

DIFFUSION OF AN INNOVATION: THE ELECTRONIC PORTFOLIO PROJECT IN
THE COLLEGE OF EDUCATION

By
GAIL L.RING

A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

2002

Copyright 2002

by

Gail L. Ring

ACKNOWLEDGEMENTS

I would like to extend my gratitude to the individuals without whose mentoring, advice, and support, this work would not have been completed. My deepest gratitude is extended to Dr. Mary Grace Kantowski, chairperson of my committee, who has given me her guidance, wisdom, and encouragement throughout my graduate program. She is always patient and willing to answer my many questions. I am honored to call Dr. Kantowski my mentor and my friend. I would like to thank my committee members Drs. Jeff Hurt, Mary Ann Clark, and Eugene Todd, who have been steadfast in their support throughout my doctoral studies and patiently worked with me to make my dissertation better.

I am indebted to Dr. Sebastian Foti who recognized in me the ability to BECOME a Ph.D. I learned a great deal in his courses and even more from impromptu office conversations. Dr. Foti continues to instruct, challenge, inspire, and mentor me in all aspects of teaching, learning, and technology.

Heartfelt thanks are extended to my family and friends who have supported and encouraged me throughout my doctoral studies. I thank Dr. Diane Silva for her generous assistance in clarifying my writing helping me to make my dissertation better. I also thank Dr. Colleen Swain, my colleague and friend, who was a constant source of support and understanding mixed with the perfect amount of “get busy.” Special thanks go to

my mother, Ruth Decker, who taught me by her example to put God first in everything;
and to my sister, Jan, my first role model, whom I have always and will always look up
to.

TABLE OF CONTENTS

	<u>page</u>
ACKNOWLEDGMENTS	iii
LIST OF TABLES	viii
LIST OF FIGURES.....	ix
ABSTRACT	x
 CHAPTERS	
1 DESCRIPTION OF THE STUDY.....	1
Introduction.....	1
Significance of the Study.....	2
The Electronic Portfolio Project	4
Statement of the Problem	6
Research Questions	7
Limitations.....	7
Definition of Terms.....	9
Summary	10
2 REVIEW OF THE LITERATURE.....	11
Theoretical Framework	11
Understanding Individual and Group Level Responses to Change	12
Constructivism	15
Cognitive Flexibility Theory	18
Technology as a Constructivist Learning Environment	20
Portfolios and Preservice Teacher Education	23
Authentic Assessment	40
Summary.....	45
3 METHODOLOGY	46
Setting of the Study	55
Description of the Site.....	55
Section of the Site	56
Description of the Subjects.....	57
Data Collection	57
Field Notes.....	58

Interviews.....	58
Surveys.....	59
Student Portfolios.....	59
Participant Observation	60
Data Analysis.....	60
Theoretical Saturation	61
Issues of Reliability and Validity.....	61
Reliability of Results.....	61
Validity of Results.....	62
 4 THE ELECTRONIC PORTFOLIO PROJECT AT THE UNIVERSITY OF FLORIDA	
.....	64
Perceived Attributes	66
Compatibility with Needs	66
Triability	66
Communication Channels	70
Nature of the Social System	73
Faculty Time	74
Portfolio Assessment.....	75
Privacy	76
Choice of Illustrations	77
Characteristics of Adopters.....	79
Extent to which the Project Impacted the Program.....	85
Perceived Attributes	86
Relative Advantage	86
Have our students become more reflective?	87
Have our students demonstrated an increased understanding of the FAPs?	89
Have students begun making curricular, programmatic and professional connections?	90
Complexity	92
Observability.....	94
Type of Innovation Decision	95
Communication Channels	96
Extent of the Change Agents Promotion Efforts	97
Support	99
Workshops	101
Online Support.....	105
Summary.....	106
 5 THE STUDENTS' EXPERIENCES	107
Reflection upon Practice.....	108
Writing the Rationale Statements	110
Students Need Time to Reflect	111
Developing a Habit of Reflection	113
Collaboration	115

Understanding the Standards the Guide the Teaching Profession.....	118
The Challenge of Technology Integration.....	120
Selection of Illustrations.....	125
Portfolio Development and Professional Practice	126
Students Understanding of the FAPs	129
Communicating Via Technology.....	133
Other Interesting Observations	136
Summary.....	138
 6 LIMITATIONS AND FUTURE IMPLICATIONS.....	 139
Limitations.....	140
Future Implications	142
Longitudinal Studies	142
Content Areas.....	143
Faculty Development and e-Portfolios.....	144
Summary.....	144
 APPENDIX	
 A COMPONENTS OF THE ELECTRONIC TEACHING PORTFOLIO.....	 146
B STUDENT EXIT INTERVIEW QUESTIONS	147
C STUDENT SURVEYS	149
D. RATIONALE STATEMENT TUTORIAL.....	150
E. COURSE MATRICES.....	151
F. FAP ILLUSTRATION TEMPLATE.....	154
LIST OF REFERENCES	155
BIOGRAPHICAL SKETCH.....	167

