachers of the teaching behaviors of cooperating teachers. *Education, 116*(4), 612-619.

Pajares, F. (2002). *Overview of social cognitive theory and of self-efficacy.* Unpublished manuscript. Retrieved on February 3, 2003 from http://www.emory.edu/EDUCATION/mfp/eff.html

Panel on Educational Technology, President's Committee of Advisors on Science and Technology. (1997, March). *Report to the President on the use of technology to strengthen K-12 education in the United States.* Retreived on March 1, 2003 from http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/PCAST/k-12ed.html

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Persichitte, K.A., Caffarella, E.P., & Tharp, D.D. (1999). Technology integration in teacher preparation: a qualitative research study. *Journal of Technology and Teacher Education, 7*(3), 219-33.

Proctor, T. J., Rentz, N. L., & Jackson, M. W. (2001). Preparing teachers for urban schools: the role of field experiences. *The Western Journal of Black Studies, 25*(4), 219-218.

QSR International (1997). QSR NUD*IST 4.0 [Computer software]. Melbourne, Australia: QSR International.

Richardson-Koehler, V. (1988). Barriers to the effective supervision of student teaching: A field study. *Journal of Teacher Education, 39*(2), 28-34.

Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. In J. Sikula, T.J. Buttery, & E. Guyton (Eds.), *Handbook of research on teacher education* (pp. 102-119). New York: Macmillan.

Roblyer, M. D. (2000). The National Educational Technology Standards (NETS): A review of definitions, implications, and strategies for integrating NETS into K-12 curriculum. *International Journal of Instructional Media, 27*(2), 133-46.

Rourke, L. and Anderson, T. (2002). Using peer teams to lead online discussions. *Journal of Interactive Media in Education,* (1). Retrieved on March 8, 2003 from www-jime.open.ac.uk/2002/1

Sandholtz, J. H., Ringstaff, C. & Dwyer, D. C. (1990). *Teaching in high-tech environments: Classroom management revisited* (Revisited first-fourth year findings: Apple Classrooms of Tomorrow Report #10). Retrieved on March 13, 2003 from http://www.apple.com/education/k12/leadership/acot/library.html

Sandholtz, J. H., Ringstaff, C. & Dwyer, D. C. (1994). *Student engagement revisited: views from technology-rich classrooms* (Apple Classrooms of Tomorrow Report #21). Retrieved on January 13, 2003 from http://www.apple.com/education/k12/leadership/acot/library.html

Schultz, L. (personal communication, February 13, 2003).

Schlagel, B., Trathen, W., & Blanton, W. (1996, May/June). Structuring telecommunications to create instructional conversations about student teaching. *Journal of Teacher Education. 47*(3), 175-184.

Shen, Jianping (1996). A study of contrast: Visions of preservice teacher education in the context of a professional development school. *The Professional, 18*(2) retrieved on December 9, 2002 at http://www.education.auburn.edu/tpi/spring96/shen.html

Shen, Jianping (2002). Student teaching in the context of a school-university partnership: A case study of a student teacher. *Education, 122* (3). Retrieved on December 12, 2002 from: http://www.auburn.edu/academic/education/tpi/spring96/shen.html

SouthEast and Islands Regional Technology in Education Consortium (1998). *Integration of technology in preservice teacher education programs: The southeast and islands regional profile.* Orlando, FL: Instructional Technology Resource Center.

Strudler, N. B., McKinney, M. O., Jones, W. P., & Quinn, L. F. (1999). First-year teachers' use of technology: preparation, expectations and realities. *Journal of Technology and Teacher Education. 7*(2), 115-129.

Stuhlmann, J. M. & Taylor H. G. (1999). Preparing technically competent student

teachers: a three year study of interventions and experiences. *Journal of Technology and Teacher Education. 7*(4), 333-50

Task Force on Technology and Teacher Education (1997). *Technology and the new professional teacher: Preparing for the 21st century classroom.* Retrieved on February 1, 2003 from http://www.ncate.org/accred/projects/tech/tech-21.htm

Taylor, S.J. & Bogdan, R. (1984). *Introduction to qualitative research methods: the search for meanings* (2nd ed.). New York: John Wiley & Sons.

Tschannen-Moran, M. & Woolfolk Hoy, A. (2002, April). *The influence of resources and support on teachers' efficacy beliefs.* Paper presented at the American Educational Research Association, New Orleans, LA. Retreived on February 6, 2003, from http://www.coe.ohio-state.edu/ahoy/currentresearch.htm (full text)

Thomas, L., Clift, R. T., & Sugimoto, T. (1996). Telecommunications, student teaching, and methods instruction: An exploratory investigation. *Journal of Teacher Education, 47*(3), 165-174.

