5-8-2007

E-PORTFOLIOS: THEIR IMPACT ON PRESERVICE TEACHERS' SELF-DIRECTED LEARNING AND COMPUTER TECHNOLOGY SKILLS

YUFANG CAROLE HUANG
University of Missouri-St. Louis, carolehuang@gmail.com

CHAPTER I: INTRODUCTION

Computer technology has transformed society by enabling many people to work anytime, anywhere, and free from a workplace anchored in time and space in this digital age (Nie & Erbring, 2000). This is accomplished through the support of the educational system, private and public business organizations, the government, and a variety of other systems. In response to technological advances, teachers today have a heavy responsibility not only to introduce computer technology to students, but also adopt the new skills to survive in today's digital age. Subsequently, introducing and using computer technology as a tool in teaching and learning continues to grow in popularity at the higher education level.

In education, instructors often tend to emphasize the Internet's usefulness for research while overlooking its role in collaborative learning. Using the Internet can encourage students to work together, form partnerships with their community, and use their creativity to communicate and to inform others from around the world. For instance, two students may be working on a group project, but one of them cannot be at school regularly. With the Internet, they are able to work on the same project at different times.

The Internet has also promoted widespread use of multimedia technologies. For example, the Internet allows individuals to distribute audio, video, and graphic content. These multimedia technologies have impacted higher education in a variety of ways, especially in teacher education programs (McKeachie, 1999).

Students in teacher preparation programs should be prepared to engage in distance learning, collaborative learning, multimedia usage, and other innovative teaching methods throughout their career. Whether an alternate teacher certificate or a traditional education program is chosen, it is the responsibility of the college or university's teacher education program to provide future teachers with knowledge of how to integrate computer technology into student learning.

Vannatta (2000) pointed out that implementation of a long-range technology plan could result in increased proficiencies and classroom integration among education faculty members. Her finding showed that moderate to high levels of faculty proficiency and integration were limited to the areas of word processing, e-mail, and Internet-related activities. Hence, it is possible that increased use of technology by preservice teachers can ultimately lead to increased technology proficiency among their K-12

students. As preservice teachers use computer technology more in their teacher education program, they will feel more comfortable including computer technology in their own classroom curricula. Many colleges and universities have taken steps to incorporate computer technology in the classroom and curricula, including Blackboard (a content management system designed for academic institutions), e-mail, on-line registration, and wireless operating systems on the campus. The College of Education at the University of Missouri-St. Louis (UMSL) is one example of how technology has been integrated into the curricula.

The College of Education at UMSL is known for a wide-range of undergraduate and graduate programs. At the undergraduate level, the College of Education offers the Bachelor of Science in Education (B.S.E.) degree. All B.S.E. degree programs lead to Missouri teacher certification. In addition, the Bachelor of Educational Studies (B.E.S.) degree is offered for those interested in education-related careers that do not require formal teacher certification. At the graduate level, programs include the Master of Education, Education Specialist, Doctor of Education, and Doctor of Philosophy in Education. For example, the graduate degree program in Adult Education in the division of Educational Leadership and Policy

Studies leads to a broad spectrum of research interests and experiences in andragogy, adult education programming, international comparative adult education, African American adult education, and educational gerontology, just to name a few.

The College of Education at UMSL also offers an extensive baccalaureate and post-baccalaureate teacher certification program, which prepares future teachers. Its Division of Teaching and Learning is the primary department for the B.S.E. degrees and certification programs. The College of Education encourages its faculty to use technology, in some form, in their curricula by asking students to obtain course literature from the Internet and interact with Mygateway, a system whereby faculty can place course documents, syllabi, and assignments, as well as develop a discussion board. This type of computer technology tool affords students greater freedom to study at any time that suits them, and at their own individual pace, thereby allowing more opportunities to obtain their education.

In order to advance career opportunities or get a promotion, people, including both traditional and non-traditional students, enroll in colleges and universities. People with backgrounds outside of education are returning

to school to become teachers. Thus, because of these diverse learners, some people believe that teacher education programs cannot assess these future teachers' abilities by simply looking at their academic performance (i.e., grades). In Missouri, the College of Education's teacher education program at UMSL has been using both academic grades and professional portfolio development to assess the preservice teachers' learning. Through these two assessments, the content and the teaching methods can be judged to determine a teacher's performance (personal communication, H. Sherman, February 19, 2004).

Student Assessment

At most institutions of higher learning, students are assessed on their knowledge gained by taking tests throughout the semester. These can be in-class or take-home exams. Tests often consist of multiple choice, true-false, or essay questions. With some in-class tests, students are able to use their notes; however, for the most part, students are expected to repeat what they have learned (Angelo, 2000). In addition to tests, students are often graded or assessed on individual or group projects, including written assignments or class presentations. Written assignments are generally in the form of a paper where students are able to discuss a topic of interest in

detail. This helps students highlight and/or reflect what they have learned from the course materials. Often students are required to conduct a presentation. This can be done individually or with other classmates. This gets students to go through a process of teaching and learning. Not only do they learn from the presentation preparation but they also learn from hearing others' viewpoints. However, these assessments only engage students in idle theorizing (Stefanakis, 2002).

The first step to assess learners accurately is to determine the purpose of a given assignment. If the purpose of the assignment is to improve student learning, the instructor will employ formative assessment; whereby the instructor focuses on giving students frequent feedback via written comments. Formative assessment does not usually include numbers or grades (Black, 1998). If the purpose of the assignment is to create a finished product, then the focus should be on summative assessment; whereby the instructor gives the feedback needed to justify the grade assigned. The instructor grades only the product and cannot see the student's learning process in the work (Black 1998). In teacher preparation programs, the instructor's focus is on students' practical teaching experiences as well as their grades. One of the popular assessment tools

in today’s teacher education programs is the use of portfolios which facilitate both formative and summative measures.

Portfolios

A portfolio, in a teacher education program, is a collection of work produced by an inservice or preservice teacher, a future teacher. As an artist uses a portfolio to collect work to illustrate his or her talents, an educational portfolio is designed to demonstrate a future teacher's talents. Thus, educational portfolios are constructed by in-service or preservice teachers to highlight and demonstrate their knowledge and skills in teaching. A portfolio also provides a means for reflection; it offers the opportunity for critiquing one's work and evaluating the effectiveness of lessons or interpersonal interactions with students or peers (Benson, & Walker de Felix, 2001; Doolittle, 1994). Most traditional teacher education portfolios are organized into paper-based documents demonstrating knowledge or understanding of various educational standards and placed into using three-ring binders with divided sections. The binder holds all the presentations, pictures, and tapes of their course work or student teaching work. A problem with this traditional method is that boxes, binders, cassettes, pictures, and

drawings take up lots of physical space (Barrett, 1998). As a result of these drawbacks, electronic portfolios (E-portfolios) are becoming increasingly popular.

An electronic portfolio, using computer technology, allows the learners to collect and organize their portfolio artifacts in multimedia types. It allows, for example, preservice teachers to create a feedback section and invite their instructors and peers to respond to artifacts and ultimately the overall E-portfolio. The teacher education program at UMSL has proposed that preservice teachers switch from paper-based to electronic-based portfolios.

Although E-portfolios are preferred at UMSL, both faculty members and students must be introduced to their use. It is not an easy task to train all the faculty members and students in a teacher education program to utilize the E-portfolio program. However, in an effort to do so, the College of Education at UMSL, in the fall of 2002, initially formed the Electronic Portfolio Committee (EPC) to assist with this major and large developmental movement. Initially, the EPC was composed of one associate dean of the College of Education, three faculty members from the Teacher Education Department, one faculty member from the Counseling department, one student teacher coordinator, one state certification consultant, the

director of the E. Desmond Lee Technology and Learning Center (TLC), and three TLC staff. I was one of the TLC staff nominated to be on the committee. This unique combination of experts in education and technology began a journey in exploring the introduction of the E-portfolio to preservice teachers. The EPC is in charge of using E-portfolios to develop higher-quality teacher candidates and to strengthen the teacher education program at UMSL.

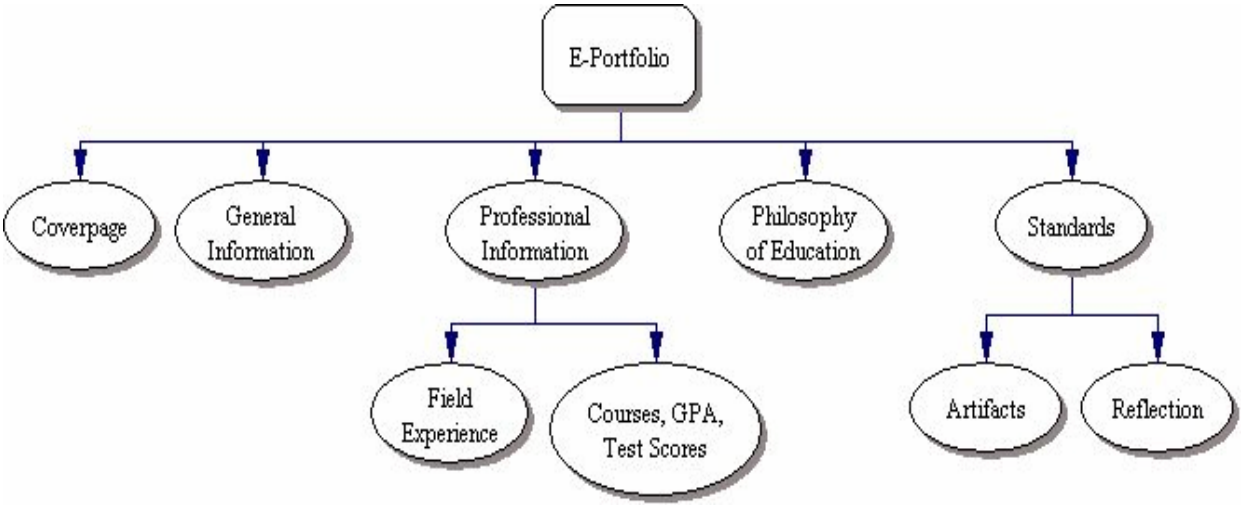

Figure 1 E-portfolio Certificate Requirements at UMSL

The EPC proposed the E-portfolio requirements and undertook making the E-portfolio template (see Figure 1) to assist preservice teachers to achieve their requirements. One of the purposes of developing an E-portfolio at UMSL is to demonstrate each preservice teacher's proficiency in the

certificate field of each educational standard (Song, Scordias, Huang, & Hoagland, 2004). As illustrated in Figure 1, there are several components an E-portfolio.

At UMSL an E-portfolio includes five sections:

1) *coverpage* which includes the name of the student and the university;
2) *general information* which includes student contact information;
3) *professional information* which includes student transcripts and test scores along with the school and cooperating teacher's information from their student teaching;
4) *philosophy of education* which outlines student's belief about the image of a teacher; and
5) *standards* which reflects the preservice teacher's growth and their reflective journals on classroom activities to meet national and/or state standards.

Standards

In the past decade, the National Council for Accreditation of Teacher Education (NCATE), in conjunction with the International Society for Technology in Education (ISTE), developed several sets of guidelines in professional teacher preparation programs. According to NCATE (2003), educators need to have knowledge of computer

technology skills: to deliver, develop, present, and assess instruction; to effectively use computers as an aid to problem solving; to facilitate school and classroom management; to conduct educational research; to achieve personal and professional productivity; to understand the basis for computer science education; and to provide electronic information access and exchange. This perception of the benefits of using E-portfolios as an assessment tool has been adopted by the State of Missouri and has led to a requirement of professional portfolios as a component of the certification projects for teacher graduates.

Within the State of Missouri, using computer technology as a tool to support learning in the K-12 classroom is specifically included in the Missouri Standards for Teacher Education Program (MoSTEP). It states “the preservice teacher understands the theory and application of technology in educational settings and has adequate technological skills to create meaningful learning opportunities for all students” (2003, para. 10). According to the Missouri Department of Elementary and Secondary Education (DESE), educators need to meet each one of the 11 standards.

1.2.1: Knowledge of Subject Matter

1.2.2: Human Development and Learning

1.2.3: Individualization and Diversity

1.2.4: Curriculum and Planning

1.2.5: Instructional Strategies

1.2.6: Classroom Motivation and Management

1.2.7: Communication Skills

1.2.8: Assessment of Student Learning

1.2.9: Professional Development and Reflective Practice

1.2.10: Ethics, Relationships and Communication

1.2.11: Instructional Technologies

Within the 11th MoSTEP standard, Instructional Technologies, six indicators address educators' computer technology proficiency by:

1.2.11.1 demonstrating an understanding of technology operations and concepts.

1.2.11.2 planning and designing effective learning environments and experiences supported by informational and instructional technology.

1.2.11.3 implementing curriculum plans that include methods and strategies for applying informational and instructional technology to maximize student learning.

1.2.11.4 applying technology to facilitate a variety of effective assessment and evaluation strategies.

1.2.11.5 using technology to enhance personal productivity and professional practice.

1.2.11.6 demonstrates an understanding of the social, ethical, legal and human issues surrounding the use of technology in PK-12 schools and applies that understanding in practice. (DESE, 2003, para. 12)

To demonstrate that they have met each standard, preservice teachers need to create lesson plans, classroom management plans, curriculum unit plans, observation journals, and/or projects. After developing those artifacts throughout the semester, students write the reflective sections for each standard to show how those artifacts meet the standards. This gives preservice teachers a learning experience from theory to practice.

According to Mezirow (1991), the general definition of learning is “the process of using a prior interpretation to construe a new or a revised interpretation of the meaning of one’s experience in order to guide future action” (p.12). Learning always involves five contexts (a) make an association within a frame of reference, (b) accept an

interpretation as learner's own, (c) call upon an earlier interpretation, (d) establish the truth, justification, appropriateness, or authenticity of what is asserted, and (e) decide, change an attitude toward, modify a perspective on, or perform (Mezirow, 1991). It appears that more and more non-traditional learners in general are attempting to make their own learning more meaningful.

Self-Directed Learning

Adult learning means more self-direction and learners taking control of their own learning (Knowles, 1980, 1989; Knowles, Holton III, & Swanson, 1998). In addition, adult learners attempt to make decisions about what will be learned, how it will be learned and when it will be learned. A major emphasis on research in adult learning has been focused on self-directed learning (Brockett, 1985c; Brocket & Hiemstra, 1991; Guglielmino, 1977; Merriam, 2001). This brings attention to the research that learning becomes a self-directed activity not only for successful living but as a basic survival skill in this digital age.

As self-directed learners, when preservice teachers do their E-portfolios, they have control over what artifacts they would like to include to represent their images as a teacher. Hence, although they are given general guidance on their portfolios, they decide what specifically will be

included. In the process of completing their portfolios, preservice teachers more likely than not are acquiring computer technology skills since E-portfolios are technology based. For example, students use their class teaching pictures to present the interaction in the classroom. They learn how to use the camera, scanner, and photo editing to complete this task. This spontaneous action of learning can be described as incidental learning. Incidental learning unlike informal learning, almost always takes place and is often unrecognized as learning by learners. It is a byproduct of another activity and can occur by trail and error. It can take place at work, in the car, at home, or almost everywhere (Kerka, 2000). While developing their E-portfolios, students are exposed to computer technology on a regular basis. Students also have to take the initiative to learn on their own or from other resources (i.e., human) to complete their E-portfolios; learning computer technology skills either incidentally or intentionally. The incidental learning occurs as a byproduct of their developing an E-portfolio.

Problem Statement

Based on the literature review, there are no research studies describing developing an E-portfolio impact on self-directed learning, and there are very little research

studies on E-portfolios use impact on the computer technology skills. While the literature relative to self-directed learning is voluminous, there are no studies which examine the development of E-portfolios and how the impact they have on adult learners, and more specifically, teacher education students.

Purpose of the Study

The purpose of this research study was to investigate how developing E-portfolios impacts preservice teachers' self-directed learning and computer technology skills (CTS). This research uses case study methods that focus on answering the following questions:

1. Does developing E-portfolios impact preservice teachers' computer technology skills and/or self-directed learning?
    a. What is the impact, if any, of developing E-portfolios impact preservice teachers' self-directed learning?
    b. What is the impact, if any, of creating E-portfolios on preservice teachers' computer technology skills?