LIST OF TABLES

<u>Table</u>	<u>page</u>
1-1 Florida's 12 Accomplished Practices.....	5
3-1 Research Questions, Data Collection, and Analysis	49
4-1 Entrance Survey Results.	102
4-2 Self Assessed Technology Ability.....	102

LIST OF FIGURES

<u>Figure</u>	<u>page</u>
3-1 Portfolio Project Model.....	51
3-2 Variables Determining the Rate of Adoption.....	53
4-1 Current Communication Channels and Communication Channel Goals.	71
4-2 S-Shaped Curve of Adoption and Normality.....	85
5-1 A Student's Perspective on Reflection.....	131
5-2 Types of Technology Used.	134

Abstract of Dissertation Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy

DIFFUSION OF AN INNOVATION: THE ELECTRONIC PORTFOLIO PROJECT IN
THE COLLEGE OF EDUCATION

By

Gail L. Ring

December 2002

Chair: Dr. Mary Grace Kantowski

Major Department: School of Teaching and Learning

This study explored the diffusion of an innovation in the form of electronic portfolios in the Secondary Teacher Education Program in the College of Education at the University of Florida. Specifically, the study was designed to provide a model of innovation diffusion related to the implementation of e-portfolios in a college of education. In addition, the study examined the impact that developing, publishing, and maintaining web-based portfolios had on preservice teachers over the course of their master's degree program.

A qualitative study was conducted to reveal the facilitators in the implementation of the innovation. The participants in this study were students enrolled in the Secondary Education Program in the College of Education at the University of Florida. The findings

were drawn from an analysis of field notes, surveys, email correspondences, interviews, and student portfolios throughout the first year of the e-Portfolio Project implemented in the fall of 2000. The research findings are likely to provide the groundwork for colleges of education considering implementing a program wide innovation in the form of electronic portfolios and provide insights into the prospective teacher growth that occurs during the portfolio development process.

Much of the recent portfolio research discusses portfolio implementation in an anecdotal manner, focusing on studies undertaken in a single class, or with a small population of preservice teachers. This study, however, investigated the implementation of an electronic portfolio project throughout a one-year secondary education graduate program. The results of this study indicate that a key factor in the innovation diffusion process is the involvement of all stakeholders. The quality of the students' portfolios reflects the level of faculty influence. In addition, the opportunity students have to engage in reflective practice is essential to a student's professional development. It was through the process of selecting an illustration, connecting it to a Florida Accomplished Practice, explaining the connection (written in the rationale statement), and making appropriate and necessary revisions that students became more inquiry oriented and more reflective.

CHAPTER 1 DESCRIPTION OF THE STUDY

Introduction

Preparing teachers for the 21st century is a matter of concern for both political and educational leaders in this country (Piper, 2000). This problem is compounded by the fact that “today a very substantial proportion of people are engaged in work, in jobs that did not exist when they were born and that number is increasing” (Papert, 1998). The National Council of Teacher Accreditation (NCATE) requires its accredited colleges of education to provide adequate access to computers and other technologies, requires faculty and students to be able to use technology effectively, and has challenged higher education to infuse technology into the entire teacher education program (NCATE Standards, 2000). These changes pose a challenge for colleges of education. Historically, the burden of accountability was placed on the professors. However, accountability is becoming a shared responsibility among teacher preparation programs, faculty, and students.

In response to changes in accreditation, which require students to share accountability, faculty in the College of Education at the University of Florida decided collectively that each student should be responsible for the selection, storage, and presentation of their illustrations for each of the 12 Florida Accomplished Practices in a web-based electronic portfolio. The Electronic Portfolio Project (<http://www.coe.ufl.edu/school/portfolio/index.htm>) is a college wide innovation that

impacts administrators, professors, students, and the curriculum of our teacher education program. The purpose of this study is to explore the diffusion of an innovation in the form of electronic portfolios in the Secondary Teacher Education Program in the College of Education at the University of Florida. In addition, this study explores the impact developing an e-Portfolio had on the professional growth of preservice secondary education teachers. Of interest are the facilitators in the implementation of such a program, the development of students as professionals, as well as changes in a student's use of technology that may have occurred during this study.