Topp, N. (1996). Preparation to use technology in the classroom: Opinions by recent graduates. *Journal of Computing in Teacher Education, 12*(4), 24-27.

U.S. Census Bureau, (2000). *County and City Data Book: 2000.* Retrieved on February 15, 2003 from: http://www.census.gov/prod/www/ccdb.html

U.S. Congress, Office of Technology Assessment. (1988). *Power on! New tools for teaching and learning.* Washington, DC: U.S. Government Printing Office. (full text)

U.S. Congress, Office of Technology Assessment. (1995). *Education and technology: Future visions.* Washington, DC: U.S. Government Printing Office. OTA-BP-EHR-169

U.S. Congress, Office of Technology Assessment. (1995). *Teachers and technology: Making the connection.* Washington, DC: U.S. Government Printing Office. OTA-EHR-616.

U.S. Department of Commerce (1995). *Falling through the net: A survey of the "have nots" in rural and urban America.* Retrieved on March 18, 2003 from http://www.ntia.doc.gov/ntiahome/fallingthru.html

Virginia Board of Education (1998). *Technology standards for instructional personnel* (Statutory Authority: § 22.1-16 of Code of Virginia). Retrieved February 12, 2003 from http://web.odu.edu/webroot/instr/ED/llschult.nsf/pages/tsip

Wetzel, K., Zambo, R., Buss, R., & Arbaugh, N. (1996). Innovations in Integrating Technology into Student Teaching Experiences. *Journal of Research on Computing in Education, 29*(2), 196-214.

Whitney, L., Golez, F., Nagel, G., & Nieto, C. (2002). Listening to Voices of practicing teachers to examine the effectiveness of a teacher education program. *Action in Teacher Education. 23*(4), 69-76.

Willis, J., Austin, L., & Willis, D. (1994). *Information Technology in Teacher Education: Surveys of the Current Status. A report prepared for the Office of Technology Assessment.* Houston, Texas: University of Houston, College of Education.

Willis, J. W., & Mehlinger, H. D. (1996). Information technology and teacher education. In J. Sikula, T.J. Buttery, & E. Guyton (Eds.), *Handbook of research on teacher education* (pp. 978-1029). New York: Macmillan.

Wong, H. K., & Wong, R. T. (1998). *The first days of school: How to be an effective teacher* (2nd ed.). Mountain View, CA: Harry K. Wong Publications.

Valdez, G., McNabb, M., Foertsch, M., Anderson, M., Hawkes, M., & Raack., L. (2000) *Computer-based technology and learning: Evolving uses and expectations.* Oak Brook, IL: North Central Regional Educational Laboratory. Retrieved March 13, 2003 from http://www.ncrel.org/tplan/cbtl/toc.htm

Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks,

CA: Sage Publications.

Zeichner, K.M. (1986). Content and contexts: neglected elements in studies of student teaching as an occasion for learning to teach. *Journal of Education for Teaching, 17*, 5-24.

APPENDIX A

Technology Standards for Instructional Personnel (TSIP)
8 VAC 20-25-10 et seq.
Statutory Authority: § 22.1-16 of the *Code of Virginia*
Effective Date: March 4, 1998

8 VAC 20-25-10. Definitions.

The following words and terms, when used in this regulation, shall have the following meaning unless the context clearly indicates otherwise:

Demonstrated proficiency means a demonstrated level of competence of the technology standards as determined by school administrators.

Electronic technologies means electronic devices and systems to access and exchange information.

Instructional personnel means all school personnel required to hold a license issued by the Virginia Board of Education for instructional purposes.

Productivity tools means computer software tools to enhance student learning and job performance.

8 VAC 20-25-20. Administration of technology standards.

A. School divisions and institutions of higher education shall incorporate the technology standards for instructional personnel into their division-wide technology plans and approved teacher education programs, respectively, by December 1998.

B.School divisions and institutions of higher education shall develop implementation plans for preservice and in-service training for instructional personnel. The implementation plan shall provide the requirements for demonstrated proficiency of the technology standards.

C.Waivers shall be considered on a case-by-case basis of the 18-hour professional studies cap placed on teacher preparation programs for institutions requesting additional instruction in educational technology.

D.School divisions shall ensure that newly-hired instructional personnel from out of state demonstrate proficiency in the technology standards during the three-year probation period of employment.

Technology Standards for Instructional Personnel (8 VAC 20-25-10)

E.Course work in technology shall satisfy the content requirement for licensure renewal for license holders who do not have a master's degree.

F.School divisions shall incorporate the technology standards into their local technology plans and develop strategies to implement the standards by December 1998.

G.Institutions of higher education shall incorporate technology standards in their approved program requirements and assess students' demonstrated proficiency of the standards by December 1998.

8 VAC 20-25-30. Technology standards.

A.Instructional personnel shall be able to demonstrate effective use of a computer system and utilize computer software.