Significance of Study

The results of this research study should be beneficial to instructors who teach and/or use E-portfolio

programs and other teacher preparation programs. Developing E-portfolios may help students in all programs improve their computer technology skills and trigger their self-direction and desire to learn. In addition, E-portfolios provide faculty with an effective, alternative assessment tool (Barrett, 2000). If we want K-12 students to have better computer technology skills, K-12 teachers should have curriculum that includes some form of computer technology to assist them. Many teachers volunteer to take some computer technology courses to improve their skills. This is significant because future teachers should work toward developing some computer technology skills (Song, Scordias, Huang, & Hoagland, 2004). Computer technology has become an important tool to many people, so this study also points out the benefits to adult education and higher education. Developing an E-portfolio for course purpose can help students adopt computer technology skills smoother. A teacher education E-portfolio is a collection of work illustrating a future teacher’s talents, along with offering the opportunity to benefit future adult and higher education instructor learning computer technology; especially when they have an understanding of the theories of self-directed learning and Andragogy.

Knowledge about the self-directed learning process would contribute to both theory and practice of self-directed learning in the digital age. In addition, this research may provide the foundation for further research into E-portfolio curriculum design and how to use E-portfolios as an assessment tool for effective professional development.

Limitations

The generalizability to the population cannot be assumed because the purposive sampling technique was utilized in this study. This study was also limited by the criteria utilized to select the sample. The volunteer participants in this study were learners who were enthusiastic or otherwise biased toward using E-portfolios. Depending on the results, the archived portfolios may not provide as much detailed data as is expected because artifacts are all self-selecting by the participants.

Definition of Terms

Some terms need to be clarified, in order to have a better understanding of this research study.

Adult/Adult Learner. Adults/adult learners refers to people who frequently must apply their knowledge in some practical fashion in order to learn effectively; there must be a goal and a reasonable expectation that the new

knowledge will help them further that goal. In this study, an adult or adult learner refers to the person who is taking teacher preparation classes at UMSL and who is a nontraditional learner.

Adult Education. It is the practice of teaching and educating adults. The practice is often referred to as training and development. It has also been referred to as Andragogy (Knowles, 1975).

Andragogy. The word Andragogy was created in 1833. It initially defined as “the art and science of helping adults learn” (Knowles, 1980). Since Knowles’ first edition of *The modern practice of adult education: From Pedagogy to Andragogy*, it has taken on a broader meaning. The term currently defines an alternative to pedagogy and refers to learner-focused education for people of all ages. It includes five issues to be considered and addressed in formal learning. They include (1) letting learners know why something is important to learn, (2) showing learners how to direct themselves through information, and (3) relating the topic to the learners’ experiences. In addition, (4) people will not learn until they are ready and motivated to learn. Often this (5) requires helping then overcome inhibitions, behaviors, and beliefs about learning.

Artifacts. The materials that preservice teachers create or develop for their student teaching, such as lesson plans, observation journals, classroom reflective journals, field notes, etc.

Computer Technology Skills (CTS) Inventory. It refers to a survey instrument, which identifies all the computer technology skills the E-portfolio program requires students to use. This instrument was developed by the researcher and validated by the EPC.

Certificate E-portfolio. It refers to student teachers who create E-portfolios to be certificated from teacher education program at the University of Missouri, St. Louis. It also called *professional E-portfolio* or *certification E-portfolio* in this study.

Course E-portfolio. It refers to an E-portfolio that students create through their courses to meet their course requirements. In this study, internship students create course E-portfolios during their internship semester.

Electronic Portfolio (E-portfolio). There are many kinds of E-portfolios. In this study, there are two kinds of E-portfolio: course E-portfolio (see definition) and certificate E-portfolio (see definition). An electronic portfolio is an individual’s collection of work in electronic form. In this study, an E-portfolio refers to a

design to demonstrate a future teacher's knowledge and skills in teaching.

Electronic Portfolio Committee (EPC). It refers to a committee formed to assist the E-portfolios development in Teacher Education at the College of Education in UMSL.

Instructor or Faculty Member. In this study, it refers to the person who is teaching courses in Teacher Education at UMSL.

Learning. Reflecting on experience to identify how a situation or future actions could be improved and then using this knowledge to make actual improvements (Mezirow, 1991). This process can be individual or group-based.

Pedagogy. Pedagogy is the art or science of teaching. The word comes from the ancient Greek paidagogos, the slave who took children to and from school. The word “paida” refers to children, which is why some like to make the distinction between Pedagogy (teaching children) and Andragogy (teaching adults). The Latin word for pedagogy, education, is much more widely used, and often the two are used interchangeably.

Preservice Teacher. In this study, a preservice teacher is an adult who is enrolled in one of the Teacher education programs at the University of Missouri-St. Louis (UMSL).

Nontraditional Learner. Cross (1980) defines the nontraditional student as

> an adult who returns to school full or part time while maintaining responsibilities such as employment, family, and other responsibilities of adult life. These students also may be referred to as adult students, re-entry students, returning students, and adult learners. (p.631)

The major difference between the two groups, traditional and nontraditional learners, is the number of responsibilities outside of the classroom.

Self-Directed Learning (SDL). It is a learning style, which was identified by Knowles (1975). He has defined it as

> a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 18)

Self-Directed Learning Readiness Scale (SDLRS). It is an instrument developed by Lucy M. Guglielmino (1977) and

used in this study to identify the participants' SDL levels.

Teacher Education. It refers to the preservice teacher education program of UMSL in which the student teaching candidates are either from a four-year undergraduate program or a professional program to get their teaching certificates.

Traditional Learner. It refers a student whose age is between the ages of eighteen and twenty-two, attends school full time, is single, and does not work full time.

Summary

Education has witnessed the growth of computer technology in the past three decades. Many colleges and universities now include computer technology in the classrooms. The College of Education at UMSL provides an example of how to integrate computer technology into curricula. Since computers are becoming the norm in most educational programs, students are faced with the need to become computer literate.

Different forms of assessment have been used in colleges and universities. Although written tests are popular techniques for assessment, for teacher education programs, E-portfolios have gained ground as an assessment tool. Within the State of Missouri, E-portfolios enable

colleges and universities to meet the national and state educational standards. With the use of the E-portfolio, preservice teachers can reflect more on their own work and thus engage in ongoing learning.

Learning is a complex activity, which includes acquisition of skills and knowledge as well as changes in attitudes and values. Many different domains of learning have been identified in order to meet different people's learning needs. A major emphasis on research in adult learning in recent years has been focused on self-directed learning.

The purpose of this research study is to investigate how developing E-portfolios impact preservice teachers' self-directed learning and computer technology skills. The results of this research study should be beneficial to instructors who teach and/or use E-portfolio programs, K-12 administrators, other institutions' teacher preparation programs, and adult and higher education faculty. Developing E-portfolios may help students improve their computer technology skills and trigger their self-direction, as well as provide evidence to the faculty that the E-portfolio is an alternative assessment tool.

In the following chapter, I will discuss and outline the history of education, theories in learning, assessment,

and computer technology. I also will review the literature on E-portfolios. In chapter three, I will discuss the methodology and more specifically, the methods used in the study and chapter four will provide a summary of the finding. In chapter five, I will discuss the impact developing an E-Portfolio on self-directed learning and computer technology skills and provide a conclusion and recommendations for future research.

CHAPTER II: LITERATURE REVIEW

The purpose of this study was to investigate how electronic portfolios (E-portfolios) impacted preservice teachers' self-directed learning (SDL) and computer technology skills (CTS). The chapter will begin with a review of the historical development of education. It continues with a discussion on assessment, learning, and computer technology in education.

History of Education

Today's higher education system is changes of educational practices throughout history. After World War I, secondary education grew until it became standard for almost all children, just as elementary school had in the 1800s (Pulliam, 1987). Higher education began to expand, especially in the years following World War II. This advance of the educational world raised new issues concerning the relationship of the school and the society. Changes in technology, the social order, economy, wars, and conflict over the meaning of democracy led to a re-evaluation of educational aims (Pulliam, 1987; Pulliam & Van Patten, 2003).

Higher Education

Society viewed schools as social ladders for individual and group improvement. With the exception of the

period of the great economic depression, college enrollments steadily increased, but the greatest explosion in the size and number of colleges quickly grew after World War II. Colleges have become more utilitarian and scientific in nature, although the liberal arts college is still a major American institution. With the addition of professional colleges, such as education, agriculture, engineering, commerce, and medicine, and with the organization of separate departments within colleges, higher education has become highly specialized (Pulliam & Van Patten, 2003).

A direct result of the expansion in higher education, which could not be accommodated by existing colleges, was the junior college or community college movement. Community colleges have provided the first two years of standard college education for many students, thus taking some of the pressure off four-year colleges and universities. Both the numbers of community colleges and universities have significantly increased during the last six decades (Pulliam, 1987).

According to *The Condition of Education: 2000*, the annual report released by the U.S. Department of Education's National Center for Education Statistics (NCES), more Americans are participating in education, from

preschoolers to adult learners. The report shows that trends in the performance of elementary and secondary students in reading, mathematics, and science have generally been positive over the past two decades. Postsecondary enrollments have increased because of the combined influence of higher rates of enrollment and growth in the number of 18- to 24-year olds, who constitute the traditional college-age population. By 1998, 37% of all Americans in the age group 18 to 24 were enrolled in college, up from 26% in 1980.

In 1999 to 2000, most of the older undergraduates, who were more likely to have family and work responsibilities, were concentrated in public two-year colleges; today these are called community colleges. Younger undergraduates were more likely to be enrolled in four-year institutions, which are called colleges or universities. Horn, Peter, and Rooney’s (2002) study reported that 56% of undergraduates in their 30s and 63% of those 40 or older attended community colleges, while 55% of those ages 19 to 23 were enrolled in four-year institutions. As more people get their education, society gains more qualified workers. As a result, parents want their children to meet or exceed their education level.

To serve people’s desire for learning, society needs more qualified teachers. Many different degree programs or majors are offered in the universities: art and sciences, business administration, nursing and health sciences, education, etc. Colleges of Education offer many degree programs, including Elementary Education, Secondary Education, Special Education, and etc. Students who take courses to be future teachers through teacher education program are often referred to as student teachers or preservice teachers. Teacher preparation programs have changed dramatically over the years (Ornstein & Levine, 1993).

Teacher Education

Many normal schools in the early 20th century were more like secondary schools than colleges. Large numbers of rural teachers were given certificates on the basis of passing examinations or on the strength of a year or two of college work. For years a shortage of teachers created a reluctance to enforce general standards of certification. Without exception, normal schools did become four-year colleges and most universities developed colleges of education. The 45 colleges for teachers in 1920 had grown to four times that number by 1940 (Pulliam, 1987).

The numbers and quality of normal schools improved very quickly. The colleges, with their classical curriculums, looked down on the normal schools because they did not consider education as a professional field. The normal schools defended teaching as a profession (Ornstein & Levine, 1993). Those schools attempted to provide the prospective teacher with a laboratory for learning, using model classrooms as a place to practice their new skills. After World War II, most teachers were prepared with a general or liberal college education, specialized knowledge of the field to be taught, professional courses including methods and psychology, and practice teaching. During this period, American teachers became better qualified to practice their profession (Pulliam & Van Patten, 2003).

And while today’s teachers are better qualified, there is still room for improvement. The education of American teachers is a national problem. Parents complain about the performance of teachers, university professors question their subject matter competence, administrators feel the universities certify people who cannot cope with school problems, and teachers themselves often feel ill prepared to work with their students (Pulliam & Van Patten, 2003). Researchers and scholars in the late 1900s reported that teacher training appears to make a difference in the

ability of teachers to affect student achievement. In operation, in America, the development and improvement of instructional skills were required. In 1972, the Commission of Public School Personnel Policies in Ohio reported that 78% of the teachers who had graduated from the 53 teacher education institutions in the state thought student teaching was the most valuable part of their preparation (Pulliam, 1987).

Since its beginnings, the development of education has expanded in significant ways. Most children received standard elementary and secondary education after World War I, and higher education began to expand in the years following World War II. A direct result of the expansion in higher education was the growth of community colleges. In the past six decades, the numbers of community colleges and universities have increased (Pulliam & Van Patten, 2003). This growth has included expansion of teacher education programs. And, because of the growth teacher, assessment techniques have been modified to meet the new demands of teacher education.

Assessment

The U.S. educational system began the assessment movement in the late 20th century. It had its supporters and detractors, but it was more embraced by legislators and

academic administrators. To evaluate those preservice teachers' effectiveness and efficiency is a formidable task. Assessment used on the national and local settings by the 1990s, such as for disciplines, workshops, and consultants. Assessment developed into every level of education (Boston, 2002). According to Fenton (1996),

> Assessment is the collection of relevant information that may be relied on for making decisions. Evaluation is the application of a standard and a decision-making system to assessing data to produce judgments about the amount and adequacy of the learning that has taken place (p. 20).

According to Jones (1994), assessment can be conducted many times throughout a program, and the two main categories of assessments are formative and summative. Formative assessment occurs when instructors receive information from the students in ways that enable students to enhance their learning or when students can engage in a similar, self-reflective process. For instance, to determine a better understanding of how much the students have learned to the instructors, students may give presentations after each section to summarize what they have learned and how they have learned. The presentations would be a formative assessment (Boston, 2002; Jones,

1994). Summative assessment can be used to assess attainment of the stated outcomes and is graded and counted toward the student's final mark. For example, if upon completion of a program students should have the knowledge to pass an accreditation test, taking the test would be summative in nature since it is based on the cumulative learning experience (Angelo & Cross, 1993).

Most higher education institutions assess the students' knowledge by giving tests or exams throughout the semester. These tests and exams can be in-class or take-home exams, and they often consist of multiple choice, true-false, or essay questions. Clarke, Madaus, Horn, and Ramos (2000) report that tests, which dominated in the first half of the 20th century, were challenged and there was a move towards 'alternative assessment' in the 1980s. Today's teacher education programs pay more attention to practical teaching experience. Traditionally, Grade Point Average (G.P.A.) and test scores were used as the only assessment tools; however, one of the most important developmental movements in today's teacher education programs is the use of alternative forms of assessment to evaluate student's learning. One of the popular forms of authentic assessment is the use of portfolios, which

facilitate both practical teaching experience and traditional academic evaluation measures.

Portfolios

For educational purposes, a portfolio is a purposeful collection of students' work that shows their effort, progress and achievement over a period of time. Ellsworth (2002) found that portfolios play an important role by providing a mechanism through which classroom teachers can come to a deeper understanding of their professional practice. She also found that the process of implementing portfolios in a culture of reflective practice and critical inquiry resulted in professional growth in four areas:(a) the preservice teachers' ability to effectively use portfolios; (b) their understanding of their students; (c) their ability to make informed improvements in their instructional practice; and (d) their understanding of the professional support that was necessary for the process to succeed. Ellsworth's research supports the conclusion that a portfolio is an accurate performance-based assessment tool. Specifically, her three-year case study discovered that although portfolios were not the only assessments used, school teachers felt that no other form of assessment could, by itself, provide such a comprehensive view of

individual learning and provide as much information for school teacher reflection.

The materials in a portfolio may vary according to the purpose of and audience for the portfolio. For example, a portfolio includes selected contents, the criteria for selection, valued judgments, and evidence of self-reflection (Krause, 1996; Paulson, Paulson, & Meyer, 1991). A portfolio is at the heart of a learner's demonstration, documentation and defense of his/her learning and ability, so the first audience for the portfolio is the author. It serves as a record of achievement. The portfolio has been designed with colleges, scholarship committees, future employers, and collaborators in mind (Jones, 1992, 1994; Loughran & Corrigan, 1995; Lyons, 1998).

Portfolios are also constructive instruments for authentic assessment for students (Baron & Collins, 1993; Read & Cafolla, 1999). The portfolio assessment process helps students develop reflective skills, establish relationships between courses and experiences, and promote faculty collaboration and communication (Benson & Walker de Felix, 2001; Galloway, 2002). Morin (1995) believes that preservice teacher portfolios strongly encourage the self-reflection process and allows teachers to demonstrate teaching effectiveness and growth. Further, the portfolio

process can “promote ownership of the learning process, foster reflection, enhance teaching, and provide concrete evidence of achievement” (Johnson, Kaplan, & Marsh, 1996, para. 50). This is espoused by Fingeret (1993) who found that portfolio assessment helps students learn to reflect on what they have learned and how they learn. According to Bergman (n.d.), developing portfolios is learner centered and adapts developmental needs and measures for a variety of educators. There are two platforms for portfolio production: paper-based and electronic-based.