Significance of the Study

Since the study explores both the Secondary Teacher Education Program and the e-Portfolio Project as an organizational innovation and how portfolios evidence a preservice teacher's professional growth, two layers of understanding are expected to emerge. I focus on the change process a college of education undergoes as it attempts to implement a program-wide innovation. In addition to considering what facilitates change at the program level, this study also informs others of the problems faced when prospective teachers attempt to share what they have simultaneously learned about teaching, technology, and standards. This study may provide insight into how to motivate and coach students to become more reflective and active participants in the learning process. This is consistent with Mokhtari, Yellin, Bull, and Montgomery's (1996) suggestion that: "In classrooms, portfolios encourage teacher self-direction and reflection and form the basis for professional development." This study was designed to plot and understand the steps of successful development of a college-wide innovation of

electronic teaching portfolios linked to state standards. Arter and Spandel (1995) argue the significance of this goal:

The perceived benefit for instruction is that the process of assembling a portfolio can help develop student self-reflection, critical thinking, responsibility for learning, and content area skills and knowledge. (It is important to point out that most of the evidence to support these claims comes from logical argument and anecdotes. There exists very little “hard” evidence that demonstrates the impact of portfolios on students). (p. 38)

This study is significant because it goes beyond anecdotal information to the evaluation of the use of portfolios throughout a graduate program. This longitudinal study allowed the researcher to observe the e-Portfolio Project from start to finish within a bounded time frame, making it possible to identify emerging problems and implement necessary changes throughout the first year of implementation.

As educators, we understand the importance of authentic and formative assessment, yet we are often forced to rely on standardized tests and summative evaluation as a means of learning about the strengths and weaknesses of our students.

When reflection is utilized to its fullest potential, students become more willing to accept responsibility for their learning and are more likely to recognize the relationship between classroom instruction and how it relates to their world. They also begin to understand how to assess and evaluate their own learning, which is a lifelong skill that is necessary for future success. (Johnson, N. & Rose, L.M., 1997, p. 5)

If learners are not yet skilled in taking charge of their own learning, our tools and environments should help people move in that direction. This shift will have significant implications for our research designs, for different learners will go in very different directions and end up learning very different things. Alternative research methodologies will be mandatory; indeed, we will probably need to invent new ones. (Kozma, 2000, p.14)

Literature suggests that the development of a portfolio aids students in making links between theory and practice. The ability to make these links contributes to the professional development of our students. According to Barton and Collins: (1993)

Teacher education programs that function at the undergraduate and master's level commonly emphasize practice and expose students to a variety of practical techniques that have been shown to work successfully with learners. Some programs seek to go a step further, and link these practices with theories of learning, development and cognition, although students often fail to make these linkages. (p. 201)

This study looked for evidence of change in attitudes, change in quality of work, and changes in instruction as well as the student's increasing ability to make connections with theory and practice as a result of the e-Portfolio Project under development at our college. It is our goal that students, through the development of their e-portfolios, begin to make connections among practical techniques, the state standards, and the theories of learning development and cognition.

The Electronic Portfolio Project

Beginning in the 2000-2001 academic year students enrolled in the secondary education master's degree program have been required to develop and maintain electronic portfolios to demonstrate their competency in the 12 Florida Accomplished Practices (FAPs). The FAPs were developed by the Florida Education Standards Commission. These twelve "practices" are listed in Table 1-1. The e-Portfolio Project was designed to provide a forum through which students demonstrate their proficiency in these twelve practices. Campbell, Cignetti, Melenyzer, Nettles, and Wyman (2001) suggest that, "As students connect their work to standards, they begin to see the value and relevance of their work" (p. 50). An assumption was made that portfolio development

would facilitate connection making and highlight the value and relevance of their teacher preparation work. In addition to demonstrating their competence in the FAPs, student portfolios address other aspects of their educational experience such as their ability to use technology, self-assessment and decision making skills, as well as their ability to reflect on teaching and learning.

Table 1-1. Florida's 12 Accomplished Practices

Assessment	Uses assessment strategies (traditional and alternate) to assist the continuous development of the learner.
Communication	Uses effective communication techniques with students and other stakeholders.
Continuous Improvement	Engages in continuous professional quality improvement for self and school.
Critical Thinking	Uses appropriate techniques and strategies which promote and enhance critical, creative, and evaluative thinking capabilities of students.
Diversity	Uses teaching and learning strategies that reflect each students' culture, learning styles, special needs, and socio-economic background.
Ethics	Adheres to the Code of Ethics and Principles of Professional Conduct of the Education Profession in Florida.
Human Development and Learning	Uses an understanding of learning and human development to provide a positive learning environment which supports the intellectual, personal, and social development of all students.
Knowledge of Subject Matter	Demonstrates knowledge and understanding of subject matter.
Learning Environments	Creates and maintains positive learning environments in which students are actively engaged in learning, social interaction, cooperative learning and self motivation.
Planning	Plans, implements, and evaluates effective instruction in a variety of learning environments.
Role of the Teacher	Works with various education professionals, parents, and other stockholders in the continuous improvement of the educational experiences of students.
Technology	The pre-professional teacher uses technology as available at the school site and as appropriate to the learner. S/he provides students with opportunities to actively use technology and facilitates access to the use of electronic resources. The teacher also uses technology to manage, evaluate, and improve instruction.