B.Instructional personnel shall be able to apply knowledge of terms associated with educational computing and technology.

C. Instructional personnel shall be able to apply computer productivity tools for professional use.

D.Instructional personnel shall be able to use electronic technologies to access and exchange information.

E.Instructional personnel shall be able to identify, locate, evaluate, and use appropriate instructional hardware and software to support Virginia's Standards of Learning and other instructional objectives.

F. Instructional personnel shall be able to use educational technologies for data collection, information management, problem solving, decision making, communication, and presentation within the curriculum.

G. Instructional personnel shall be able to plan and implement lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings.

H. Instructional personnel shall demonstrate knowledge of ethical and legal issues relating to the use of technology.

APPENDIX B

An Overview of the STAT program

The STAT program is a partnership between an urban university in Virginia, and a k-12 rural school district about 100 miles away. Over the past year and a half, the STAT program's goal has been to create technology proficient teachers in both institutions and to counter the effects of the digital divide pervasive in poverty-stricken Clover County. STAT's $1.3 million three-year grant is funded through the United States Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) initiative and consists of five major components:

1. Field-based master's degree program

Nearly one third of Clover's teaching staff is currently enrolled in ODU's field-based master's program. Clover County has difficultly both recruiting and retaining teachers. Low teacher salaries and the remote location contribute to a near 20% turn-over rate. Clover County is able to market ODU's field-based masters degree program as a means to both attract and keep good teachers. Through the use of grant funding, Clover pays the fees, tuition and book costs for all of the teachers enrolled in the program. In return, teachers agree to teach in the district one year for every year they were enrolled in the program.

The main emphasis of the field-based master's program is learning to improve instruction through technology. Teachers already certified complete a core of courses emphasizing curriculum development, instructional strategies, assessment techniques and the use of action research as a vehicle for self-reflection and instructional improvement. Uncertified teachers replace elective courses with state requirements such as Reading in the Content Area but otherwise complete the same core classes. All courses employ technology integration and require teachers to demonstrate the transfer of learned skills into the classroom environment.

2. Internship program

Interns begin their placement either during new teacher orientation in August, or during the in-service days at the start of the district's spring semester in January. Interns remain in their position until the end of the semester or year. Interns accept the same responsibilities as regular classroom teachers except that they are only required to teach half time. This leaves ample time for interns to meet with mentors, supervisors and technology specialists, and to observe and assist in other classrooms.

Dictated by the grant proposal, the goal of each intern is to find new ways to incorporate technology into the planning and preparation of lessons, to design lessons that utilize recent software applications, and to develop project-based lessons that require students to use a variety of technological media for both the construction and presentation of their work.

A unique funding mechanism allows the internship program to operate with minimal external funding. Clover County leaves one teaching position vacant for every

three ODU interns it accepts. The money allocated to the teaching position is used to pay stipends to three year-long, or six semester-long, interns and their mentor teachers. Clover County, in effect, hires three teachers for the price of one.

3. TOPS

Technology Opportunities for Parents and Students (TOPS) classes began in the fall of 2001. TOPS classes are technology courses, offered every Tuesday night, for the parents and relatives of Clover County public schools student. The classes are free of charge and include many incentives to encourage the participation of the residents. Dinner and child-care are provided at each class session.

An average of 30 adults participate each week in TOPS classes. Participants select from beginner, advanced beginner and intermediate classes. A variety of topics are covered in the sessions including Microsoft Word, Excel and PowerPoint. Participants learn to send and receive email and how to browse the Internet.

TOPS classes are taught by Clover County school teachers who are fulfilling requirements for their field-based masters course. Approximately 20 Clover teachers work each sessions dividing the responsibilities of teaching the adults, teaching and caring for the children and serving the dinner.

4. Student technology assistants

Student technology assistants focus on helping different populations simultaneously. Student technology assistants provide in-classroom support to teachers when and where they need it. At the same time, they learn responsibility and earn respect from their teachers and peers as the take on new roles as technology helpers. The program encourages students to explore information technology jobs and programs, a field where undoubtedly, a significant proportion of future jobs will lie. Working as part technology assistant team, students gain valuable and marketable experience that will give them a head start toward a future career.

5. Technology Training for ODU Methods Faculty

Within the college of education, the STAT program provides training, resources and support for methods faculty. Members of the methods faculty are encouraged to model technology-infused instruction in their courses so preservice teachers not only learn to use technology, but learn how to teach with it.

In early 2002, the STAT program purchased a wireless mobile laptop lab. This allowed methods faculty to bring technology into their regular classrooms. STAT provides workshops and staff support for faculty members interested in using the mobile labs. Each semester, ODU methods faculty are paired with their former students who are participating in the internship. Interns share their technology teaching experiences with their former professors and, at the end of the semester, make individual presentation of their technology experience to one of their professor's classes.