Paper-based portfolios

While the benefits of using portfolios are worthwhile, traditional paper-based portfolios limit their effectiveness. Most traditional teacher education portfolios are organized into paper-based documents demonstrating each national or state standard using three-ring binders, with divided sections. A binder holds selected presentations, pictures and tapes for the students’ course work and student teaching development.

With traditional portfolios, the students are likely to work on and collect the assignments or projects at the last minute. Thus, opportunities and motivation to review, reflect, and revise on the project is limited. There is less chance for the learners to self-reflect on their

development over time. Another problem with this traditional method is that they take up lots of room and waste a lot of paper and time with boxes, binders, cassettes, pictures, and drawings. As a result of the drawbacks with traditional portfolios, electronic portfolios are becoming increasingly popular (Barrett, 1998; Follow; 1995).

Electronic portfolios (E-portfolios)

An electronic portfolio can be used for formative and summative assessment of students' assignments and required artifacts such as lesson plans, reflective journals, or projects. Improvement is the goal of formative and summative assessment. An E-portfolio allows preservice teachers to create a feedback section and invite their instructors and peers to respond to artifacts. Preservice teachers can use those responses to easily make modifications to their work. E-portfolios give users a sense of ownership, support collaboration, facilitate on-going self-evaluation, supply easy access of artifacts, and provide opportunities to revise and improve on earlier learning (Song, Scordias, Huang, & Hoagland, 2004, p. 2943). This ability to change enables teachers to reflect more on their own work and thus engage in on-going self-improvement.

With the on-going nature of the E-portfolio, students develop their portfolio artifacts little by little over an extended time. They are more likely to reflect on their projects from time to time. The information in the E-portfolios is stored on a computer hard drive, floppy disc, CD or other media and takes up very little physical space. Students use technology to collect and organize the documents and use multimedia artifacts in order to present a wide range of evidence of acquisition of appropriate standards (Barrett, 2000; Bergman, n.d.; Carney, 2001).

Good teachers take standards into account when they create their lesson. A standard represents a specific idea of what the teacher expects a student to recall, replicate, manipulate, understand, or demonstrate at some point down to the road, and how the teacher will know how close a student has come to meeting that standard. There is a new emphasis on standards over the last decade at the national, state, and local levels, which is he use of computer technology (NCATE, 1995).

Preservice teachers can create and maintain as many E-portfolios as they wish by using an E-portfolio program. They may wish to revise a portfolio they made earlier for academic purposes, re-certification or promotion purposes and later to present themselves effectively to prospective

employers. They can use the E-portfolio program to track and reflect upon their growth as a professional teacher.

In general, higher education has focused on accountability or improvement of assessment. There are many different formats of assessment: tests, exams, projects, presentations, and portfolios. Most educators believe assessment should be about improving students' learning and determining the quality of learning produced (Boston, 2002). In other words, learning still matters the most.

Learning

The term "learning" has been used to describe a product, a process or a function. As a product, the emphasis is on the outcome or results of a learning experience. As a process, the emphasis is on what takes place during a learning experience and as a function, the emphasis is on certain important aspects which are believed to help produce learning (Smith & Associates, 1990). However, Aker, Spaulding, Adams, and White (1984) had a different definition of learning, "the act of learning is a process rather than a product; in other words, learning is the process through which an individual acquires the facts, attitudes or skills that produce changes in behavior" (p. 4).

In the nature of learning, two philosophical traditions emerged from the writings of Plato and Aristotle that parallel the behavioral and cognitive traditions. The behaviorist saw that human behavior is powerfully shaped by its consequences, and it has been effective in training animals and helping human beings modify their behavior (Stanford Encyclopedia of Philosophy, n.d.). Behaviorism is dismissed by cognitive scientists developing intricate internal information processing models. And they believe "the behaviorists fell short of what is most important in education for most educators" (Hofstetter, 1997, para. 4). Bruning, Schraw, and Ronning (1995) borrow from the computer world in their definition of the goal of the cognitive movement in education, which is:

> A theoretical perspective that focuses on the realms of human perception, thought, and memory. It portrays learners as active processors of information--a metaphor borrowed from the computer world--and assigns critical roles to the knowledge and perspective students bring to their learning. What learners do to enrich information, in the view of cognitive psychology, determines the level of understanding they ultimately achieve. (p. 1)

Hofstetter (1997) states the key difference between these two views of learning is that the learner's perception thought process is the most important fact in the cognitive learning process, and the importance of the learning environment is emphasized in behavioral learning, based on the association of stimulus and response.

Perspectives on adult learning have changed dramatically over the decades. Cranton (1994) stated that "adult learning has been viewed as a process of being freed from the oppression of being illiterate, a means of gaining knowledge and skills, a way to satisfy learner needs, and a process of critical self-reflection that can lead to transformation"(p. 3). Research on adult learning indicates that teachers teach adults differently than children (Cahoon, 1995; King & Lawler, 2003; Merriam 2001; Mezirow & Associates, 2000). Adult learning is frequently spoken by adult educators as if it were a discretely separate domain, having little connection to learning in childhood or adolescence. The field of adult education has been commonly called andragogy (Knowles, 1975), a term that has been established in the literature as qualitatively different from the education of children - pedagogy (Cross, 1981; Knowles, 1975). Table_1 shows Knowles' assumptions for adult learning.

Table_1 Knowles' Andragogical Assumptions

Learner	Assumption
Concept of the Learner	During the process of maturation, a person moves from dependence toward increasing self-directedness, but at different rates for different people and in different dimensions of life. Adults have a deep psychological need to be generally self-directing, but they may be dependent in certain temporary situations.
Role of the Learner's Experience	As people grow and develop they accumulate an increasing reservoir of experience that becomes and increasingly rich resource for learning--for themselves and for others. Furthermore, people attach more meaning to learning they gain from experience than those they acquire passively. Accordingly, the primary techniques in education are experiential ones--laboratory experiments, discussion, problem-solving cases, field experiences, etc.
Readiness to Learn	People become ready to learn something when they experience a need to learn it in order to cope more satisfyingly with real-life tasks and problems.
Orientation to Learning	Learners see education as a process of developing increased competence to achieve their full potential in life. They want to be able to apply whatever knowledge and skill they gain today to living more effectively tomorrow. Accordingly, learning experiences should be organized around competency-development categories. People are performance-centered in their orientation to learning.

Note: Knowles (1980), Modern Practice of Adult Education: from Pedagogy to Andragogy

Knowles' definition of andragogy focuses on the teacher's role; his andragogical theory is based on

characteristics of the adult learner. His four assumptions are that as (a) individuals mature, their self-concept moves from that of a dependent personality toward one of increasing self-directedness; (b) they accumulate a growing reservoir of experience that becomes a rich resource for learning and a board base upon which they can relate new learning; (c) their readiness to learn becomes increasingly more oriented to the developmental tasks of their social roles and not the product of biological development and academic pressure; and (d) their time perspective changes from one of future application of knowledge to one of immediate application, giving them a problem-centered rather than subject-centered orientation to learning (Davenport, 1987; Darkenwald & Merriam, 1982; Knowles, 1980). Although there are several ways adult learns, four types of learning will be discussed in this section: self-directed learning, transformative learning, critical reflection, and incidental learning.

Self-Directed Learning

During the last three decades, self-directed learning (SDL) has been recognized as an important variable in adult learning. Knowles (1975), in his book, *Self-Directed Learning*, provided foundational definitions and assumptions about SDL. He stated SDL is “a process in which individuals

take the initiative, with or without the help of others, to diagnose their learning needs, formulate learning goals, identify resources for learning, select and implement learning strategies, and evaluate learning outcomes" (p18).

According to Merriam (2001), SDL has three goals: (a) learners taking the responsibility for their own learning; (b) the promotion of emancipatory learning and social action; and (c) the fostering of transformational learning. Brockett and Hiemstra's (1991) Personal Responsibility Orientation model (Figure 2) illustrates that in SDL, the learners accept responsibility for their own learning.

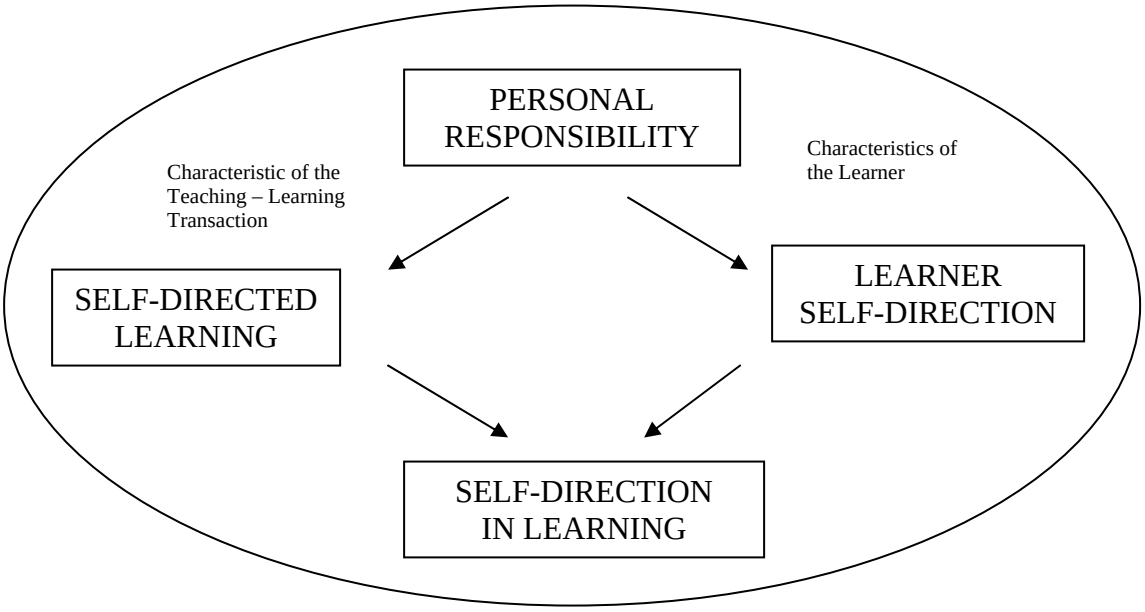

Figure 2: The "Personal Responsibility Orientation" Model

If SDL is intrinsically about self-determination, it should consequently have emancipatory potential. Maehl

(2000) counters this when he wonders whether SDL serves to “accommodate learners to prevailing social and political beliefs while conveying an illusion of individual control?” (p. 51). According to Vann (1996), there are studies that suggest self-direction is an orientation learned through socialization; in order for SDL to achieve its emancipatory potential, “certain political conditions must be in place” (Brookfield, 1993, p. 237). As such, organizational culture may limit learner control over the educational environment. Candy (1991) suggests that research on SDL was in a stalemate in the 1980s because of the absence of a consistent theoretical base, continued confusion over the term's meaning, and the use of inappropriate research paradigms. Brockett and Hiemstra (1994) suggest that SDL should prompt new thinking and research.

Kerka (1994) explored three myths associated with self-directed learning. First, adults are naturally self-directed. Adults’ capability for self-directed learning may vary widely. Second, self-direction is an all-or-nothing concept. In the learning process, the learners either turn toward self-direction or to a totally different learning concept. Adults have varying degrees of willingness to assume personal responsibility for learning. The third myth is that self-directed learning means learning in isolation.

The learners can learn in any settings if they are self-directed.

Hiemstra (1994) sums up in her study that self-directed learning should include the following:

- individual learners can become empowered to take increasingly more responsibility for various decisions
- self-direction is best viewed as a continuum or characteristic that exists to some degree in every person and learning situation
- self-directed learning does not necessarily mean all learning will take place in isolation from others
- self-directed learners appear able to transfer learning, in terms of both knowledge and study skill, from one situation to another
- self-directed study can involve various activities and resources, such as self-guided reading, participation in study groups, internships, electronic dialogues, and reflective writing activities
- effective roles for teachers in self-directed learning are possible, such as dialogue with

learners, securing resources, evaluating outcomes, and promoting critical thinking

- some educational institutions are finding ways to support self-directed study through open-learning programs, individualized study options, non-traditional course offerings, and other innovative programs. (para.3)

What makes SDL different from other learning is that the learners set their goals, the ways to achieve their goals, the evidence of accomplishment, and they determine how their goals will be evaluated (Caffarella, 1993). The learning depends not on the subject matter to be learned or on the instructional methods used; instead, self-directedness depends on who is in charge, who decides what should be learned, what resources should be used, and how the success of the effort should be measured.

People learn most naturally when they have a problem-solving experience related to real life issues; however, this learning experience needs to provide knowledge and skills in purposeful reflection (Dewey, 1986). By viewing learning as a construction of the individual, educators became interested in self-directedness through awareness of its central role in individual learning projects (Houle, 1961; Tough, 1971).

Guglielmino (1977) developed the Self-Directed Learning Readiness Scale (SDLRS), a self-reporting inventory, designed to assess a variety of characteristics supportive of self-directed learning. This instrument has been translated into many languages and used in more than 20 countries. It aims to measure self-directed readiness or to compare various self-directed learning aspects with numerous characteristics of adult learners. Several studies have been conducted which validate the SDLRS. The work of Abou-Rokbah (2002), Fullerton (1998), and Jones (1992) demonstrate that the SDLRS is reliable.

Adults often prefer to engage in self-directed learning, where the learner has some control over setting priorities and choosing content, materials, and methods. Self-directed learning can provide a foundation for transformative learning. During the process, individuals use critical thinking to challenge previous assumptions.

Transformational Learning

Transformational learning describes “how learners construe, validate, and reformulate the meaning of their experience” (Cranton, 1994, p. 22). It is the process of effecting change in a frame of reference (Cranton, 1994, 1996; Mezirow, 1991, 1995, 1997). Taylor (1998) believes that too much emphasis has been placed on the role of the

instructor at the expense of the role of the learner. Although it is difficult for transformative learning to occur without the instructor playing a key role, learners also have a responsibility for creating the learning environment and share the responsibility for constructing and creating the conditions under which transformative learning can occur. For learners to change their specific beliefs, attitudes, and emotional reaction, they must engage in critical reflection on their experiences, which in turn leads to a perspective transformation (Clark, 1993; Mezirow, 1991). To illustrate, Scordias (2004) conducted a study on how teachers change their beliefs during an online course and found that the greatest advantage of using on-line computer technology is that it facilitates learners' thoughtful responses. It is an important component to both learners and instructors to provide the time to reflect thoughtfully.

"Meaning is an interpretation, and to make meaning is to construe or interpret experience" (Mezirow, 1991, p. 4). During the process of making meaning, the learners experience uncomfortable and anxious feelings and behaviors until the knowledge or actions become meaningful. According to Mezirow (1991), learning is all about making meaning,

and this type of learning is identified as transformation. It involves five primary interacting contexts:

1. The frame of reference or meaning perspective in which the learning is embedded
2. The conditions of communication: language mastery; the codes that delimit categories, constructs, and labels; and the ways in which problematic assertions are validated
3. The line of action in which learning occurs
4. The self-image of the learner
5. The situation encountered, that is, the external circumstances within which an interpretation is made and remembered. (p.13-14)

The perspective of transformation is said to be triggered when an adult experiences a significant personal event, a personal crisis, or an internal search for meaning, labeled by Mezirow (1995) as a disorienting dilemma. This event may be a swift experience or one that is encountered over a long period of time. Research has identified two types of disorienting dilemma that were essential in initiating a change in perspective. First was an external event that forced an internal dilemma. Next was an internal disillusionment where expectations and solutions were not welcomed (Daley, 1997; Mezirow).

As described by Mezirow (1997), transformative learning occurs when individuals change their frames of reference by critically reflecting on their assumptions and beliefs and consciously making and implementing plans that bring about new ways of defining their worlds. Mezirow (1997) suggested that individuals can be transformed through a process of critical reflection in his transformative learning theory, and these dilemmas prompt critical reflection and the development of new ways of interpreting experiences.

Critical Reflection

Critical reflection is the process of analyzing, reconsidering and questioning experiences within a broad context of issues. For example, it could include the issues related to curriculum development, learning theories, or the use of the computer technology (Mezirow, 1991). “Critical reflection has often been used as a synonym for reflection on premises as distinct from reflection on assumptions pertaining to the content or process of problem solving” (p. 105). Evidence that adults are capable of this kind of learning can be found in developmental psychology. Critical reflection occurs when a person’s beliefs, goals, or expectations are put to meaningful questions (van Halen-Faber, 1997). In other words, the real significance of

adult learning appears when learners begin to re-evaluate their lives and to re-make them.