Although there are many definitions of portfolios found in the literature, the definition that is most closely aligned with the conceptual framework of the University of Florida e-Portfolio Project is that of Winsor and Ellefson (1995): “A fusion of processes and product. It is the processes of reflection, selection, rationalization and evaluation, together with the product of those processes” (p. 68). A goal of the e-Portfolio Project was to move beyond using portfolios solely as an assessment tool to using portfolios as a means through which our students become reflective professionals.

The e-portfolio is comprised of various components representing students’ instructional and academic experiences. In developing an e-portfolio students make connections among the theories they are learning in their courses, their assignments, and the authentic experiences they have in their field placements. Appendix A shows the components of the teaching portfolio, the types of documentation that would be included in these components, and the setting in which the documentation might originate.

Statement of the Problem

This study explored the diffusion of the e-Portfolio Project innovation throughout the Secondary Education Program in the College of Education. Specifically, the study was designed to provide a model of innovation diffusion related to portfolio implementation in a college of education and share the factors that facilitate the success of this project. In addition, the project examined the impact that developing, publishing, and maintaining web-based portfolios had on the professional and academic growth of preservice teachers over the course of their master’s degree program.

Research Questions

This research study focused on two sets of research questions. The first set of questions explored the innovation diffusion of the e-Portfolio Project at the organization level. These questions included:

1. How does the Secondary Education Program impact the innovation effort, that is, the e-Portfolio Project?
2. How does the innovation effort impact the Secondary Education Program?

The second set of questions explored how prospective teachers experienced the e-Portfolio Project. These questions included:

3. How do students exhibit professional growth when developing a portfolio in response to a set of accomplished practices?
4. In what ways does the student's rationale statement reflect understanding of the appropriateness of illustrations for the Accomplished Practices?
5. In what ways do students' illustrations change to include a variety of media as they develop their electronic portfolios over time?

Answers to these questions should provide insights useful to colleges of education as they face change or as they implement similar projects in their colleges.

Limitations

The study contained limitations to generalization in that the sample combined graduate preservice teachers from all disciplines and is limited to the pre-service experience. The study is generalizable in the sense that it confirmed Rogers' research on Innovation Diffusion when applied in a College of Education setting.

The Secondary Education Master's Degree program is a one-year program and as such the long-term effects of portfolio development could not be measured.

The varying size of each secondary education program area was also a limitation to this study. The secondary English education program contained 27 students, the secondary social studies education program contained 18 students, the secondary mathematics education program contained 5 students, the secondary science education program contained 5 students, and the secondary foreign language education program contained 4 students. Although there are common courses that all Secondary Education students take as a group each semester, in most cases the head of the program area is the primary teacher for that program. For example, in the Secondary English Education Program most of the courses the English education students take each semester are taught by the head of the Secondary English Education program. Consequently, this limits the contact students have with other professors in the College of Education. Therefore limited participation in the e-Portfolio Project by a faculty member in the Secondary Education Program could negatively affect all students in an entire program area for the entire graduate year.

The question of whether performance assessments sufficiently allow for an accurate judgment about students' achievement may also be a limitation to this study. According to Lin (1993), the question of whether the performance assessment sample sufficiently enables fair and accurate judgments about students' achievement is central to assessment reform. After all, if one of the promises of assessment reform is to enable an understanding of students' educational needs, exactly what an assessment product indicates about a student's achievement status must be reliably understood. In this

context, then, multiple examples of student work on multiple performance tasks may be the answer to the problem of generalizability. Inter-task reliability, however, has been difficult to attain; studies indicate that performance on one open-ended task is often only weakly related to performance on a related task (as quoted in the Assessment of Student Assessment found online at: <http://www.ed.gov/pubs/SER/ASP/studel-2.html>). This project required students to include multiple illustrations for each practice, thus improving the reliability of the study.

Definition of Terms

The following definitions of terms will be useful to the reader of this dissertation:

Florida Accomplished Practices (FAP): Twelve best practices designed by the Florida Education Standards Commission, for which all preservice teachers enrolled in Florida Colleges of Education must demonstrate multiple examples of proficiency.

Illustrations: pieces of evidence developed by students, which demonstrate their proficiency in a specific practice. An example of an illustration might be a unit plan, electronic presentation, etc.

Intervention: An action or event that influences use of an innovation (Hall, Zigarmi, & Hord, 1979, as quoted in Hall, 1979).

Portfolio: A means for collecting students' efforts, progress, and achievements in one or more areas (Paulson, Paulson, & Meyer, 1991).

Electronic Portfolio: A web-based or software-based, organic, evolving collection of a student's work (Foti & Ring, 2000).