APPENDIX C

Interview Protocol

Name of intern:
Date/time of interview:
Duration of interview:

Opening statement: *Thank you for meeting with me today. The purpose of this interview is to talk about your experience with integrating technology during your student teaching experience in Clover County and to gauge how your attitudes toward technology have changed over the past month. With your permission, I would like to tape record our conversation for my personal records and reference. Do you give me permission to record this interview? Very well. Let's begin.*

How do you feel your use of technology has progressed over the past month?

What kinds of new technology applications or strategies have you used recently?

How did those go?

In what ways is technology helpful to you in the classroom?

What kinds of problems have you had with technology? How have these problems affected your teaching?

Has your perception of technology, and its usefulness in the classroom, changed? If so, how has it changed?

In what ways do you see your preservice training influencing you as you try to use technology in your classroom?

APPENDIX D

Observation Guideline

Date/time of observation:
Intern name (or number):
Subject/Grade level:
Number of students in the class:
Duration of observation:

Learning objectives

What are the objectives of the lesson (can be found in lesson plan)?

Technology use

What types of technologies (software, technology, etc.), if any, are being used?
How are they being used (to what end? What was the apparent purpose?)

Student engagement

How are the students responding to the lesson?

Pedagogical Skill with technology

How were transitions (moving from a non-technology segment of the lesson to a technology segment and vise versa) made? Were they smoothly done, was it choppy, unorganized, etc.?

What kind of problems did the intern seem to have?

When problems (particularly technology glitches) occurred, how were they dealt with? Were they dealt with quickly & proficiently?

Curricular effectiveness of the technology used

How did the technology chosen fit the learning objectives?
Did the technology help propel the lesson? (Kozma)
Did the technology do nothing more than deliver the concept? (Clarke)

NETS standards for Teacher

Which NETS standards for Teachers are being demonstrated in this lesson?

General notes on lesson:

APPENDIX E

National Educational Technology Standards for Teachers (NETS-T) and Performance Indicators

CODES

NETS-T-1 TECHNOLOGY OPERATIONS AND CONCEPTS
Teachers demonstrate a sound understanding of technology operations and concepts.

A. Teachers demonstrate introductory knowledge, skills, and understanding of concepts related to technology (as described in ISTE 's *National Educational Technology Standards for Students*).

B. Teachers demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies.

NETS-T-2 PLANNING AND DESIGNING LEARNING ENVIROMENTS AND EXPERIENCES
Teachers plan and design effective learning environments and experiences supported by technology.

A. Teachers design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners.

B. Teachers apply current research on teaching and learning with technology when planning learning environments and experiences.

C. Teachers identify and locate technology resources and evaluate them for accuracy and suitability.

D. Teachers plan for the management of technology resources within the context of learning activities.

E. Teachers plan strategies to manage student learning in a technology-enhanced environment.

NETS-T-3 TEACHING, LEARNING,AND CURRICULUM
Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning.

A. Teachers facilitate technology-enhanced experiences that address content standards and student technology standards.

B. Teachers use technology to support learner-centered strategies that address the diverse needs of students.

C. Teachers apply technology to develop students' higher order skills and creativity.

D. Teachers manage student-learning activities in a technology-enhanced environment.

NETS-T-4 ASSESSMENT AND EVALUATION

Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.

A. Teachers apply technology in assessing student learning of subject matter using a variety of assessment techniques.

B. Teachers use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.

C. Teachers apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication, and productivity.

NETS-T-5 PRODUCTIVITY AND PROFESSIONAL PRACTICE

Teachers use technology to enhance their productivity and professional practice.

A. Teachers use technology resources to engage in ongoing professional development and lifelong learning.

B. Teachers continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning.

C. Teachers apply technology to increase productivity.

D. Teachers use technology to communicate and collaborate with peers, parents, and the larger community in order to nurture student learning.

NETS-T-6 SOCIAL, ETHICAL, LEGAL,AND HUMAN ISSUES

Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PreK-12 schools and apply those principles in practice.

A. Teachers model and teach legal and ethical practice related to technology use.

B. Teachers apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.

C. Teachers identify and use technology resources that affirm diversity.

D. Teachers promote safe and healthy use of technology resources.

E. Teachers facilitate equitable access to technology resources for all students.

APPENDIX F

NETS Performance Indicators for Technology-literate Students

All students should have opportunities to demonstrate the following performances.