The purpose of critical reflection is to welcome new or develop old frames of reference that will lead to transformation. According to Swartz and Park (1994), “reflecting deeply on our own experiences and those of our students, we (in-service/preservice teachers) discover that explicating and exploring dilemmas is of itself a way of knowing” (p. 101). Critical thinking often becomes a cognitive process whereas critical reflection is both a cognitive and affective exercise. The attitude one carries often determines what one believes and if he or she will open his or her heart to transformation (Yorks & Marsick, 2000).

van Halen-Faber (1997) stated that critical reflection is a powerful confirmation of personal growth and development, which leads to transformative action. Assisting learners to become critically reflective of their assumptions and habits of mind is essential to adult education. Oftentimes adults are unaware of beliefs, assumptions, and ideologies that control their own decision-making process. “Acknowledging the importance of personal knowledge, personal relevance, personal responsibility, and personal voice results in reflective

practice, which ultimately leads to transformative action" (van Halen-Faber, p. 59).

Incidental Learning

Several research studies (Baskett, 1993; Cahoon, 1995; Garrick, 1998; Marsick & Watkins, 2001; Kerka, 2000) define incidental learning as a byproduct of some other activity, such as task accomplishment, interpersonal interaction, sensing the organizational culture, learning from mistakes, or even formal learning. When people learn incidentally, their learning may be taken for granted, tacit, or unconscious (Garrick, 1998; Marsick & Watkins, 2001). Incidental learning takes place wherever people have the need, motivation, and opportunity for learning. It often occurs in the workplace and when people are in the process of completing tasks on the computer (Baskett 1993; Cahoon, 1995; Mealman, 1993). For example, if a person wants to create a grade report on a computer program, he or she will learn the new skills while he or she is creating the grade report. Incidental learning happens in many ways: through observation, repetition, social interaction, problem solving, mistakes, assumptions, beliefs, and attributions (Cahoon, 1995; Marsick & Watkins, 1990; Rogers, 1997).

Marsick and Watkins (1990) conducted a study to see how incidental learning of human resource developers in the

professional field produces unintended consequences. The study shows that when people are going through a process that moves from “balance” to “out of balance”, “they experience dissonance and anxiety that create readiness of learning” (p. 177). Without this process, people are less likely to explore their beliefs and develop alternative actions. “The critical ingredient is the individual’s belief that the case accurately portrays a problem in his or her practice” (p.177). When this learning occurs in a group or in a public setting where others will help the learners deal with what really happened, most learners will more likely take the risk needed for the learning outcomes. And when they see mistakes and errors as learning materials rather than embarrassment, the learners are more effective.

The most important implication for incidental learning is the need for openness to the surprises that are characteristic of practice. Learning sometimes displays in unique, unexpected and conflicted situations, and this “involves reflecting on the “backtalk” from a situation, questioning the assumptions underlying knowing-in-action, and conducting on-the-spot experiments” (Marsick & Watkins, 1990, p. 149). This successful reflective learning experience involves openness in unsure and conflicted situations, and this openness is illustrated in the

unexpected learning from others. It seems essential for the learners to have openness and the experimental attitude to maximize the role of incidental learning (Kerka, 2000).

As adult learning becomes increasingly widespread in higher education, there are more opportunities to broaden our understanding of adult learning. The literature on adult learning is vast, but some of the more popular areas include self-directed learning, transformative learning, critical reflection, and incidental learning. Each concept provides basic assumptions about adults and their learning processes. By exploring these aspects of learning, technology is having an impact on the learning process.

Computer Technology

Computer technology has leaded in a new era of technology, bringing with it great promise and great concerns about the effect on children and adults. Although these issues are tended to be seen as being new, similar concerns have accompanied each new wave of technology throughout the past century: films in the 1900s, radio in the 1920s, and television in the 1940s.

Nearly everyone agrees that K-12 students must have access to computers and other technology in the classroom. Many believe these computer technologies are necessary

because competency in their use is an important feature of career preparation; others see equally important outcomes for civic participation. Most importantly, a growing research base confirms technology's potential for enhancing student achievement (NCATE, 1995). Today's teachers are employed to know how to use computer technology, but knowledge of and skill in the use of technology has not been necessary for all teachers. Many school teachers are aware of the impact of computer technology. Some voluntarily take some computer technology courses. Computer technology has become a daily tool that teachers cannot ignore during this progressive period of time. More and more learning activities operate with computer technology in education (Nie & Erbring, 2000; Vannatta, 2000).

Computer Literacy

Our increasingly technological society has created the necessity for universal computer technology literacy. The term "computer technology literacy" has been defined with a wide variety of meanings. Besser (1993) stated that to learn computer technology literacy is to be a good citizen because "be(ing) a productive member of society, an individual must know about computers" (p. 63). Bork (1993) also stated that to teach computer technology literacy is similar to teaching language: "everyone will need to be

computer literate in the society of the future because computers will be widely used in all activities” (p. 76). Computer technology has become a needed tool for people’s livelihood. According to Childers (2003),

> Using a computer is almost like driving a car. Some choose not to learn to drive at all, while most learn just the basics; others have an in-depth knowledge of the automobile and can do more than simply drive it. Then there is a final class, the professionals, who create and build the machines. (p. 5)

Computer technology literacy appears to have at least three components: (a) the ability to use a computer as a tool; (b) the ability to manipulate an application or learning to program; (c) and enough knowledge of the computer’s capabilities to make intelligent decisions regarding its social and political use (Goddard, 1983, p. 22). U.S. Department of Labor at Bureau of Labor Statistics (1999) conducted a study, *Computer Ownership Up Sharply in the 1990s* and found that 66% of American households where a person attended graduate school during the year of 1997 had a computer (See Figure 3). Many teacher education programs incorporate computer technology into the course curriculum.

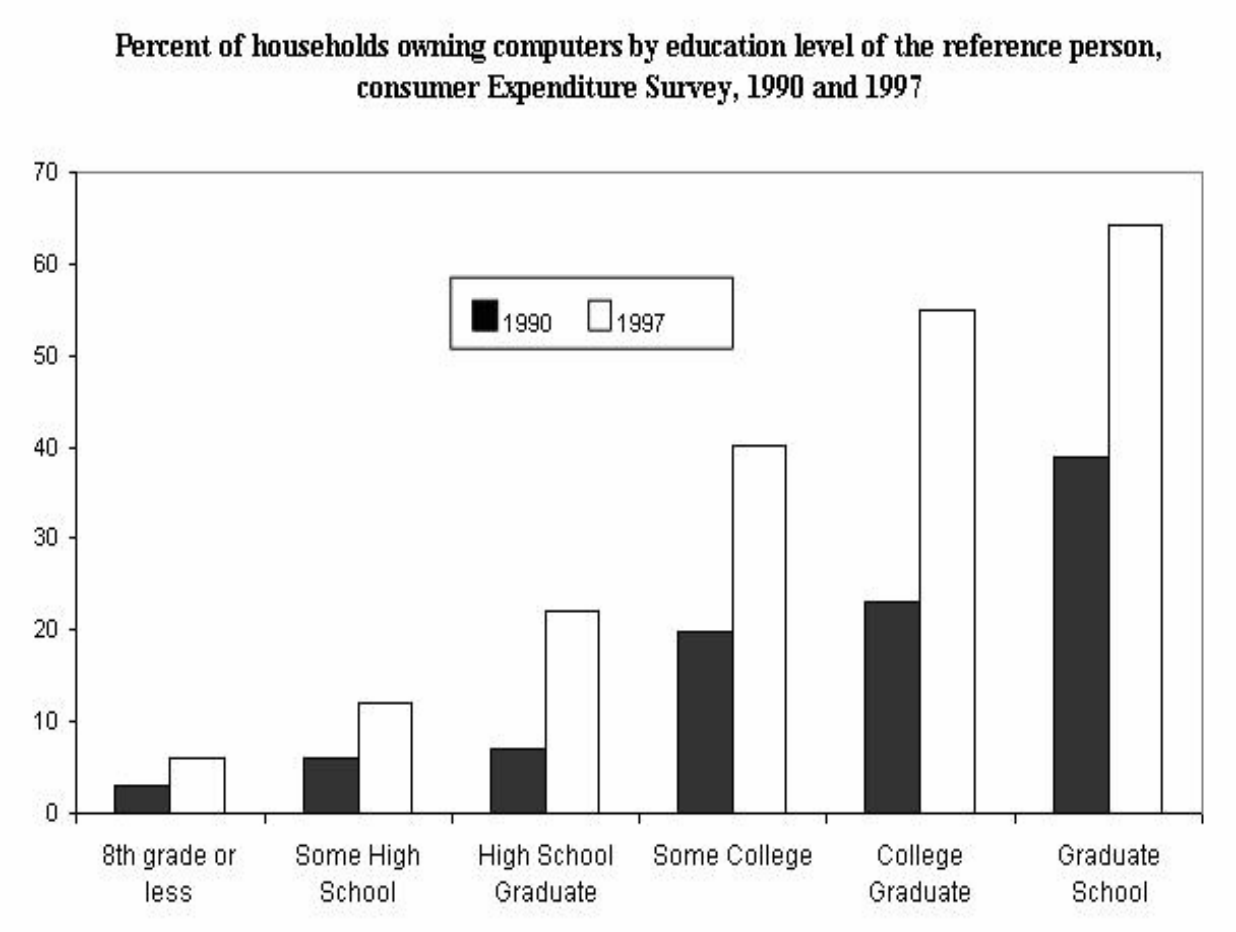

Figure 3 “Households Owning Computers”, resource from U.S. Department of Labor (1999)

Teacher Education and Computer Technology

There are two approaches for integrating computer technology in teacher education programs in the United States: computer courses and the computer technology integrated into education curriculum. The Office Technology Assessment (1995) reported that a majority of colleges of education required instructional technology or educational computing courses to preservice teachers. According to

Fulton (1989), teacher education faculty members had a direct influence on preservice teachers integrating technology in their professional practice and those preservice teachers had a direct influence on their K-12 students across the curriculum.

Brent (1992) recommended that a computer technology integrated approach was of great benefit to the preservice teachers so that they would be able to enhance their learning of content areas; model behaviors that teacher education programs expect them to use computer technology in their teaching; draw their attention to computer technology relevant to their discipline; and develop their professional repertoires by repeated use computer technology in the real context.

Due to the wide use of computer technology, technology literacy can no longer be relegated solely to computer teachers. Integration of technology skills will become a requirement, rather than an option, for Missouri classroom teachers. With a computer literacy rich environment, developmentally appropriate curriculum activities both on and off computer, and adaptations, all children are insured opportunities to develop emergent computer technology skills.

Summary

The main objective of this research study is to understand the relationship between self-directed learning, E-portfolios, and computer technology skills. Selected literature relevant to the purposes of this study were presented and reviewed in this chapter. It reviewed the historical development of education, assessment, learning, and computer technology. The discussion of teacher education, portfolios, type of learning, and computer technology literacy are covered in this chapter as well.

With the exception of the period of the great economic depression after World War II, college enrollments steadily increased and the greatest explosion in the size and number of colleges. With the organization of separate departments within colleges, higher education has becomes highly specialized. One area of specialization is Education. Colleges of Education can be found at most 4-year institutions. Despite the proliferation in teacher education programs, many criticize the education system.

Because the lack of the teachers performance, parents question about the quality of the teachers. In the late 1990, research and scholars reported that the teacher training show the difference in teachers' ability affect students' achievement. To evaluate those preservice

teachers' effectiveness and efficient is a formidable task. The certification exam may provide a minimum criterion, but it doesn't measure teachers' effectiveness.

Today's teacher education programs pay more attention to practical teaching experience. Traditionally, Grade Point Average (G.P.A.) and test scores were used as the only assessment tools; however, the use of alternative forms of assessment to evaluate student learning becomes one of the most important developmental movements in today's teacher education programs. One of the popular forms of authentic assessment is the use of portfolios. Portfolios facilitate both practical teaching experience and traditional academic evaluation measures. The portfolio assessment process helps students develop reflective skills, establishes relationships between courses and experiences, and promotes faculty collaboration and communication.

There are two platforms for portfolio production-paper-based and electronic-based. Most traditional teacher education portfolios are organized into paper-based documents demonstrating each national or state standard using three-ring binders, with divided sections. As a result of the drawbacks with traditional portfolios, electronic portfolios are becoming increasingly popular. An

E-portfolio allows preservice teachers to create a feedback section and invite their instructors and peers to respond to artifacts. Generally, higher education has focused on improvement of assessment. There are many different formats of assessment: tests, exams, projects, presentations, and portfolios. Most educators consider assessment should be about improving students' learning and determining the quality of learning produced. In other words, learning still matters the most.

Perspectives on adult learning have changed dramatically over the decades. It has been viewed as a means of gaining knowledge and learning new skills. It is a process of critical self-reflection that can lead to transformation (Cranton, 1994). There are different learning concepts such as self-directed learning, transformative learning, critical reflection, and incidental learning. Furthermore, there are basic assumptions about adults and their learning processes in a computer technology environment.

CHAPTER III - METHODS

The purpose of this study was to investigate how electronic portfolios (E-portfolios) impact preservice teachers' self-directed learning (SDL) and computer technology skills (CTS). I used a case study method for this research. Case study allows me to gather in-depth data to best address the questions that this study strives to answer:

1. Does developing E-portfolios impact preservice teachers' computer technology skills and/or self-directed learning?
    a. What is the impact, if any, of developing E-portfolios on preservice teachers' self-directed learning?
    b. What is the impact, if any, of creating E-portfolios on preservice teachers' computer technology skills?

Research Approach

A case study research method typically examines the interplay of all variables in order to provide as complete an understanding of an event or situation as possible (Merriam, 1998). In this study, each case was a unit of analysis. This type of comprehensive understanding is

arrived at through a process known as “thick description”, which involves interpreting the meaning of demographic and descriptive data such as cultural norms, community values, ingrained attitudes, and motives (Bachor, 2000; Merriam, 1998). All participants chosen for these case studies were in the same training class. To facilitate this multiple case studies research for an in-depth understanding of the situation and meaning, a qualitative research method was used in this study primarily. In addition, some descriptive quantitative analyses were performed to inform the case studies. Two survey instruments were used in this study. In many forms of case study research, data was collected through participants’ interviews, observations, and in this case, their completed E-portfolios. This research was designed as a collection of in-depth studies of the E-portfolios completed by five preservice teachers during their internship or student teaching semester at the University of Missouri-St. Louis (UMSL).

In this study, the participants were asked about their learning experiences with computer technology and E-portfolios as well as some general demographic information, such as their age, sex, educational background, and working experience. The purpose of the interviews in this study was to understand the participants’ self-directed learning

competency level, computer technology skills level, and to identify their demographics.

Participants

Five participants selected for this study were from internship and student teaching courses. All of the participants in this study were enrolled as students in the College of Education at UMSL. The teacher education program (TEP) had introduced the E-portfolio to its preservice teachers, making it a new learning tool for all traditional and non-traditional students. It was a critical time for me to gather the information for my research, because students in the TEP could choose to do their portfolios in a paper-based or electronic-based format during the fall semester of 2004, but all the preservice teachers' portfolios would be done electronically in the following fall semester. Participants in this study were non-traditional students; enrolled at UMSL to do their internship or student teaching, and who decided to do their portfolio electronically. I determined the participants from the list of students who were creating portfolios electronically as identified by the E-portfolio Committee (EPC).

Four levels of classes in the teacher education program at UMSL have the following foci: Level 1 - General Education Introduction; Level 2-Specific Pedagogy; Level 3-

Methods; and Level 4-Student Teaching. Internship students were mainly observing in the class while student teachers were mainly teaching in the class. All five participants included rich and detailed personal interviews, E-portfolio observations, and archived E-portfolio analysis.

Instrument

To facilitate an in-depth understanding of the meaning and situation in this study, the analysis of data were based from participants' questionnaires, interviews, observations, and their completed E-portfolios. Participants were asked to complete the self-directed learning readiness scale (SDLRS) and computer technology skills (CTS) questionnaires, participate in pre- and post-interviews, and to allow me to observe them developing their E-portfolios, as well as provide access to their completed E-portfolios.

Questionnaires

According to the American Statistical Association (n.d.), a "survey" can be anything from a short paper-and-pencil feedback form to an intensive one-on-one, in-depth interview. It is often used to describe a method of gathering information from a sample of individuals. This sample is the population being studied. In the current study, participants were asked to determine their SDLRS and

CTS levels. This approach allowed me to identify characteristics of a population from a group of individuals.