Reflective Practitioner: Schön (1983) points out that a practitioner's reflection can serve as a corrective to over learning. Through reflection, he can surface and criticize the

tacit understandings that have grown up around the repetitive experiences of a specialized practice and make new sense of the situations of uncertainty or uniqueness, which he may allow himself to experience.

Summary

This chapter introduced the focus of the study as the diffusion of the innovation of the e-Portfolio Project in the Secondary Education Program College of Education at the University of Florida. A goal of the project is to promote reflection on teaching, coursework, and the Florida Accomplished Practices using portfolios as a catalyst for this action. Specifically, the study investigates two layers of questions. First, how does this systemic innovation unfold in the College of Education and what are the inhibitors and facilitators of this systemic change. Second, how does the development of an e-Portfolio impact the professional development of preservice teachers.

Chapter 2 contains a review of the literature germane to the questions investigated in this study. The theoretical framework for the study involved understanding the elements of change theory, constructivism, and innovation diffusion. A description of this theoretical framework is presented in chapter 2. A description of the study's methodology appears in chapter 3 and the findings of the study are presented in chapters 4 and 5. Chapter 6 proposes implications for implementing portfolios in a college of education, and recommendations for future research.

CHAPTER 2 REVIEW OF THE LITERATURE

The review of the literature presented in this chapter includes an examination of the theoretical framework of innovation diffusion first developed by Rogers (1962 and revised in 1995), and constructivism related to knowledge acquisition, learning and exploration. The literature related to the specific innovation under study includes research on (1) Portfolios, Preservice Teacher Education, reflective aspects of portfolio development, and (2) Authentic Assessment models including the Cognitive Model of Assessing portfolios. Collectively, the studies presented in this chapter provide the foundation for this inquiry.

Theoretical Framework

Since the purpose of this study is to investigate innovation diffusion in the College of Education Secondary Education Program as well as examine the impact the innovation had on the professional growth of preservice teachers, research was conducted along two distinct lines of inquiry. An analysis of innovation diffusion and systemic change literature helps frame the inquiry and provides reasoning for constructs and methodologies used in the investigation. Specifically, the way individuals and groups respond to change is examined. Literature reviewed relating to the impact the innovation had on the professional growth of participants includes a review of previous studies involving electronic portfolios and studies related to Cognitive Flexibility Theory,

reflection, the use of technology as a catalyst for systemic change, and assessment strategies.

Understanding Individual and Group Level Responses to Change

Understanding the ways individuals and groups respond to change is essential to making sense of the e-Portfolio Project. Thus, a theoretical framework must include an analysis of group and individual response to change as well as an analysis of the innovation and its characteristics. Rogers (1995) contributes to our understanding of innovation as he defines innovation as an idea, practice or object perceived as new by an individual and diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system. Recognition that the innovation can, and probably will, be adapted by different users to fit different contexts is, according to Hall (1980), a major finding of the change process research that has implications for evaluation.

According to Rogers (1995) in his seminal book *Diffusion of Innovations*, four components of innovation diffusion exist: 1) the innovation itself, 2) the time taken to adopt the innovation, 3) the environment in which the innovation is diffused, and 4) the communication of the innovation between individuals in this environment. Rogers also describes how groups of people vary along the change continuum. He classifies these individuals into five adopter groups: innovators, representing 2.5% of the population; early adopters, the opinion leaders representing 13.5%; early majority, 34% who follow the opinion leaders moving toward change; the late majority, also 34%, who take more time to carefully examine the innovation and look for the benefits associated with the change; and finally the laggards, 16% of the population who are resistant to change, and

may even try to subvert the innovation. The innovation diffusion model of Rogers is a multi-step model involving knowledge, persuasion, decision, implementation, and confirmation. Rogers learned that if the innovation were viewed as relevant to the task at hand, a plot of the adoption of the innovation would generate a normal bell-shaped curve.

Three key parameters of the change process research central to the design of an evaluation study are: the innovation, the implementation, and the individual.

According to Hall and Hord, (1987) Implementation is a phase of the change process; innovations are usually adapted during implementations; and attention must be given to individual users and nonusers of an innovation. Thus, in studying change, attention must be paid to how the individual, the innovation, and the implementation are shaped during the change process.

Fuller's research (1969) is the basis for the work of Gene Hall, Susan Hord, Susan Loucks and others. Fuller (1969) proposed that as preservice teachers progress through teacher education and into inservice work, they move through a developmental progression of "concerns." In their early experiences, prospective teacher concerns, personal needs, or motivations are most likely to be *self*-oriented, focusing on the technical and practical aspects of teaching. As they gain exposure, training, and experience, their concerns shift to questions and needs related to the *task* of teaching. Finally, with additional experience, training, and success teachers develop more *impact*-related concerns. Fuller (1969) confirmed that new teachers typically focus on the technical aspects of their teaching. They label this period the "survival" phase in which the new teacher is concerned primarily with managing a lesson or a classroom rather than drawing connections to the student and the context of the classroom. Next, teacher

development progresses from the survival stage to the mastery stage where students become the focus of the teacher's attention.