Grades PreK – 2: Prior to completion of Grade 2, students will:

1. Use input devices (e.g., mouse, keyboard, remote control) and output devices (e.g., monitor, printer) to successfully operate computers, VCRs, audiotapes, and other technologies. (1)
2. Use a variety of media and technology resources for directed and independent learning activities. (1, 3)
3. Communicate about technology using developmentally appropriate and accurate terminology. (1)
4. Use developmentally appropriate multimedia resources (e.g., interactive books, educational software, elementary multimedia encyclopedias) to support learning. (1)
5. Work cooperatively and collaboratively with peers, family members, and others when using technology in the classroom. (2)
6. Demonstrate positive social and ethical behaviors when using technology. (2)
7. Practice responsible use of technology systems and software. (2)
8. Create developmentally appropriate multimedia products with support from teachers, family members, or student partners. (3)
9. Use technology resources (e.g., puzzles, logical thinking programs, writing tools, digital cameras, drawing tools) for problem solving, communication, and illustration of thoughts, ideas, and stories. (3, 4, 5, 6)
10. Gather information and communicate with others using telecommunications, with support from teachers, family members, or student partners. (4)

Grades 3-5: Prior to completion of Grade 5, students will:

1. Use keyboards and other common input and output devices (including adaptive devices when necessary) efficiently and effectively. (1)
2. Discuss common uses of technology in daily life and the advantages and disadvantages those uses provide. (1, 2)
3. Discuss basic issues related to responsible use of technology and information and describe personal consequences of inappropriate use. (2)
4. Use general purpose productivity tools and peripherals to support personal productivity, remediate skill deficits, and facilitate learning throughout the curriculum. (3)
5. Use technology tools (e.g., multimedia authoring, presentation, Web tools, digital cameras, scanners) for individual and collaborative writing,

communication, and publishing activities to create knowledge products for audiences inside and outside the classroom. (3, 4)

6. Use telecommunications efficiently to access remote information, communicate with others in support of direct and independent learning, and pursue personal interests. (4)
7. Use telecommunications and online resources (e.g., e-mail, online discussions, Web environments) to participate in collaborative problem-solving activities for the purpose of developing solutions or products for audiences inside and outside the classroom. (4, 5)
8. Use technology resources (e.g., calculators, data collection probes, videos, educational software) for problem solving, self-directed learning, and extended learning activities. (5, 6)
9. Determine which technology is useful and select the appropriate tool(s) and technology resources to address a variety of tasks and problems. (5, 6)
10. Evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources. (6)

Grades 6 – 8: Prior to completion of Grade 8, students will:

1. Apply strategies for identifying and solving routine hardware and software problems that occur during everyday use. (1)
2. Demonstrate knowledge of current changes in information technologies and the effect those changes have on the workplace and society. (2)
3. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse. (2)
4. Use content-specific tools, software, and simulations (e.g., environmental probes, graphing calculators, exploratory environments, Web tools) to support learning and research. (3, 5)
5. Apply productivity/multimedia tools and peripherals to support personal productivity, group collaboration, and learning throughout the curriculum. (3, 6)
6. Design, develop, publish, and present products (e.g., Web pages, videotapes) using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom. (4, 5, 6)
7. Collaborate with peers, experts, and others using telecommunications and collaborative tools to investigate curriculum-related problems, issues, and information, and to develop solutions or products for audiences inside and outside the classroom. (4, 5)
8. Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems. (5, 6)
9. Demonstrate an understanding of concepts underlying hardware, software, and connectivity, and of practical applications to learning and problem solving. (1, 6)
10. Research and evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems. (2, 5, 6)

Grades 9 - 12: Prior to completion of Grade 12, students will:

1. Identify capabilities and limitations of contemporary and emerging technology resources and assess the potential of these systems and services to address personal, lifelong learning, and workplace needs. (2)
2. Make informed choices among technology systems, resources, and services. (1, 2)
3. Analyze advantages and disadvantages of widespread use and reliance on technology in the workplace and in society as a whole. (2)
4. Demonstrate and advocate for legal and ethical behaviors among peers, family, and community regarding the use of technology and information. (2)
5. Use technology tools and resources for managing and communicating personal/professional information (e.g., finances, schedules, addresses, purchases, correspondence). (3, 4)
6. Evaluate technology-based options, including distance and distributed education, for lifelong learning. (5)
7. Routinely and efficiently use online information resources to meet needs for collaboration, research, publications, communications, and productivity. (4, 5, 6)
8. Select and apply technology tools for research, information analysis, problem-solving, and decision-making in content learning. (4, 5)
9. Investigate and apply expert systems, intelligent agents, and simulations in real-world situations. (3, 5, 6)
10. Collaborate with peers, experts, and others to contribute to a content-related knowledge base by using technology to compile, synthesize, produce, and disseminate information, models, and other creative works. (4, 5, 6)

Numbers in parentheses following each performance indicator refer to the standards category to which the performance is linked. The categories are:

1. Basic operations and concepts
2. Social, ethical, and human issues
3. Technology productivity tools
4. Technology communications tools
5. Technology research tools
6. Technology problem-solving and decision-making tools

APPENDIX G

Clover County Public Schools Lesson Plan

Teacher:
Date:
Subject:
Standards:

Special Notes:

I. Objectives/SOL focus:

II. Procedures:

i. The teacher will: (Anticipatory Set, Delivery, Monitoring)

ii. The student will: (Activities, Guided Independent Practices)

iii. Closure: (Summarizes the learning points)

III. Assessment: (Evaluate what has actually been taught in this lesson)

IV. Assignment/Homework: (Reference SOL)

V. Materials/Resources/Infusion of Technology (Tests, Quizzes, Handouts, etc.)

APPENDIX H

Technology Log

Name of Intern:

DATE	SUBJECT/ GRADE LEVEL	WHAT TECHNOLOGY DID YOU USE AND WHY?

APPENDIX I

Glossary of Instructional Technology Terms

As part of the revolution accompanying the advent of the Internet, it has become commonplace for the names of computer related and web-based products to go ignore the standard rules of capitalization, spelling, and abbreviation. Therefore, many of the technological applications mentioned in this study follow those "rules." The following list of instructional technology terms represent applications the interns used during the semester:

Dukane projector – the brand of digital (or data) projector used in Clover County schools. Interns often refer to the digital projector as "the Dukane."

eduTest – one of most popular online assessment tools for teachers and schools. Developed by Lightspan, eduTest allows a teachers to construct assessments, using a comprehensive question bank linked to the curriculum standards they are teaching. (http://www.edutest.com/products/)

ezboard – an online discussion platform utilized by the researcher and interns in this study. ezboard is a free service that hosts thousands of online discussion communities. ezboard touts itself as being the "world's largest message board network" with over 14 million registered users. (http://ezboard.com/index.html)

FTP or FTP-ing – "FTP" stands for File Transfer Protocol, which is the method of transferring web site material from the computer it was created on to a computer that will house the web site and display it on the Internet.

Hot link – Internet web pages are full of links to other web pages. When scrolling over a text or an image, in a website, and the mouse pointer changes from a slanted arrow to a hand with the index finger pointing. That means that if you click on it, it will take you to the website it is linked to. The process of creating links between websites is called "hot linking."

Macromedia Dreamweaver – a professional grade software used to create web pages.

unitedstreaming – an on line service that provides an extensive archive of digital video clips for streaming to teachers' desktops to supplement their instruction. *unitedstreaming* is available to school districts through subscription. Clover County subscribed to this service. Therefore, the interns had access to and were encouraged to use *unitedstreaming*.(http://www.unitedstreaming.com)

Web quest – a teacher created web page that guides students through a series of research activities. The web quest takes students through each step of the project, from research to the development of a final product. Most web quests include a rubric so that the students know precisely how their final product will be guided. For more information on web quests, see Bernie Dodge's site, http://webquest.sdsu.edu/webquest.html.

Wireless laptop cart – a cart filled with 20 to 30 laptop computers. Each laptop can connect to the Internet through a wireless connection. The laptop carts are equipped with a wireless router that sends and receives the network signals to and from the laptops.

Wireless router – a wireless router connects wireless computers to the Internet. It is connected to the network, using an Ethernet cable and sends a signal out to computers with wireless capabilities. Wireless routers work similarly to a wireless phone hub, which connects to a phone line and sends and receives signals from the wireless phone.

APPENDIX J

Online Discussion Board Questions

Below is a chronological list of the questions the researcher posted on ezboard.com. At the end of each question is the date in which the question was posted, followed by the number of the research question it related to (in bold; see Table 4, p. 76).

1. What is your teaching philosophy? (2/5) **3**

2. After a particularly frustrating day of teaching, you go back home. Instead of taking a nap, you decide to go for a walk. During your walk, you think about your day and how frustrated you are. Suddenly you notice a shiny object on the ground. You reach to pick it up. You rub off the dust that is covering it. As soon as you do, a geenie pops out of it. He is a special geenie for teachers, and will grant you three wishes regarding your teaching style. So, if there are three things you could change (for the better) with regard to your classroom management strategies, what would they be? (i.e. in other words what three new qualities would you like to acquire that would help improve your classroom management practices?) (2/12) **3**

3. So, after a much anticipation, you've finally received your precious laptop. What are the first things you plan on doing with it in the classroom? (2/17) **1**

4. As some of you have mentioned, it can be quite a task trying to get your students interested and "engaged". What strategies, tools, or "tricks" have you employed to help get your students actively participating in your lessons? What has frustrated you the most about student engagement? (2/24) **1**

5. So, you've been here a month: planning, trying, striving, struggling, juggling, practicing, perspiring, experimenting, teaching, etc. You get the picture. But, how do you know your students are getting anything from all your effort? How do you know they are learning (i.e. how do you assess them?)? (3/2)