Interviews

Qualitative researchers (Berg, 2001; Patton, 1990) have defined multiple types of interviews. There are three basic approaches to in-depth interviewing that differ mainly in the extent to which the interview questions are determined and standardized beforehand: the *informal conversational interview*; *semi-structured interview*; and *the standardized open-ended interview*. *Semi-structured interview* were used in this study.

In an *informal conversational interview*, interview questions emerge from the immediate context and asked in the natural course of things. In a *semi-structured interview*, some of the questions and topics are predetermined. Many questions are formulated during the interview and the interview follows some checklist. This type of interview is more systematic and comprehensive because it delimits the issues to be taken up in interviewing a number of different people. A *standardized open-ended interview* uses exact wording and sequencing of questions. All interviewees are asked the same basic questions in the same order, but the questions are open

ended. Each approach serves a different purpose and has different preparation requirements. The most common way of deciding which type of interview to use is by determining the amount of structure desired. Moreover, within the list of topic or subject areas, the interviewer is free to pursue certain questions in greater depth (Berg, 2001; Merriam, 1998).

Observation

According to Berg (2001), Bogdan and Biklen (1992) and Merriam (1998) a well-planned observation includes: a framework and detailed field notes. In this study, the framework consisted of each participant completing a pre- and post SDLRS and CTS questionnaire, a pre-interview, numbers of observations, and finally a post-interview. All my participants were taped as they thought aloud during a work session of approximately one hour. In some situations I attempted to identify patterns, connections, and sequences.

In this particular study, the participants were asked to permit observations of them creating their E-portfolios. In conducting the observation, I followed the methodology suggested by Ericsson and Simon (1980). I asked each participant to verbalize thought processes as he or she engaged in creating an E-portfolio. Participants were

instructed not to attempt to make their reports more coherent by providing explanation. When the participant became engrossed in an activity and failed to self-report, I would prompt with the question, “why did you do that?” All the observations were videotaped and transcribed. The detailed field notes from the observations were also included in the appendix section.

Archive

Archival data collection involves using previously published or documented findings available in public records, private records or cultural artifacts, such as school records, personal journals, e-mails and letters, photos, videotapes and audiotapes, magazines, newspapers, and medical data. Using archival data allows a researcher to identify specific trends over time and to compare historical information from different time periods (Berg, 2001).

Participants’ E-portfolios were used as archived data in this study. After E-portfolios were completed, I conducted a careful analysis of them. I printed out each page of the E-portfolios so that I would be able to easily annotate and code them. I also examined the E-portfolios carefully online, following each hyperlink and taking notes as I did so. I looked at content, language, design, and the

manner in which the participants used features of the E-portfolio software to represent concepts. So, I would be able get a deeper understanding of how preservice teachers' self-directed learning skills and their computer technology skills were affected throughout the E-portfolio experience.

The Role of the Researcher

The role of the researcher was a part of the research instrument for data collection because I had to be dependent on and involved with participants over a period of time (Merriam, 1998). As a doctoral student at UMSL, I adopted a "learner" role in order to learn about the adult learners' characteristics in learning technology through the questions had asked. The participants' attitudes toward using E-portfolios allowed me to understand how adult learners learn differently.

Data Collection

Data were collected using a variety of sources to ensure that the same phenomena were explored from multiple perspectives, thus enhancing the reliability of the interpretation of the data collected. The principal data collection techniques used were questionnaires, interviews, observations, and archived data. Participants were asked to complete the questionnaires, participate in interviews,

allow me to observe them developing their E-portfolios, and provide access to their completed E-portfolios.

I contacted the EPC to identify those students who were doing their internship or student teaching and who had chosen to develop their portfolios electronically. Before and after the E-portfolio creation, I gave the pre- and post- questionnaires to those students to find out their demographic information, SDLRS scores, and CTS levels, so the participants could be purposely selected for this particular research study. Then I arranged an interview in the beginning of the semester with each participant. The participants were observed throughout the semester to get the detailed description of how they interacted with their E-portfolio experience. At the end of the semester, the participants completed a post-SDLRS and CTS to determine if their self-directed learning skills were impacted and to see if their CTS proficiency had increased or if they had learned any new CTS. Finally the participants were asked permission to access their completed E-portfolio. All data collection were transcribed and coded for analysis.

Self-directed Learning Readiness Scale

Each participant was asked to complete Guglielmino's (1977) Self-Directed Learning Readiness Scale (SDLRS) (see appendix B) as a pre- and post-questionnaire to identify

their self-directed learning competency level. It aimed to measure the extent to which individuals perceive themselves as possessing skills and attitudes frequently associated with self-direction in learning.

The content of the scale was based on a three-round Dephi survey of 14 experts including Knowles and Tough in the area of self-directed learning. SDLRS was a self-reporting questionnaire using a Likert scale, which asked for responses to 58 statements regarding learning preferences and attitudes toward learning. The instructions for administration asked that respondents not be told the name or exact purpose of the scale to avoid possible response bias. It was divided into five levels: low (58 - 176), below average (177 -201), average (202-226), above average (227-251), and high (252-290) (Guglielmino & Guglielmino, 1991). High scores indicate persons who prefer to determine their own learning needs, and plan and implement their own learning. In addition to the overall score, Guglielmino (1977) identified eight factors, which have been validated and supported with previous studies:

- self-concept as an effective learner
- openness to learning opportunities
- initiative and independence in learning

- acceptance of responsibility for one's own learning
- love of learning
- creativity
- ability to use basic study skills and problem-solving skills
- future orientation

The SDLRS has been used by hundreds of organizations and researchers, so it is worthy and trustworthy to be used as an instrument for reference. Abou-Rokbah (2002), Fullerton (1998), and Jones (1992) are a few of the researchers who have provided the SDLRS' reliability in their studies.

Long and Agyekum (1988) stated that the SDLRS is valid if it is used with young adults at a college level similar to those in Guglielmino's study. In this study, the participants are student teaching candidates at a four-year institution. The criteria will be consistent and so it was appropriate to use the SDLRS in this study. In order to establish reliability of the findings, an audit trail was implemented in this study by tracing methodological decisions, process of inquiry, analysis, and emergence of interpretation and findings.

Computer Technology Skills Questionnaire

I developed a two-page Computer Technology Skills (CTS) questionnaire. The initial questionnaire included seven sections: general computer technology, Microsoft Word, Excel, PowerPoint, Scanner, Internet searching, and E-mailing. Basically it asked students if they knew how to complete certain tasks within each of the seven sections. The EPC members at UMSL who were E-portfolio and computer technology experts were asked to review the questionnaire for validity. After a review from the EPC, one section, web design, was added to the pre-questionnaire and two sections, web design and E-portfolio program, were added to the post-questionnaire. Once I obtained their feedback, revisions were made and the final draft was developed.

All the basic skills of creating an UMSL E-portfolio were presented on the CTS questionnaire (see Appendix C). For example, students knew how to make a lesson plan in an E-portfolio program if they knew how to do it in a Microsoft word program. Before the participants had developed their E-portfolios, they were asked to identify their CTS by completing a pre-questionnaire. After they had completed their E-portfolio at the end of the semester, they were asked to fill out a post-questionnaire to

determine if they learned new CTS or increased proficiency with existing CTS.

Interviews

With case studies, data are manipulated through the human instrument rather than through some inanimate inventory or questionnaire (Berg, 2001). Semi-structured interviews were needed in this study because this type of interview provides a great deal of flexibility. The purpose of the interview in this study was to understand the learners' self-directed learning competency level, computer technology skills level, and E-portfolio experience. The participants were asked to give as many interviews as needed throughout the study.

At the initial interview, the participants were asked for general demographic information including their age, sex, educational background, occupation, work experience, technology experience, and E-portfolio experience (see appendix D). A post interview was given to each participant at the end of the semester regarding their experience of creating E-portfolios. The interviews were conducted at the E. Desmond Lee Technology and Learning Center (TLC) at UMSL. The TLC in the College of Education at the University of Missouri-St. Louis is an educational technology hothouse, which provides assistance, equipment, and

computer application programs related to education to faculty, in-service /preservice teachers, students, administrators, the community, and educational technology coordinators.

Each interview was 45-60 minutes in length. During the interview, the participant was audiotape recorded. The conversation was transcribed into written documents. Once the information was transcribed, I put it into themes.

Observations

In this particular study, the participants were observed creating their E-portfolio while at TLC. Field notes captured the moments of participants developing their E-portfolios. From the thick description of field notes, I was able to identify how participants were solving problems with their E-portfolios. This approach gave me a better understanding of how the participants developed their E-portfolios, their self-directed learning, and their computer technology skills.

Through the observations, I was able to confirm the information gathered from the participants' questionnaires and interviews. Preservice teachers had total freedom to spend time on doing their E-portfolio, so the observations took as long as the participants needed to meet their goals.

Archived Data

Participants' E-portfolios were used as archived data in this study. The participants were asked to provide a copy of their E-portfolios following each observation. For example, if one participant had decided to create a lesson plan in the E-portfolio program, he or she needed to provide a copy of it as archived data. The participants were also asked to allow me to view their completed E-portfolios at the end of the semester. This approach gave me a deeper understanding of how the preservice teachers made their decisions and how they learned during their E-portfolio experience.

Human Subjects Review

The study was approved as exempted upon presentation to the Office of Research Administration, Human Subjects committee at the University of Missouri-St. Louis. I completed the Human Participants Protection Education for Research Teams computer based training. The investigation took place in an educational setting--the teacher education program at the University of Missouri - St. Louis.

Trustworthiness

Lincoln and Guba (1985) suggested the concept of trustworthiness consists of three elements: credibility, transferability, and confirmability. These elements

parallel validity, generalizability, and objectivity. Each of the three criteria was applied to this study as follows:

Credibility - In order to establish credibility and confidence in the truth of findings, I implemented the following methods: extended engagement in order to have enough contact to overcome misrepresentations due to my impact on the study, persistent observation in order to identify critical events and relationships relevant to the topic gained through constant analysis by the researcher, triangulation by collecting information from different points of view to elicit the various constructions of reality existing in the context of inquiry, and member checks by allowing participants to verify all data and interpretations.

Transferability - The following method was implemented: thick description in order to provide significantly detailed setting, data, and findings. It allowed the readers to determine whether the findings from this study might apply to their own settings.

Confirmability - The documentation was preserved so that interpretations could be traced to their original sources.

Summary

This chapter outlined the design methodology that was used to investigate how E-portfolios impact preservice teachers' SDL and their CTS. It presented the research questions, methods, participants' selection, data collection, human subject review, and trustworthiness. I developed an instrument to analyze the CTS and used SDLRS to identify my participants' SDLR level. I also use the observation and the interviews for data collection, and I had to be dependent on and involved with my participants over a period of time. Meanwhile, I became learned about the adult learners' extent to which they learned technology through the research questions asked. The research study allowed me to understand the relation of E-portfolios and adult learners' self-directed learning and computer technology skills. The research findings will be discussed in chapter four.

CHAPTER IV: FINDINGS

Before I restate my research questions and present the findings of my study, I will first summarize where and when the potential participants are introduced to the E-portfolio. I will follow that information with a list of the technology that is introduced to the students in order for them to accomplish their E-portfolio.

All students in the Teacher Education program at University of Missouri-St. Louis (UMSL) are required to complete their portfolio electronically during their student teaching experience. The E-portfolio fulfills the requirements for teacher certification because the preservice teachers give evidence that they have met state standards. It is through the process of reflection, organization, and presentation of work in the E-portfolio that evaluators make this determination.

The technological expertise of the E-portfolio users in the workshops during my study varied, as no one had substantial knowledge and experience creating E-portfolios. In order to create a competent E-portfolio, the student needs to be able to use a variety of hardware and software. Hardware includes, at a minimum, use of a computer, a scanner and a digital camera with related software. Software includes, the E-portfolio program (a web-based

application), word-processing, web editing, browsing, and a slide presentation program. Many participants also discovered that they needed to use supplemental programs, such as Adobe Photoshop to modify images.

Research Questions

In designing and conducting this study, the main research question was: Does developing E-portfolios impact preservice teachers' computer technology skills and/or self-directed learning? Two secondary questions were: What is the impact, if any, of developing E-portfolios on preservice teachers' self-directed learning? And, what is the impact, if any, of creating E-portfolios on preservice teachers' computer technology skills?

Participants

Two internship students, Amy and Pauline, and three student teachers, Cory, Elise, and Sam participated in this study. Their ages ranged between 25 and 33 years. The participants considered themselves non-traditional students because they had other responsibilities in addition to attending school or they were pursuing the education degree as part of a career change. Pauline and Sam were Elementary Education majors and the other participants aspired to become Special Education teachers at the elementary school level. In this study, Amy and Pauline were required to

create course E-portfolios, while Elise, Sam and Cory were creating their certificate E-portfolios.

Internship participants

The two participants completing their internships were Amy and Pauline. Amy was a full-time student with a part-time job at a history museum. Amy had a smoother adjustment to the process of creating an E-portfolio because she had previously created an E-portfolio in a course called Methods of Teaching Social Studies earlier in her program. Amy was trying to improve upon her previous E-portfolio by adding and editing lesson plans and projects. She was “very glad” that she had learned some basic computer technology skills in the context of working on the course E-portfolio during that previous semester, so she could focus on the lesson plans and projects.

The other internship student was Pauline, a single mother with a three-year-old daughter. Pauline had the least experience, of all the participants in this study, in using computer technology. Because of her inexperience, she had to learn the technology, hardware and software, while she wrote her lesson plans and course projects. Unlike Amy, Pauline was resistant to the E-portfolio. For Pauline, the E-portfolio’s purpose was clearly to prepare for next semester’s student teaching requirement. The E-portfolio

was an assignment she had to complete in order to receive her degree. She struggled often as she learned the technology, but she succeeded in achieving her objective of completing an E-portfolio.

Student Teaching Participants

Elise had just gotten married and changed her career from a secretary to a teacher in special education. For Elise, video or multimedia would have made little difference in the value of her E-portfolio. She only liked to present her lessons over a projector. Her E-portfolio was the most basic of the five. For example, all her tests were in black and white and included no graphics. Due to not attending all the required E-portfolio workshops, Elise had limited desire to use more computer technologies for her E-portfolio creation.

Cory, majoring in special education, was an injured Marine and decided to change his career path becoming a teacher. He was both a full-time student and worked full time to support himself and pursue his education. Whereas Elise created her E-portfolio just to meet the requirements, Cory took the opposite course. Cory’s E-portfolio focused on: getting a job anywhere in the nation, demonstrating his computer technology skills, and meeting the Teacher Education Program’s requirement. Like the other

participants in this study, Cory was given an E-portfolio template. However, he prioritized its functions to show “a little more of his own personality”.

The last participant to be introduced is Sam, who was in his late twenties. He changed majors and became an elementary school teacher. After completing his E-portfolio, Sam reported he was “very satisfied” with his project. Unlike Pauline, who had the least computer technology experience, Sam once majored in computer science and was raised in a family with a strong computer technology background. This was his main factor in choosing computer science as a major. Sam with his advanced technology skills was quite successful in using the E-portfolio software application in ways integral to his E-portfolio. Sam thought education had always been a big part of his life, and he saw himself as a “lifelong learner who will always be learning through research, experience, and interaction with others.” This was another reason for him to become a teacher. He wanted to share his learning experience, and as an exchange, he learned more from his students.

Computer Technology Skills

When reflecting on what they had learned, all participants expressed that their computer technology

skills had improved and that they had learned practical skills in using computer technology as a tool in teaching, or learned to improve their teaching strategies. For example, searching for appropriate images on the Internet, posting images or photos to the E-portfolio, scanning the document or pictures and modifying the images were some of the things they did. Amy, Cory, and Sam also mentioned that they had learned to use video clips or PowerPoint presentations in their E-portfolio, which made them more likely to use those computer technologies and other sources more readily in the classroom.

All participants took the computer technology skill (CTS) assessment before and after they completed their E-portfolio project. From the analysis, it was evident that their computer skills had increased (see Table_2, p. 86). The participants demonstrated a wide range of computer technology skills/knowledge before using the E-portfolio application; however, their skill levels were much closer upon completion of the program. The CTS survey measured 32 skill levels divided into 7 categories in the pre-test (See Appendix C): General Skills, Word Processing, PowerPoint, Excel, Email accessing, Internet processing, and Web-design. In the post-test, the E-portfolio was added making a total of eight categories. The total skill levels were 39

(See Appendix F). The category of E-portfolio was added to the post-survey to determine whether the participants had learned new CTS or increased proficiency with existing CTS by creating their E-portfolios. Because there were 32 skill levels in the pre-test and 39 in the post-test, the participants' CTS levels are presented by using norm scores in order to make pre-post comparisons easier.