While Rogers focuses on the innovation, the Concerns-Based Adoption Model (CBAM), developed by Hall, Wallace, and Dossett (1973) focuses on the intended adopter and how he/she approaches change. The CBAM model recognizes innovation implementation and innovation adoption, and then brings an additional emphasis to the understanding of change as a process by focusing on the individual. From the CBAM perspective each individual will adopt the innovation in his/her own way, and in that respect each individual is considered to be either a user or a nonuser. CBAM experience suggests that, in school settings, because administrators and other decision-makers are not in the classroom, they are not reliable sources of information about actual classroom practice. The CBAM considers the Stages of Concern (SoC) and the Levels of Use (LoU) of the innovation as well as the innovation itself. Hall and Rutherford (1976) learned that there are seven stages of concern individuals move through when facing innovation: awareness, information, personal, management, consequence, collaboration and refocusing. Like Fuller, Hall and Rutherford (1976) condense these seven stages into three: self, task, and impact. Additionally, they contend that the successful implementation of an innovation requires the appropriate intervention as well as a need for change agents to assist with the facilitation of an innovation.

Cicchelli and Baeher (1989) investigated the concerns of teachers regarding the use of microcomputers in the classroom. In this study 78 teachers at the elementary, junior high, and high school levels completed the Stages of Concern Questionnaire (Hall, Wallace & Dossett, 1973). This study confirmed the findings of the earlier studies of

Fuller (1969) and Hall and Rutherford (1976) where the concerns of the teachers at all levels develop in an hierarchical order, beginning with self, then moving to task, and finally attending to impact.

Constructivism

The second framework that forms the basis for this study focuses on the learner. Constructivism is based on the assumption that learners are active participants in the learning process, constructing knowledge in a meaningful, authentic context. Instead of viewing a portfolio solely as an assessment tool, the portfolio has the potential to assist with learning, learning about learning, and learning about teaching each informing the other. Yancy and Weiser (1997) describe this knowledge development:

Rather than our learning about portfolios proceeding as a spiral, then, we might instead think of it as developing in waves, with one wave of practice preparing the next wave of theorizing about that practice, with an intermediate wave extending new practice. By such reflective “wave action” is knowledge created. (p. 11)

These “waves” of intellectual growth begin to permeate the preservice teachers’ educational experience at the University of Florida as they transition from student to teacher. Research on change places emphasis on viewing change as a process, not an event (Hall, 1980; Hall & Hord, 1987; Rogers, 1983; Ely, 1995). Shulman discusses the power of portfolios as tools for documenting growth over time:

Portfolios retain almost uniquely the potential for documenting the unfolding of both teaching and learning over time and combining that documentation with opportunities for teachers to engage in the analysis of what they and their students have done. (Shulman as quoted in Huebner, 1996, p. 11)

Dewey (1915) believed that true new knowledge and intellectual growth are constrained by the systematic teaching method of assignment followed by study and recitation. Instead, he argued for a more learner-centered classroom where exploration

and engagement were encouraged. Brown, Collins, and Duguid (1989) write that authentic activity (the ordinary practices of the culture) is important for learners because it is the only way they gain access to the standpoint that enables practitioners to act meaningfully and purposefully. Jonassen (1996) believes that learning theory is in the midst of a revolution, in which researchers and theorists are arguing about what it means to know something and how we come to know it. Catherine Fosnot (1996) stated, “Constructivism is a theory about knowledge and learning; it describes both what “knowing” is and how one comes to ‘know’” (p. ix). Constructivism, in many ways is changing the way we understand knowledge and the construction of knowledge. Many educational philosophies have contributed to our understanding of constructivism.

Piaget (1974) believed that a great deal of how learners construct knowledge depends upon what they already know, believe, and interpret. Thus, playing an active role in constructing knowledge. Additionally, Vygotsky (1978) argued that the creation of knowledge is dependent on context and relationships. Jonassen, Peck, and Wilson (1999) provide an example of this process:

Knowledge construction results from activity, so knowledge is embedded in activity. Nearly every child in American schools is required to memorize the states and capitals. But they probably do not make much meaning for those facts, if they have not experienced them in a rich way. If, however, students attend a field trip to the state capital, then they construct some meaning for it, although not always the meaning that the teacher intends. (p. 3)

This idea captures how constructivist theory depends on the learner's active participation in the learning environment. Reisetter and Fager (1995) conclude that constructivism has at its foundation learning and understanding built around present understanding.

Consequently, the knowledge that students possess when they enter the classroom will influence their learning. Student-centered and constructivist approaches to learning are central to the e-portfolio development process.