6. If someone were to come into your classroom, what do you think they would see? Describe. (3/9) **1**

7. By now you have hopefully tried out a few technology applications in the classroom. What is have you learned from these experiences? When you are planning a lesson or a unit, do you consider using technology more or less, because of these experiences? (3/17) **1,2,3**

8. What instructional technology application do you use most often in your class? Why do you use it? (3/24) **1,3**

9. Wow! The fact that we are on question #9 tells me that you are now approaching the halfway point of your internship experience. All of you have learned and experienced so

much in these 9 weeks. What is the most prominent thing about teaching you have learned so far? (3/30) **1,3**

10. I just won the lottery, and instead of spending it on booze, sports cars, and "the fast life" , I've decided to spend all of it on education. I've even set up my own foundation, The Lee V. Education Foundation. My foundation has a program where any teacher can apply to receive $5,000 to use for anything that can help them with classroom instruction. All you have to do is write out a budget and give the reasons why you want to buy certain things. How would you spend your 5 grand? Why would you choose to spend it this way? Write a brief budget and tell me what your thinking is behind it. (4/8) **1,3**

11) By now, all of you have tried a variety of instructional technologies in the classroom. What has been your most successful? Why? (4/14) **1,2,3**

12) You've just took a week off from teaching because of spring break, and you now see (probably) that you are close to the end. How will technology fit into your teaching for the remainder of your experience? (4/27) **1,2,3**

13) Starting the first day of this semester, most of you started teaching, with full responsibility, right off the bat. How did this affect your use of technology in the classroom? Did you use it more or less than you would have? (5/5) **1,2,3**

14) What is your favorite technology application you have used in the classroom? Why? (5/14) **1,2,3**

15) With all the emphasis that is placed on technology in this program, are you getting tired of it yet? (5/20) **2,3**

16) Now that you have used computers and technology with your students for almost a full semester, you are in a position to reflect on their skills with technology. Did their technology skills fall below or exceed your expectations? How would you describe your student's level of proficiency with computers? How would you compare their technology skills with yours? (6/3) **1,3**

17) Congratulations! This is your last week. You're done! Finito! Summer's here! TIme to get a full-time job next year with your own classroom, your own kids, real $, and responsibility. What role has technology played in your experience this semester? What role do you see it playing for you next year and in the years to come? (how will you use it?) (6/9) **1,3**

APPENDIX K

Informed Consent Document For
The ACTT Now Internship Program Study
Old Dominion University

INFORMED CONSENT DOCUMENT
The purpose of this form is to provide you, as a participant in the ACTT Now program, with information toward making a decision about whether or not you wish to participate in a research project, entitled the ACTT Now Internship Project, and to record the consent of those students who say YES.

TITLE OF RESEARCH: ACTT Now Internship Program

RESEARCHERS: Dwight Allen, Ph.D., Professor, Darden College of Education, Department of Educational Curriculum and Instruction, Old Dominion University

Lee Vartanian, Ms.Ed., Research Assistant, Darden College of Education, Department of Educational Curriculum and Instruction, Old Dominion University

DESCRIPTION OF RESEARCH STUDY:
Several studies have been conducted looking into the subject of the instructional technology practices of teachers. Some studies, as well, have investigated the attitudes teachers have toward technology. None of them have examined the experiences student teachers face as they endeavor to use technology in the classroom. The purpose of this study is to gain a deeper understanding of the struggles, successes, and situations new teachers face as they try to incorporate technology into their lessons.

If you decide to participate, then you will join a study involving research of your experiences and thoughts about using technology in the classroom. This will involve the researcher regularly observing you teach and conducting oral interviews with you about your experiences with technology in the classroom. You will be asked to keep a simple log of your technology use and will be asked to respond to a question about technology each week over the Internet. Your lesson plans will also be looked at, by the researchers, in order to see the presence of technology elements. If you say YES, then your participation will last for the 5 months you are teaching in Clover County Public Schools with the ACTT Now project (January 27, 2003 – June 20, 2003). Approximately 8 student teachers will be participating in this study.

EXCLUSIONARY CRITERIA:
You should be registered for student teaching with Old Dominion University's Darden College of Educations Office of Teacher Services, in order to be eligible for the study.

RISKS AND BENEFITS

RISKS: Although every effort will be employed to protect your confidentiality, it may happen that your confidentiality will be compromised through the descriptions of the final report. See CONFIDENTIALITY.
BENEFITS: The main benefit to you for participating in this study is that you will participate in a learning process with the researchers, as they try to understand your experience more deeply. The results of the study will likely shine light on the nature of the internship experience as a whole, as well as your own experience.