Table_2: Participants' CTS Levels

Participants	Amy		Pauline		Elise		Sam		Cory	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
General	6	6	6	6	6	6	6	6	6	6
Word	2	3	1	3	3	3	3	3	3	3
PowerPoint	3	3	1	4	2	3	4	4	3	4
Excel	1	1	0	1	1	1	3	3	1	1
E-mail	5	5	2	5	3	4	5	5	4	5
Internet	2	4	4	6	4	5	7	7	5	6
Web Design	1	4	0	2	0	2	2	4	2	2
E-portfolio	*	7	*	7	*	7	*	7	*	7
Total Score	20	33	18	34	19	31	30	39	24	34
Norm Score	0.62	0.84	0.56	0.87	0.59	0.79	0.93	1.00	0.75	0.87

Except Sam, four of the participants were surprised to realize that they had accidentally learned web-design skills while they created their E-portfolio project. Sam

was the only one who knew how to design a Web site before utilizing the E-portfolio, but he admitted that the experience of utilizing an E-portfolio improved his familiarity with computer technology skills.

The CTS pre-test results for all of the participants ranged from 18 to 30 (Table_2). After their E-portfolio development, Sam had the highest score, 39 of 39 skills; Pauline and Cory had the same score at 34; Amy's score was one point less at 33; and Elise had a score of 31.

As presented in Table_2, Amy's CTS norm score on her pre-test was 0.62, but she increased her norm score to 0.84 in the post-test. It indicates that she improved 5 levels of her basic CTS proficiency along with the skills of manipulating an E-portfolio application. Like Amy, the internship student, Pauline was one of the two who had the lower CTS scores on the pre-test, scores at 18; however, Pauline learned a lot of computer technology skills through the process of creating her own E-portfolio project. This indicates that Pauline increased 9 levels in the seven categories and learned the E-portfolio application. By the end of the semester, her CTS level was the same as Cory's. She was very surprised that she had learned that many skills through doing her E-portfolio. Unlike the others, Elise did not ask for any assistance during her E-portfolio

creation. Her CTS norm score on the pre-test was 0.56 and the post-test norm score was 0.87. The table presents that her basic CTS level increased 5 levels and she also indicated that she was capable of using E-portfolio application.

Both Sam and Cory had high scores on the CTS pre-test before creating their E-portfolio, so they only increased by minimum levels on the post-test. Due to Elise's busy student teaching schedule, she did not attend the workshops nor did she visit the TLC for any questions she may have had. She completed her E-portfolio entirely at home. As a result, this gave her more time to work on her E-portfolio. Consequently, it was primarily full of text and links. Elise explained in the interview,

> I do not have to come to UMSL to turn in my portfolio, and it really saved me a lot of traveling time. It was not as hard as I thought before. It actually saved me a lot of time. I modified some of the lesson plans I created before, and all I did was insert them into Livetext. By doing so, I was more and more familiar with the program, but one thing I was really scared about was that the program would crash. It happened last semester, and I just had my fingers crossed. I

> hoped someone can contact Livetext to make sure it works until my E-portfolio gets graded.

A couple participants in their reflection also emphasized the importance of teachers learning how to use computer technology as a tool in class. Cory noted,

> This [Computer technology] was just one of the numerous instructional strategies that I used to effectively encourage students' thinking and problem solving skills. I chose to use a child-centered lesson format, which allowed for the learners to disclose verbally what their knowledge of the subject matter was and was not. Through discussion I was able to replace misconceptions with correct concepts. I could informally assess student learning and facilitate new learning at the same time. The students got a chance to analyze other students' way of thinking and analyze their own way of thinking in reference to the election process and political affiliation.

Sam said,

> There is no one facet of life that is not tied to technology in some way. However, I also believe it is important to utilize technology in meaningful ways with a purpose. Simply using technology for technology's sake defeats the purpose. Technology

> should be used to make things easier and more efficient, not to make things more complicated. Often times, technology is taught in isolation of subject areas, rather than integrated across the curriculum. Not only will students need to understand how to use technology as tools, they also will need to know how to solve problems using these tools.

Along with Sam's point of view, Amy stated in her reflection, "Teachers need to keep up with (computer) technology and allow children to grow with the world, but at the same time, teach kids how to read along with various methods that motivates them and keeps them interested."

Except Pauline, four participants also felt that they were more willing to use computer technology as instructional techniques. They also felt more comfortable making mistakes. The E-portfolio seemed to provide a vehicle for these preservice teachers to use computer technology in the classroom. For example, Elise reported in the interview,

> The fact that I chose to create my certification portfolio via an electronic format demonstrates my understanding of the benefits of technology in my personal and professional life. I have increased my knowledge of technology through the practice and

development of my electronic certification portfolio. I understand the importance that (computer) technology plays in all careers and I will encourage my students to become aware of the prominent place (computer) technology plays in our society.

Amy wanted to become more familiar with the program application, so she could be ready for her student teaching next semester. She had learned to create a PowerPoint presentation, to take pictures with a digital camera, to scan documents, and to insert hyperlinks. She visited the TLC regularly to work on her E-portfolio, so that she could practice and manipulate the E-portfolio application. She explained, “I am doing my intern [ship] this semester, so for me, it is really just a great time to practice it, so I can be ready for my student teaching portfolio.”

Adopting new technology often causes anxiety to learners, as they have the power and responsibility for their work. Many preservice teachers set their goals very high, which caused some anxiety during the E-portfolio process as well. Cory decided to create his own E-portfolio without using the template EPC had provided. Amy was anxious at the beginning of the semester because it was a new application that she had only been using for one semester. But soon she remembered the skills she obtained

from the previous learning experience along with the TLC staff's help. The COE provides well-trained TLC staff to assist faculty members and students to smoothly adapt to the creation of E-portfolios. As the semester progressed, she asked fewer questions. By mid-term, she was confident enough to demonstrate how she manipulated the program that she created for her internship E-portfolio. She said,

> I was a little bit afraid of this E-portfolio in the beginning. It seems like such a big thing and it is a big thing, but it is very user friendly, easy to access, easy to actually check yourself if you are doing something right; they have spell check. They have people trained in the TLC to help you out if you need anything. And they also have the tutorial with Livetext (E-portfolio application program). If I need anything (help), I can go back to that.

Self-Directed Learning

A self-directed learner takes the initiative in formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. Amy evaluated her teaching strategies each time after the lesson by working on the reflective journals in her E-portfolio. Pauline asked for assistance from the E-

portfolio experts from the Technology and Learning Center (TLC), a computer technology resource learning center for faculty and students at the University of Missouri-St. Louis (UMSL). Although Elise had little desire to use the computer technology, she took the initiative to complete her portfolio electronically. Sam expressed the different academic disciplines thought to be interconnected and put that belief into practice. Cory was one of a few who liked to learn by participating in seminars for Special Education. He decided his E-portfolio appearance would be different from others in the Teacher Education program. Those who had a higher self-directed learning readiness (SDLR) level seemed to take the E-portfolio learning experience more personally.

The 58-item, Likert-type instrument, Self-Directed Learning Readiness Scale (SDLRS), was designed to assess a learner's readiness to engage in self-directed learning based on a self-report of attitudes, values, beliefs, and skills. It is divided into five levels: low (58 –176), below average (177 –201), average (202-226), above average (227-251), and high (252-290). Below are the participants' pre and post E-portfolio SDLRS results.

Table_3 Participants' Pre- and Post-SDLR Levels

Participants Type	Name	Pre-Test Scores & SDLR Level	Post-Test Scores & SDLR Level
IS	Amy	232 Above Ave (227-251)	237 Above Ave (227-251)
IS	Pauline	257 High (252-290)	266 High (252-290)
ST	Elise	217 Average (202-226)	219 Average (202-226)
ST	Sam	260 High (252-290)	268 High (252-290)
ST	Cory	268 High (252-290)	280 High (252-290)

Note: IS indicates Internship Student, and ST means Student Teacher

Table_3 shows that one internship participant, Pauline, and two student teachers, Sam and Cory, improved their SDLR 9 points, 8 points, and 12 points. Amy and Elise improved 5 points and 2 points on their SDLR after E-portfolio development. Amy's pre SDLR level was 232. After developing her E-portfolio, her SDLR increased 5 points. Although Pauline did not know how to create an E-portfolio initially, she was one of the participants who registered a high SDLR level with a score of 257. Pauline's post survey SDLR level was 266 after the E-portfolio development.

Elise, who had 217 on her pre-survey, increased her score to 219 in her post-test. Cory had the highest pre E-portfolio SDLR level 268, and his post SDLR level was 280. After creating his E-portfolio, Sam increased his pre E-portfolio SDLR level of 260 to 268 points.

In addition to commenting on creating an E-portfolio, quite a few participants said that they had gained other knowledge and skills. For instance, Cory and Sam said that the experience had taught them to take charge of and accept responsibility for their own work. They decide when they want to create their E-portfolios before the deadline, what artifacts to present, whoever the audience(s) will be, and what image they want the audiences to glean from reading their E-portfolios. Most of the participants' audience(s) was the school hiring administrators and/or the Teacher Education Evaluators.

Cory said,

> I know what the people who are gonna hire me want, that's what I know, and I am gonna give them what they want. Even if I don't like it. I learned that in the military. It's not really about me. It's about I give them their needs. And in the same process, I take care of myself. So if I go for a job, you are not really trying to please yourself, you try to please that

> person you want to impress. So I figure they will be impressed by the electronic portfolio, even thought I was not familiar with it.

Amy stated,

> I want my readers to see that I was able to include the work sample and the stuff I have done in the field, actual children's work that have come out of my lesson plans and pictures of me working with students.

However, quite a few participants considered the E-portfolio nice but also demanding because of its learner-centeredness and self-direction. For example, Cory stated,

> This experience gave me more responsibility of my work. I also learned that there's never enough time. I thought in the beginning that there was enough time to create the E-portfolio that I was supposed to do. That was not the case. When I took it easily and thought I had all the artifacts done, all I had to do was to place them in the (E-portfolio) program, but every time I read the lessons or papers I wrote from previous courses or for other classes, I would want to make some minor changes, and I ended up never getting it finished. So I was in a real hurry in the end. I want my portfolio to be 'tangible.'

Instead of learning the functions in the E-portfolio program, Amy and Elise (the two students with lower SDLR scores) just inserted their pre-service paper in the program. Most artifacts were only links to their word documents. The major reason for them was just to meet the requirement and/or to be certified.

E-portfolios

Two internship students needed to create course E-portfolios while the student teachers in this study were working on their certificate E-portfolios. The five participants had to define the purposes and primary audiences before they created their E-portfolio. Working on the E-portfolio gives students ownership. They can revise their E-portfolios to meet the different purposes, such as academic courses, student teaching presentation, and job hunting. Although all participants in this study had different purposes and audiences, they all wanted and needed to meet TEP requirements.

As Amy began her E-portfolio, she knew well that she needed to complete this project in order to receive the grade for her Internship semester. The composition of her primary reading audiences was her course instructors and her internship supervisor. She also wanted to be able to

use her E-portfolio to prepare her for the student teaching E-portfolio the following semester. Amy explained:

> Well, I wanted it to be a good learning experience for my next semester [of student teaching]. I heard it would be hard to do the student teaching at the same time while working through the E-portfolio. If I have a good foundation this semester, I think it would be easier for me while I am student teaching.

To meet the course requirement, Amy's E-portfolio purpose was to figure out who she was as a teacher. By the time she completed her E-portfolio, Amy was convinced of its value and she was thinking about herself as a teacher. She stated,

> During my internship, I learned that a lot of it isn't you; it's about the students. They have different reading styles, and what a teacher should do in order to help them read better. It actually took me awhile after I was done and sort out whom I am and what I need to do in order to become better for student teaching.

Pauline was one of the five participants who had no experience with the E-portfolio program. She had no idea how to create an E-portfolio before she began her internship semester, and she had limited exposure to

computer technology. As a beginner using the technology, she had to learn both hardware and software at the same time. Although she often struggled, she succeeded in achieving her objective, which was to meet TEP requirements.

Pauline had two purposes in constructing her E-portfolio: to become familiar with the E-portfolio program for next semester's professional certification E-portfolio and to meet the TEP requirements for her internship. She expressed her goals in this way:

> I am taking 12 hours, and one of them is my internship. We need to submit for our E-portfolio standards; and I just do the teachers' requirements for those. I really don't like it [E-portfolio], and the more I use it, the more I don't see it as being useful. It hasn't helped me and it gives me extra, more things to do. . . . All I want to do is to get through this semester and be ready for next semester's certificate E-portfolio.

As she began the semester, Pauline was resistant to the whole idea of E-portfolios. For her, the initial purpose of E-portfolios was clearly to meet the professors' requirements in order to pass her internship classes. She was using the E–portfolio application program for a better

grade in addition to preparing for next semester's certification E-portfolio. It was these goals that made the portfolio project somewhat more convincing for Pauline.

Constructing an E-portfolio was not something that Elise was eager to do. Her certificate E-portfolio had no special functions compared to others. She reported that she initially found it difficult to become motivated. It was only the pressure of deadlines in the TEP that kept her on task. Her purpose in doing the E-portfolio was simply to meet the program requirement, get the degree, and show that she had computer technology skills. Elise explained in the interview,

> It was really tough for me this semester. I have to work full time at school and do extra preparation for the teaching at home. I didn't have much time to work on my [E-] portfolio, but I am glad that I saved all my papers and projects that I have done throughout the program [TEP]. It saved me some time. All I did was go through my lesson plans, papers, and projects, and I selected the ones that satisfied the standards, then I made modifications. I think if I had used Livetext (E-portfolio program) from the first semester of the Teacher Education Program, it would save me more time and I can see the growth of myself as a teacher.

For Sam, creating his E-portfolio was to be up-to-date in today's information age. A secondary purpose was to meet the TEP's requirement. Sam explained in the interview,

> It [creating an E-portfolio] shows I am comfortable using technology. Um. . . It's easier. If I am looking at hiring someone that gives me a binder I will totally put it off versus going to this Web site and checking it out and it's all linkable versus flipping back and forth the binder. By flipping all the artifacts, I may be flipping a hundred times. That will just keep the hiring person annoyed. It's easier on the readers and it's easier on the person making it because technology is all around. It becomes more and more part of the daily lives you know. Ten years ago, people used cell phones and Beepers and now people have a PDA on their phone, and people have a camera on their phones. Everything is connected. Technology is not supposed to be used. It's to be something that helps you do something more effective or better. It's to improve something, not just to do it. You can use the technology in a wrong way and make it something harder just for the sake of using technology. But if you use it correctly, it becomes a time saver with kids of the different ways to read the information or

some kids are more visual learners while some are not. PowerPoint gives you opportunities to show the information on the desk.

Sam’s perspectives on teaching and learning spread through his E-portfolio. Sam wants his students to learn from his teaching. He hoped his audiences would form a positive image of him as one who had been very well prepared for teaching by the TEP of the College of Education. He also wanted to be perceived as a reflective person with strong views about education.

Sam’s choice of artifacts and how he presented them influenced how he authored his portfolio electronically. In his E-portfolio, Sam not only adeptly showed how computer technology can be a helpful tool in teaching and how students can learn lessons, but he also presented his progress during his student teaching. Sam is comfortable using technology as a tool. He did not find the process of constructing his portfolio difficult. In fact, upon reflection, he reported that Livetext, the E-portfolio program Teacher Education is using, had poor word tools such as spell check and font size, but other than that, Sam had a great productive experience. In the end, Sam was quite pleased with the manner in which he was able to express his ideas and images on his E-portfolio.

Early on, Cory was well aware of the need to complete his E-portfolio in order to receive his degree and get a job. His primary reading audience for his portfolio was the Teacher Education Evaluator and the EPC members. The school where Cory was student teaching actually hired him because of his ability to create an E-portfolio and complete the required tasks for that school. It was the goal of getting a job that made the E-portfolio project somewhat more pleasing for Cory. He explained in the interview:

> I know the people who's gonna hire me want (qualifications and skills), and I am gonna give them what they want, even if I don't like it. I learned this philosophy in the military. It's not really about me, but it's me meeting their needs. And in the same process, I take care of myself. So, if I am going for a job, I am not really trying to please myself, instead I'm trying to please and impress the hiring person. So I figure the electronic portfolio will impress them, even though I am not familiar with it.