The importance of understanding knowledge construction within a context should not be underestimated when infusing an innovation into an existing system. For example, in her research on problem solving and mathematics education Kantowski (1979) noted that although many research studies deal with one idea in a carefully controlled environment there is also a need for investigations that are carried out in actual classroom situations. The real world of the classroom exists with many uncontrolled and uncontrollable variables, and this world should be studied too. Kantowski (1979) points evaluators to the research of Kalmykova (1958) and Menchinskaya (1969) where two characteristics are prevalent: an emphasis on the details of the thinking processes of individual students and an emphasis on research conducted in actual classroom situations. Kantowski (1974) found that research must be responsive and dynamic. For example, processes should be captured “in the making” at various stages of development under the influence of instruction so that “movements” or changes in the processes at these stages can be detected, and adjustments to the program can be made. Kantowski (1974) noted:

Kalmykova’s model has great potential for the development of instructional sequences. It is so simple, yet ingenious: observe behaviors that lead to success and those that do not; isolate differences; propose a model using successful techniques; test the model. (p. 74)

This theoretical frame complimented the e-Portfolio Project and the way in which it was diffused throughout the ProTeach curriculum. During each stage of the e-Portfolio Project changes were made to the model based on feedback from stakeholders.

Research by Hill and Land (1998) concludes that the student-centered learning process hinges upon the learner’s ability to monitor learning needs and to engage in planning and evaluation activities. This practice places greater responsibility upon the learner for the learning that takes place. Hill and Land label such learning environments as *Open Ended Learning Environments* (OELE) where learners construct a “web” of

concepts and share them communally with other students. Similarly, in the constructivist learning environment proposed by Duffy and Cunningham (1996), both student to student and student to teacher dialogue is a preeminent instructional tool. Additionally, these types of constructivist learning environments promote cooperation over competition, and communication and probing over direct instruction (Duffy and Cunningham, 1996).

Brooks and Brooks (1993) argue that a constructivist framework challenges teachers to create environments in which they and their students are encouraged to think and explore. They stated, "This is a formidable challenge. But to do otherwise is to perpetuate the ever-present behavioral approach to teaching and learning" (p. 30).

Brown, Collins, and Duguid (1989) propose that authentic activity is essential to an environment that encourages knowledge construction. Authentic activity is the only way learners gain access to tasks that are meaningful and purposeful. The researchers claim that it is activity that shapes or hones their skills, how and why remain to be explained. The collect, select, reflect model of portfolio development is an example of an authentic activity in a constructivist learning environment. Students collect illustrations throughout their coursework and their student teaching, select at least two appropriate illustrations for each accomplished practice, and reflect on why they believe the illustration is appropriate. Reflecting on the illustrations in relation to the standards that they satisfy encourages the preservice teachers to make meaning between content and practice, prompting them to think and explore.

Cognitive Flexibility Theory

Emerging from the paradigm of constructivism is a subset of research focused on the individual level of cognitive flexibility. In their research on Cognitive Flexibility

Theory Spiro, Feltovich, Jacobson, and Coulson (1991) note that cognitive flexibility refers to the flexible way in which knowledge is assembled and also the way it is stored for flexible retrieval. Not only are understandings constructed from prior knowledge, but the prior knowledge itself is constructed to suit the demand. Research from Spiro, Feltovich, Jacobson, and Coulson (1991) suggests that people acquire knowledge in ill-structured domains by constructing multiple representations and linkages among knowledge units. Learners visit, and more importantly revisit, the same case or concept information in a variety of contexts (<http://www.ilt.columbia.edu/ilt/papers/Spiro.html>).

According to Spiro, Feltovich, Jacobson, and Coulson (1991):

This “new constructivism” is doubly constructive: (1) understandings are constructed by using prior knowledge to go beyond the information given; and (2) the prior knowledge that is brought to bear is itself constructed, rather than retrieved intact from memory, on a case-by-case basis. (p. 28)

In addition, Spiro, Feltovich, Jacobson, and Coulson (1991) argue:

Any effective approach to instruction must simultaneously consider several highly intertwined topics, such as: the constructive nature of understanding; the complex and ill-structured features of many, if not most, knowledge domains; patterns of learning failure; a theory of learning that addresses known patterns of learning failure. (p. 24)

Reisetter and Fager (1995) argue that it is critical for professors to assist students in making connections within and across knowledge domains. As educators build these connections and as students become themselves more expert in their field, their own knowledge structures will become more complex, integrated and flexible (p. 3). Spiro, Feltovich, Jacobson, and Coulson (1991) argue for the use of hypertext environments to promote cognitive flexibility in ill-structured domains. A nonlinear medium like hypertext would be very well suited for the kinds of “landscape criss-crossing” recommended by Cognitive Flexibility Theory

(<http://www.ilt.columbia.edu/ilt/papers/Spiro.html>). Since the portfolios are created in a

hypertext environment, students are able connect an assignment for a class or a lesson developed in their internship to a variety of standards, making connections "within and across knowledge domains" (Spiro, Feltovich, Jacobson, and Coulson).