COSTS AND PAYMENTS:
The researchers are unable to give you any payment for participating in this study.

NEW INFORMATION:
If the researchers find new information during this study that would reasonably change your decision about participating, then they will give it to you.

CONFIDENTIALITY:
The researchers will take every step to keep private information, such as observational notes from your classroom, interviews with you, and samples of your technology comments, confidential. Your name, the name of the school district, as well as your school will be changed. However, your subject area and grade level will remain the same. This may compromise the anonymity of some of you, particularly if you are the only intern in that grade level/subject area. It should be noted that only those thoroughly familiar with the ACTT Now internship program and its participants may be able to guess who may be indicated in the study. However, not all of the data will be presented with these indicators. When it is desirable and necessary, descriptions will be made without indicators (e.g.: "One intern stated..."). The results of this study may be used in reports, presentations, and publications; but the researcher will not identify you. Of course, your records may be subpoenaed by court order or inspected by government bodies with oversight authority.

WITHDRAWAL PRIVILEDGE:
It is OK for you to say NO. Even if you say YES now, you are free to say NO later, and walk away or withdraw from the study -- at any time. Your decision will not affect your relationship with Old Dominion University, the ACTT Now program, or otherwise cause a loss of benefits to which you might otherwise be entitled. Withdrawing from the research project will not affect any grade you receive from ODU or the pay/support you receive from Clover County Public Schools. The researchers reserve the right to withdraw your participation in this study, at any time, if they observe potential problems with your continued participation.

COMPENSATION FOR ILLNESS AND INJURY:
If you say YES, then your consent in this document does not waive any of your legal rights. However, in the event of harm arising from this study, neither Old Dominion University nor the researchers are able to give you any money, insurance coverage, free

medical care, or any other compensation for such injury. In the event that you suffer injury as a result of participation in any research project, you may contact Dr. Dwight Allen, the principal investigator at 683-5151, Lee Vartanian the research assistant at 683-6459, or Dr. David Swain the current IRB chair at 683-6028 at Old Dominion University, who will be glad to review the matter with you.

VOLUNTARY CONSENT:
By signing this form, you are saying several things. You are saying that you have read this form or have had it read to you, that you are satisfied that you understand this form, the research study, and its risks and benefits. The researchers should have answered any questions you may have had about the research. If you have any questions later on, then the researchers should be able to answer them:

Dr. Dwight Allen	683-5151
Lee Vartanian	683-6459

If at any time you feel pressured to participate, or if you have any questions about your rights or this form, then you should call Dr. David Swain, the current IRB chair, at 757-683-6028, or the Old Dominion University Office of Research and Graduate Studies, at 757-683-3460.

And importantly, by signing below, you are telling the researcher YES, that you agree to participate in this study. The researcher should give you a copy of this form for your records.

Subject's Name & Signature ______________________________
Printed Name

______________________________ __________
Signature Date

INVESTIGATOR'S STATEMENT:
I certify that I have explained to this subject the nature and purpose of this research, including benefits, risks, costs, and any experimental procedures. I have described the rights and protections afforded to human subjects and have done nothing to pressure, coerce, or falsely entice this subject into participating. I am aware of my obligations under state and federal laws, and promise compliance. I have answered the subject's questions and have encouraged him/her to ask additional questions at any time during the course of this study. I have witnessed the above signature(s) on this consent form.

Investigator's Name & Signature ______________________________
Printed Name

______________________________ __________
Signature Date

VITA

Lee B. Vartanian

Academic Experience

Ph.D.	Old Dominion University	2004	Urban Services
MS. Ed.	Old Dominion University	2001	Early Childhood Edu.
B.A.	Auburn University	1997	Social Work

Teaching Experience

2003 – 2004	Teacher, Newsome Park Elementary, Newport News, Virginia
2000 – 2003	Technology Trainer, ACTT Now Internship Program
2000 – 2003	Graduate Assistant and Guest lecturer, Old Dominion University, Darden College of Education, Norfolk, VA

Conference Presentations

Vartanian, L. (2002). *The impact of an intensive technology integration internship program on pre-service teaching practices.* Presentation at the Society for Information and Technology in Education conference in Nashville, TN, March 18-21, 2002.

Cheely, C., Vartanian, L., O'Shea, P., Allen, D. (2002). *Moving beyond make believe: On-line lesson plan collaborations.* Presentation at the Society for Information and Technology in Education conference in Nashville, TN, March 18-21, 2002.

Kidd, J., Cheely, C., Allen, D., Downs, D., Haws, S., Terry, F., O'Shea, P., Vartanian, L., Curry-Corcoran, D. (2002). *ACTT Now to link pre-service and in-service teacher education: A PT3 panel.* A presentation at the Society for Information and Technology in Education conference in Nashville, TN, March 18-21, 2002.