Since he intended to use his portfolio as a job artifact, school principals and administrators were also an important reading audience for Cory. In his E-portfolio, he represented himself as a reflective teacher, and one who had the technology skills to develop the E-portfolio. Cory

also saw this E-portfolio development experience as a rehearsal for national certification. He explained,

> I thought I really didn't want to stay in Missouri, because I thought when I am done in a couple years of teaching, I want to do my graduate studies and move to Seattle so I think uh . ..I needed to do the E-portfolio as I told you. I found another motivation to help me stay motivated to do it. Yeah.

Cory has decided to continue to develop his portfolio electronically because it will not be only for an employer, but it will be for himself and the Teacher Education evaluators. Taking ownership of the E-portfolio has an important implications for Cory because he can decide who will be the viewers of his E-portfolio and with each different audience of viewers he has the ownership to make appropriate changes towards those audiences.

Cory understood the structure of his subject matter; therefore, he was able to question and explore multiple perspectives. He presented concepts in this same manner. He claimed in his reflection,

> I have taught lessons at numerous schools and different placements to include 2nd, 4th, 5th, 9th, and 10th grade. I feel like I have had to perform an enormous amount of research for each grade level to

> ensure that I taught at the respective cognitive levels of the different levels of learners. . . I had to acquire and solidify my knowledge base on presenting effective lessons. After instructing these lessons in the classroom environment, I found that there is always something that could have been planned and executed better.

Although the participants had a variety of reasons for creating the E-portfolios, flexibility and convenience appeared to be the two primary reasons for choosing it versus a paper portfolio. For example, they could create it at their own pace, without the time constraints of the classroom. They also had the convenience of working on the E-portfolio at another place. Amy noted,

> I thought it was a really good way to learn more since I didn’t have to go to the classroom as a full-time student, part-time worker. It’s just easier. You know, it [E-portfolio application] just takes my user name and password and I can do this from home … anytime I want to. And if I don’t have time to finish something, it will save my spot, and I like that a lot.

As a single mother, Pauline liked to work on her schoolwork after her daughter went to bed. And due to Elsie’s student

teaching schedule, she decided to complete her E-portfolio and submit it to the TEP without coming to UMSL.

Sam did not develop his E-portfolio throughout the semester since he was busy working on a major section for his E-portfolio. He worked on his E-portfolio several days before the deadline, but he was a person who worked well under pressure. Initially, he had in his mind to finish his “book unit”; in the meantime, he could use most of the components to meet the standards. He created this book unit to show the audiences and to help his students to learn. Sam said, “This book unit was the crowning achievement of my college career as an UMSL student.” This unit showed a variety of lesson plans that supported many different learning styles, and it also covered many subject areas: fine arts, social studies, mathematics, technology, and communication arts.

Cory, a Special Education teacher, received a job offer before the end of the semester. Cory’s awareness of his audience was apparent from the first moments of his interview. Cory spoke of his concerns about how “personal” his E-portfolio should be. His remarks seemed to indicate he wanted his readers to read his e-portfolio differently than other authors, because he created his own template

instead of using the template Teacher Education had provided. Cory noted,

> Yeah, there were some templates there, but I decided to create my own. So when I read mine, it wouldn't be anybody else's. It will be like this guy took some time. It wouldn't be easy for me. It will be organized but different than others. That will give me a little flavor, a little personality. That's what I decided to do. I think my readers will see me as a perfectionist; a person who really cares about what he does, a good person, at least a good teacher. My peers will think I have good relationships with other teachers.

Cory also made his E-portfolio a tool for reflective thinking. For Cory, teaching involves deep personal commitment; the E-portfolio reminds him of the commitment and helps him translate his knowledge and skills into teaching practice. Cory's E-portfolio experience taught him to be thoughtful about what he does and it taught him about moral aims of education. In his reflection, he noted,

> As a morally responsible teacher, I hope to guide the children that I educate towards the proper direction and prepare them as future active and educated citizens of America. I plan to give children experiences in education that will help them to

> partake in the American dream that has eluded so many of the citizens of our nation for generations. . . the morally responsible teacher in a democratic society has to facilitate learning that encourages problem solving and critical thinking.

The E-portfolio application was totally new to UMSL's College of Education, Teacher Education Program, and to its students. All of the faculty members of Teacher Education were adopting this program while the students were struggling with their E-portfolio development. The Electronic Portfolio Committee (EPC), a committee formed to assist the E-Portfolio's developmental movement in Teacher Education at the College of Education in UMSL, offered E-portfolio workshops to faculty and students to help implement this task more smoothly. In addition, the EPC visited classes to introduce and troubleshoot E-portfolio development. However, the Livetext E-portfolio application was not as stable as it should have been during that semester without spell check system and standardization for font size and style.

All of the participants responded similarly during the interviews. The predominant theme was the positive benefits of the E-portfolio even though most of the participants were somewhat skeptical at first. They were not sure if

they could meet the Teacher Education Program's requirements and learn the E-portfolio program sufficiently within one semester.

Generally, participants had two major concerns: lack of time and confidence. The three student teachers were simply concerned about the amount of time it would take to put together an E-portfolio since they had only learned to create one in two semesters. Secondly, Amy, Pauline, and Elise initially indicated that they lacked confidence in using the technology. They did not think they could master the use of the E-portfolio program. This was especially true for the student teachers. They had the additional stress of time because they not only needed to prepare for teaching lessons, but they also needed to learn how to create an E-portfolio with newly learned computer technology skills. To illustrate this point Cory stated,

> I think it was so much easier to do the paper (portfolio) due to time constraints. I teach 40 hours a week, lesson plan another 10 hours a week, then 5 hours of grading papers. I also work another job where I can make money, so it's like you work 50 hours for free and then you have to find a job to make money. By the end of the week, I have 2 days to complete the

> portfolio and it's like how do they expect us to get it done correctly and right away. You know.

Along those same lines, Sam reported,

> I kind of just thought about it [E-portfolio] for a long time. Actually, I didn't start on it until (a week before) Friday. . . I also have another class at UMSL that I have a presentation (as final) last Wednesday. I want to complete my final presentation before the E-portfolio project.

According to Elise,

> I felt like I had no experience with the E-portfolio (at the beginning of the semester), but compared to some of my classmates, I realized, oh, I do have more experience than other people. I use the computer for. . . you know we always have a computer in the house. And I do know how to use the equipment, you know, like the scanners, the fax machines, and the peripheral equipments.

Summary

This chapter presented the findings from the research study. Amy, Pauline, Elise, Cory, and Sam's SDL and CTS levels were all increased after creating their E-portfolios. Amy had more confidence developing her E-portfolio since she had learned the application in the

previous semester, and her main focus on her Internship semester was to manipulate the E-portfolio application well to be ready for her next student teaching semester.

Pauline did not know many computer skills before the E-portfolio development and hated the technology. She commented that she would like to create an E-portfolio for her own sake and would like to be ready for next semester's student teaching certificated E-portfolio. She was very surprised about incidentally learning computer technology skills as a result of creating an E-portfolio. Elise's E-portfolio learning experience showed the convenience of computer technology. She created her E-portfolio entirely at home and turned it in to the Teacher Education Program electronically, so she could fully focus on her students teaching.

Cory had set his E-portfolio with multiple purposes. He did not use the template that EPC made. He created his own, and he wanted his E-portfolio to be viewed nationwide along with meeting the requirement. Sam viewed himself as a lifelong learner, so he wanted his E-portfolio development to be a continual learning progress. This type of inquiry learning approach to students' professional development helps those preservice teachers reflect on project-based learning for their future students.

Pauline, who had a high level of self-directed learning readiness, often accessed the TLC, and she was the one who improved her CTS the most of all participants. Amy, Sam, and Cory also accessed the TLC, but Elise did not. Elise's SDLRS level was the lowest, and her E-portfolio was very plain. However, Elise did improve her CTS level after creating an E-portfolio, the result of using some computer technology by increasing her skills in E-mail, Internet, and Web Design. This result may have been because her SDL was average and she simply had to make the kind of moderate increases.

In chapter five, I will discuss the impact developing an E-Portfolio on self-directed learning and computer technology skills. I will conclude it by talking about the implications of the findings and suggestions for further research areas.

Chapter V: Discussion and Implications

The purpose of this research study was to investigate how developing E-portfolios impact preservice teachers' self-directed learning (SDL) and computer technology skills (CTS). The main research question was: Does developing an E-portfolio impact computer technology skills and/or self-directed learning? Two secondary questions were: What is the impact, if any, of developing E-portfolios on preservice teachers' self-directed learning? And, what is the impact, if any, of creating E-portfolios on preservice teachers' computer technology skills?

Two internship students and three student teachers participated in this study. Qualitative methods as well as some descriptive quantitative analyses were used. Based on the analysis of data questionnaires, interviews, observations, and completed E-portfolios, I will discuss what the findings revealed. I will begin with the discussion of the participants' self-directed learning Readiness (SDLR) and CTS levels. Next, I will explain how developing an E-portfolio impacted their SDLR and CTS. I will conclude with the implications and recommendations for future studies.

Self-Directed Learning

The analysis of the material from the methodological framework revealed that SDL was guided by a natural, problem-solving setting; while recognition of a problem was answered more through the states of consciousness. According to Caffarella (1993), what makes SDL different from other learning is the learners set their goals, the ways to achieve their goals, the evidence of accomplishment, and the evaluation.

As SDL suggests, the participants were in charge of their own learning in their E-portfolio creation. They each determined their E-portfolio purposes and audiences, accessed assistance from the staff of the Technology and Learning Center (TLC), decided how they would compose their E-portfolio, and determined the materials to be used for the evaluation of their E-portfolio. Self-directed does not does depend on the subject matter to be learned or on the instructional methods used. Instead, it depends on who is in charge, who decides what should be learned, who should learn it, what methods and resources should be used, and how the success of the effort should be measured. Some researchers (Mocker & Spears, 1982; Vann, 1996) have pointed out that SDL could be best viewed as a continuum that exists to some level or degree in each individual’s

learning situation. For example, although Amy, an internship student, increased her SDLR by a small amount after creating her course E-portfolio, she and Pauline, another internship student, had more potential to have improvement on their SDLR. They both would make their certificate E-portfolio the following semester during their student teaching. With their positive learning attitudes and repeated learning experience, Pauline and Amy might increase their SDLR levels because self-directed learning readiness results in longer-term recall.

Posner (1991) conducted a study of high school students' self-directed learning. The students were asked to complete the “personally challenging self-directed projects” called Passages (p.3). These projects demonstrated students' abilities to use self-directed skills they had developed in the within the five stages. Students were divided into different stages. Whoever completed the requirement in one stage would move to the next stage. At the final stage, students were required to write a narrative paper of their growth in personal, social, and intellectual domains as record of their school experience in addition to their required Passages. The students who had repeated the learning experience (Passages) displayed significantly more positive self-

directed characteristics and attitudes than those who only completed the Passages once.

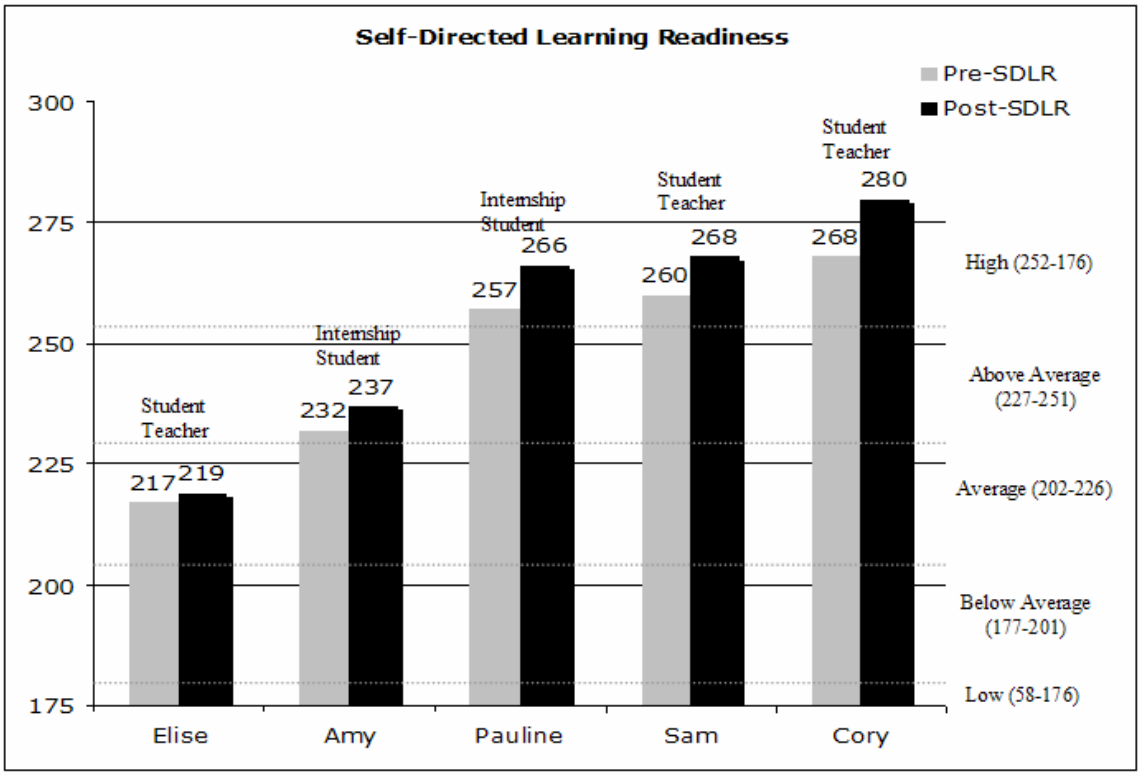

Figure 4 Participants' Pre- and Post-SDLR levels

Amy, Pauline, Elise, Sam, and Cory had varied levels on their SDLR (see figure 4). Pauline, Sam and Cory were in the high level of the SDLR. Amy's SDLR level was above average with a 5-point increase. Elise had the lowest SDLR level of the five and an increase of 2 points after developing her E-portfolio. Pauline's SDLR increased 9 points by the end of the semester. Cory's SDLR increased 12 points, and Sam's was 8 points higher than his pre-SDLR. Cory had the highest SDLR level of the five and he had the remarkable increase on his SDLR after creating his E-

portfolio. Cory had done his course E-portfolio during his internship semester, and this was his second E-portfolio.

With a higher level of SDLR, two internship students, Pauline and Amy had more potential for improving their CTS after their E-portfolio experience. For example, Amy was introduced to creating an E-portfolio earlier in her program. She created her first version of an E-portfolio for course purposes, so she did not have to create an entire E-portfolio from scratch the semester when this study was conducted. While others were adopting the E-portfolio application and preparing materials for the first time, Amy modified a couple of previous projects and papers from her first E-portfolio. Meanwhile, she focused on the reflective materials for evaluation and used the TLC staff for assistance. Hiemstra's (1994) study also showed that self-direction is a characteristic that exists to some degree in every person and learning situation and self-directed study can involve various activities and resources, such as internships, electronic dialogues, and reflective writing activities. The students were asked to modify and improve their artifacts throughout the semester.

Computer Technology Skills

Amy's CTS level was average. Pauline and Elise were the two participants who had the lowest CTS before creating

their E-portfolios. Sam and Cory scored very high on their CTS pre-tests. Although Pauline's CTS level was very low at the beginning of the semester, her CTS level increased tremendously after the E-portfolio creation (see Figure 5).

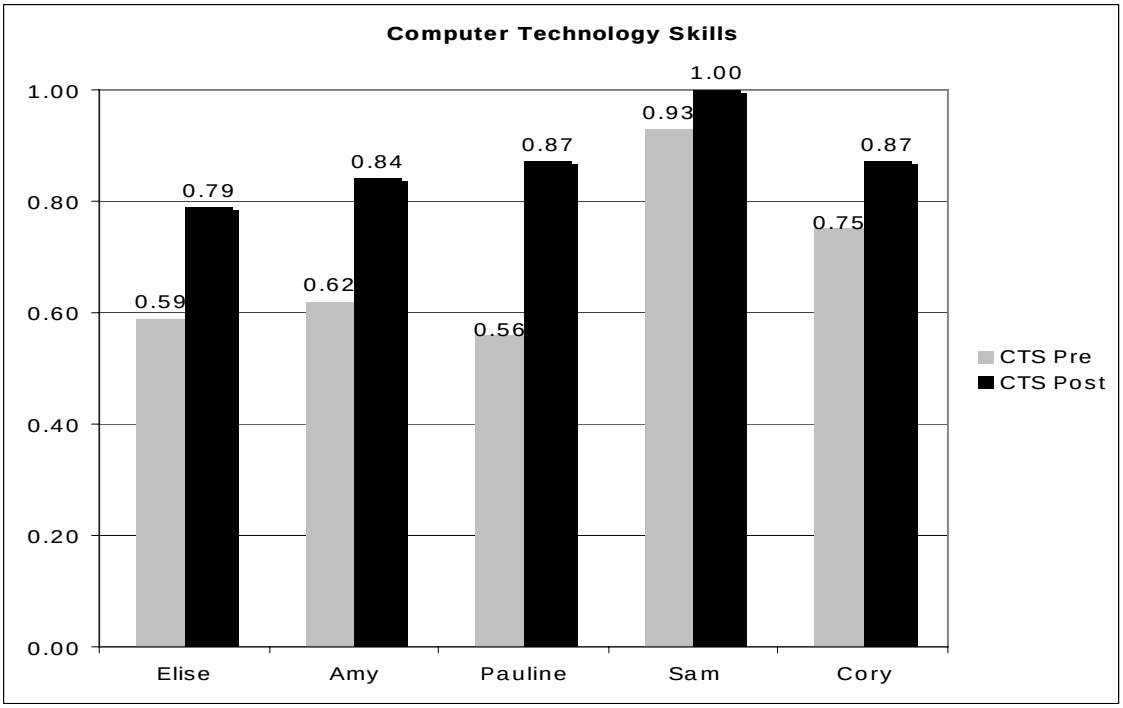

Figure 5 Participants' Pre- and Post-CTS levels

Cory and Sam had very high levels of their CTS on both pre- and post-tests, so there was little room for improvement. Sam and Cory prepared their E-portfolios using many types of multi-media applications. In addition, they both used computer technology tools into their teaching. While Sam's CTS improvement was minimal, it still improved resulting in a perfect score on his CTS post-test. Compared

to Amy and Pauline, Elise had only a slight increase in her CTS level by the end of the semester (see Figure 5).

Bork (1993) stated that to teach computer technology literacy is similar to teaching languages, and computer technology has become a needed tool for people's livelihood. Some teachers see computer technology as a lesson, but Sam saw it as a tool. The curriculum he exhibited in his E-portfolio was innovative. In his reflection journal, he revealed that he allowed his students to access a Web site from his E-portfolio thereby using his E-portfolio as a teaching tool in class. Figure 5 (p. 118) showed Sam had the highest CTS on pre- and post-tests, and as a result his E-portfolio was created more proficiently. Sam included many projects and images he did with his class using computer technology as a tool, such as a website he created for the Social Studies class, a powerpoint presentation on the subject and material to the class, and students' work scanned into jpg or pdf format, just to name few. According to Fulton (1989), preservice teachers had a directed influence on their K-12 students across the instructional technology curriculum. Interestingly, Sam reportedly transferred what he learned from the Teacher Education Program (TEP) into his own classroom. He took the initiative to involve his students

in the learning process and merge the practice into his student teaching.

The Impact of an E-portfolio on SDL and CTS

An E-portfolio can be the beginning of a program for continuing professional development, a device used to get a job, or a way to learn computer technology skills (Song, Scordias, Huang, & Hoagland, 2004). All the participants in this study began their E-portfolio with the immediate purpose of fulfilling the TEP requirements in order to receive their degree to be certified teachers and to show the hiring personnel their CTS. This approach appeared to foster these preservice teachers' SDL in terms of teaching them instructional strategies and giving them an opportunity for taking responsibility for, and taking charge of, their teaching. Additionally, it appears that students' participation in the E-portfolio process improved their computer technology proficiency.

Two internship students, Amy and Pauline, had very different results on their levels of SDLR and CTS after developing their E-portfolios. Amy's SDLR and CTS levels were both in the above average range. Before creating an E-portfolio, Amy's initial SDLR level was 232 and the norm score of her CTS was 0.62; however, after the E-portfolio development, her post-SDLR level was 237 and CTS norm score

was 0.84, a moderate increase in both cases (see Figure 4 and 5, p. 116 and p.118).

In Hiemstra's (1994) study, he described various ways of the learning environment, such as learning contracts, support groups, and computer-assisted learning, effect individuals' self-directedness and facilitate them to achieve their own learning goals. Even though Amy's SDLR and CTS levels were only increased slightly, her success showed in the participation of E-portfolio creation in terms of her computer technology proficiency and self-directedness.

The other internship student, Pauline, was one of the three participants with a high SDLR and a low CTS score before creating an E-portfolio. Yet, she was the one out of five who had experienced the largest gain with her CTS level after the E-portfolio creation (see Figure 6, p.122). Pauline's SDLR was higher than Amy's, so her self-directedness affected more on her learning. Pauline increased 9 points on her SDLR post-test, and she also increased 0.31 on her CTS post-test. Pauline took the initiative to develop an E-portfolio, and this computer-assisted learning environment enhanced her computer technology proficiency.

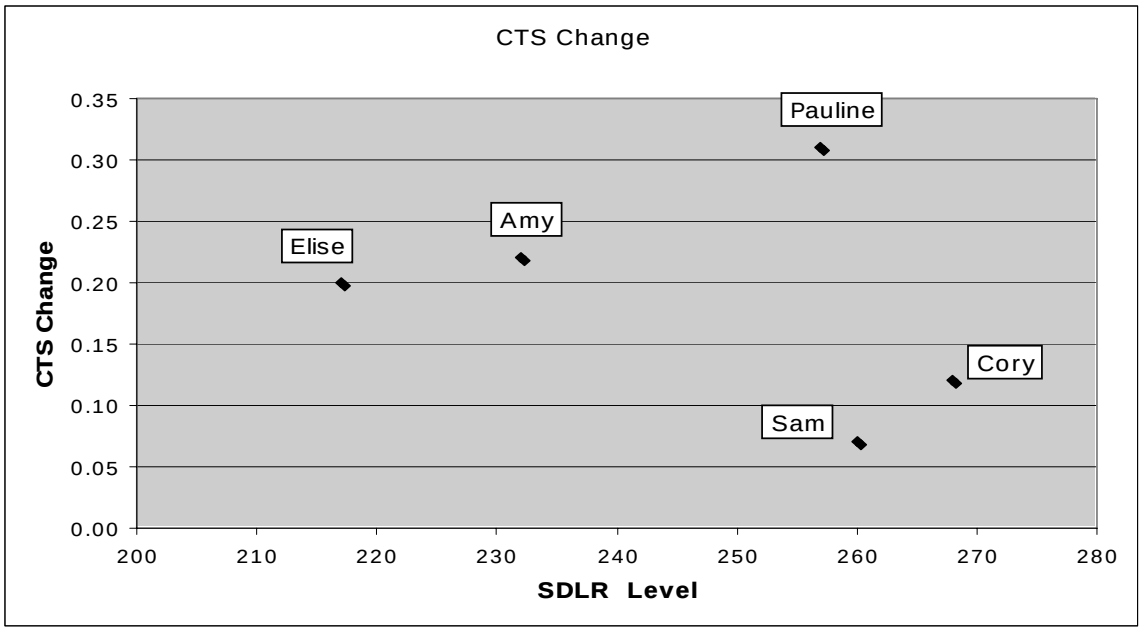

Figure 6 Participants' CTS change

While there were some individuals who had their SDLR and CTS increases, there were others who did not. For example, one student teacher, Elise, had the lowest SDLRS level of all on her pre- and post-tests. She only increased by 2 points on her SDLR level with a CTS norm score of 0.22 after the E-portfolio creation. Sam and Cory, the other two student teachers, both had high levels of SDLR and CTS. They both were in the top range, so there was not much room for improvement. Sam's CTS improvement was minimal because a perfect score was the best he could have done (see Figure 4, p.116 & Figure 5, p.118).

Although Cory and Sam both only increased the smallest amount of CTS after the E-portfolio creation, the

consequence of their E-portfolio development could not be ignored. They both included computer technology as a tool into their teaching. They transform their knowledge and skills on computer technology into teaching.

Impact on SDL

Both Guglielmino (1993) and Hassan (1981) reported a strong positive relationship between high levels of SDLR and high levels of performance at work or on learning. Sam, Cory, and Pauline had high levels of SDLR, and they all had high levels of performance at their student teaching or on the learning. Cory and Sam bring their skills and knowledge to their teaching, and Pauline gained the most CTS through creating her E-portfolio. Their self-directedness helped them be able to transfer their learning, in terms of knowledge and skills on computer technology, from one situation to another.

Pauline had one of the higher SDLR levels, and Amy’s was in the above average range. They were both in their internship semester and they both decided to do their portfolio electronically. It took some time for Amy to get used to the application, but she did not hesitate to ask for help from her instructors or the TLC assistants.

Some studies (Baskett, 1993; Brockett & Hiemstra 1991; Cross, 1981) have shown that techniques such as field

experience or problem solving can best facilitate self-directed learning. Learners have choices how they want to learn and what they want to learn; they are responsible for accepting any consequences of their thoughts and actions as learners.

Impact on CTS

Pauline was one of the two participants who had the weaker computer technology skills. So, it was not surprising that she took the initiative to come forward and asked for assistance from the TLC staff and learned how to manipulate the E-portfolio application. She accessed the TLC a minimum of twice a week to ask questions; however, the majority of her E-portfolio work was completed at home. By the end of the semester, she had improved her CTS tremendously. She was very surprised by the results.

Unlike Pauline, Elise did not seek any assistance from the TLC when she composed her E-portfolio. And, she did not attend any E-portfolio workshops. As a result, her E-portfolio was not as elaborate as other participants'. By the end of the semester, she had the lowest CTS level of all. Elise had the lowest SDLR level and had the weaker CTS level of all participants in the study. Nonetheless, Elise wanted to create her portfolio electronically to

demonstrate to the school administrators her abilities to use computer technology as a tool into her curriculum.

Elise was totally motivated to complete the E-portfolio and to earn a degree, along with gaining competence with computer technology. She was unable to take advantage from the TLC staff due to her busy schedule. As a result, her E-portfolio was completed and submitted electronically to the University. Her E-portfolio was not as vivid as other participants, but it was consistent with her purpose which was to meet TEP requirements. Even though her E-portfolio was not as elaborate as other participants, she still gained some CTS by utilizing the E-portfolio application.

Except for Elise, all of the participants demonstrated great CTS during their internship/student teaching and showed their abilities to utilize multimedia technologies. All five participants used hyper-textual links to show explicitly how a given artifact related back to the standards or their educational philosophies. Sam provided, for each of his lessons, both internal links to the goals and outside links to Missouri state standards. Cory and Amy pointed out that it was possible to electronically create and formulate whatever images or ideas came into their

minds. Cory reported that anyone can produce a professional-looking document with basic CTS.

E-portfolios at UMSL

Choosing to do an E-portfolio posed some immediate constraints for the study participants. Not all participants took advantage of the E-Portfolio Committee (EPC), which was available for help and questions during the E-portfolio workshops. First, the E-portfolio application was new to the students and their instructors. Second, not everyone in the TEP at UMSL was well trained, so they often gave out the wrong direction. Third, there was no clear instruction between EPC and the TEP, so the participants did not know which directions to follow.

There were three student teachers and two internship students in the study. Student teachers were required to attend the E-portfolio workshops, and internship students could get assistance from their classes. However, not every student teacher was aware of their required attendance for the three workshops, and two of the participants, Cory and Elise, did not know there was a template available until the end of the semester.

Creating an E-portfolio offered the opportunity to communicate to audiences globally. However, there is an

insecurity of revealing one's knowledge and information on the web to unknown audiences.

Implications and Recommendations

This study showed the changes in the participants' SDLR and CTS levels were increased after completing their E-portfolios. The data also showed participants' E-portfolio use enhanced their computer technology proficiency and their self-directed learning readiness. But, on the basis of this study, we can neither generalize to all E-portfolios authored by preservice teachers in all colleges of education, nor to teacher E-portfolios in general. Other E-portfolio authors operate in settings with different cultural artifacts. However, the study contributes a better understanding of the possible impact of learners' E-portfolios' use has on preservice teachers' computer technology proficiency and self direction. Thus, the study contributes to a developing body of research on E-portfolios, self-directed learning, and computer technology skills. With E-portfolio implementation in the TEP and many non-traditional learners going back to school, the study also has implications for research in the field of adult learning, Computer Technology, and Teacher Education.

Creating an E-portfolio is not for meeting TEP's requirement only. Telling preservice teachers that their E-portfolio will be useful for getting a job and class teaching; on the other hand, motivates them to accomplish the task, but can undermine the E-portfolio's usefulness as a self-directed learning tool and as a tool to gain computer technology literacy in a long period of time.

E-portfolios give two ways to represent and communicate teachers' knowledge: computer technology tools provide the capability to combine multiple forms of media in one document and communicate ideas to a broad audience via the Internet. These capabilities may enable teachers to capture their knowledge of practice and share it in ways not previously possible. A study done by Barrett (2000) on Electronic teaching portfolio showed teachers with rich multimedia technology literacy created rich representations of what they do and know in their classrooms.

Scordias(2004),in a subsequent study of web-based learning, suggested that the multimedia capabilities of web technology may allow the teaching profession to develop a new language of practice. By providing a structure for discourse about artifacts of teaching and learning, E-portfolios are one place where a teacher develops the

language of practice and establishes a discourse in the Internet communities of teachers.

Based on this study, it showed that the development of E-portfolios helped the preservice teachers set goals for learning and review goals periodically throughout the TEP. The E-portfolio also served as an instrument for gaining a better understanding of preservice teachers' abilities to examine artifacts they have chosen to use to document what they know. Through E-portfolio documentation, different dimensions of a Teacher Education Program may be elaborated to provide indicators of progress that can be measured.

Hence, the E-portfolio serves many purposes. During the student teaching semester, the E-portfolio becomes a tool for the student teachers to market themselves to potential employers. After graduating from the TEP, the E-portfolio can help them continue in their professional growth as educators. Ongoing documentation in the E-portfolio contains the preservice teacher's best work. According to McKinney (1998), teachers who demonstrate their competence in technology through the development of an E-portfolio are more likely to incorporate technology into their own classrooms.

Future Research

Five qualitative case studies allowed me to have a deeper understanding the impact on preservice teachers' self-directed learning and computer technology skills; however, the study was limited by the purposive sampling technique in this study. A different population with quantitative indicators can be presented for future study.

The result of this study showed all participants' SDLR scores increased; however, they stayed in the same level as their pre-test scores. According to Posner (1991), students with repeated learning experience improve their self-directed learning readiness levels extensively. A replication study with the same framework but a longer timeline can be done to observe if participants' SDLR levels increased in a technology environment.

Additional research on E-portfolios, self-directed learning readiness, and computer technology proficiency will be needed to determine how new technological tools can be integrated with other settings to support the professional development of traditional or non-traditional learners. We also need to get a deeper understanding of the changes between a learner's self-directed learning readiness and computer technology literacy through developing an E-portfolio.

Additional information about the successes and problems of particular programs will provide a better understanding of how to use E-portfolios as tools for continuing inquiry into teaching practice and devices for learning among teachers. As new technologies are integrated into the Teacher Education Program at UMSL and used for E-portfolio authoring, ongoing research is needed to demonstrate how the E-portfolio application use impacts other learning, such as life-long learning, transformative learning, and etc.

Summary

This study showed that some participants' self-directed learning readiness increased a lot, and their computer technology skills improved extensively, while others improved in a small way, after developing their E-portfolios. This study suggests how effective developing an E-portfolio might be for improving a learner's computer technology skills and how important it is for an individual to take the initiative for his/her own learning. Developing E-portfolios helped the preservice teachers set their goals for learning, review their goals periodically, gain a better understanding of their teaching and learning, and continue their professional growth as teachers throughout the TEP. As new technological tools are developed, we need

to carefully consider how they might be used to further our goal of developing the professional knowledge of teachers.

This study is not generalized due to the size of the sample and cultural settings. Additional research on the relationship of E-portfolios, self-directed learning readiness, and computer technology proficiency will be needed to determine how new computer technology tools can be integrated with other cultural settings to support individuals' professional development. As E-portfolio application is used in Teacher Education at UMSL, Ongoing research is needed to demonstrate how the E-portfolio application use impacts other learning, such as life-long learning, transformative learning, and etc.