Technology as a Constructivist Learning Environment

Constructivism is particularly relevant to studying the use of technology in an educational setting. According to Jonassen, Peck, and Wilson (1999), "Constructivism is a relatively new idea to education, and is an even newer idea to educational technology (p. iii). Jonassen argues that technologies are more effectively used as tools to construct knowledge *with*, making technology a tool to think and learn *with*. According to Jonassen, Peck, and Wilson (1999), "If we accept that our goal as technology-using educators, is to support meaningful learning, then we should use technologies to engage students in active, constructive, intentional, authentic, and cooperative learning" (p. 7). Brown, Collins, and Duguid (1989) contend, "People who use tools actively rather than just acquire them, by contrast build an increasingly rich implicit understanding of the world in which they use the tools and of the tools themselves" (p. 33). Similarly, Jonassen (1996) stated, "Knowledge of any tool is required in order to use that tool" (p. 9), and proposes the development of mindtools, computer-based tools and learning environments that have been adapted or developed to function as intellectual partners with the learner in order to engage and facilitate critical thinking and higher-order learning. As our students become more proficient with the technology, we hope that the act of constructing an electronic portfolio becomes less about the technology involved and students begin to concentrate more on the illustrations they add to their portfolio and why they chose them. Jonassen (1996) stated, "mindtools engage learners in reflective

thinking, which leads to knowledge construction” (p. 13). Just as innovation diffusion moves along a continuum, appropriate and effective technology use develops over time as teachers move along a continuum from beginner to a more advanced user.

Johnson and Liu (2000) contribute to our understanding of how technology can create constructivist learning environments. They learned that the successful integration of technology in the classroom is enhanced when:

- Type II software is used (Using a distinction made by Maddux, Johnson, and Willis, 1997) Type II software tends to turn the computer into a tool to enhance learning by allowing the learner to create, manipulate, and produce).
- Problem-based assignments are given.
- Constructivist learning environments are established.

They contend that to successfully integrate information technology, future teachers need to be competent in a variety of computer applications, they need to be able to design interesting and challenging problem-based learning situations, and they need to understand and become comfortable in designing constructivist learning environments.

Implementing technology into a traditional teaching context can serve as a tool for changing existing practices. Sandholtz, Ringstaff, and Dwyer, (1997) state, “Technology is a catalyst for change in classroom processes because it provides a distinct departure, a change in context that suggests alternative ways of operating. Technology can drive a shift from a traditional instructional approach toward a more eclectic set of learning activities that include knowledge-building situations for students” (as quoted in Dimock and Boethel, 1999, p. 20). Additionally, Dimock and Boethel (1999) suggest:

When technology supports the creation of constructivist learning environments, student roles change. Students often become peer mentors and mentors for their teachers as well. (p. 39)

As indicated, change occurs when technology becomes infused into the learning context. The literature also offers us insight into how students interact with technology by highlighting the importance of integrated tasks and reflection on their creations. According to Henry Becker (1990), not only do teachers need easy-to-use and powerful software tools, but they also need examples and models of how to use these tools in integrated ways.

In the electronic portfolio project, students were given the opportunity to integrate technology in their coursework and their internships. In addition, they were required to communicate their understanding of the Florida Accomplished Practices via their portfolio and the World Wide Web. Jonassen, Peck and Wilson (1999) found the following:

Like multimedia and hypermedia construction, web-site (e.g. online portfolios) construction is first and foremost constructive (constructionist, to use Papert's term). Our research with hypermedia construction showed that learners reflect a lot on their designs, making sure that they are desirable and interesting to other students. (p. 36)

Wickliffe (1997) and Fischer (1997) argue that through the creation of hypertext documents students can begin to better know themselves as learners, and in doing so learn to pay attention to the reader of the document (or portfolio). The portfolios developed by the secondary education students are hypertext documents allowing both the reader and the writer navigational control. Using a hypertext format such as html (hypertext markup language) students can create links among illustrations, ideas, theories, etc. This "linking" of concepts and work enables students to begin to think "more flexibly and non linearly" (Spiro, Feltovich, Jacobson, and Coulson, 1991) about what is happening in their coursework, their internships, and their professional collaborations.

Portfolios and Preservice Teacher Education

To understand the changes that took place in the college as a result of the electronic portfolio project it is necessary to define the term portfolio. Although chapter 2 includes a variety of definitions, the definition that is most closely aligned with the conceptual framework of the Electronic Portfolio Project under investigation is that of Winsor and Ellefson (1995): “A fusion of processes and product. It is the processes of reflection, selection, rationalization and evaluation, together with the product of those processes” (p. 68). It is the combination of collection, selection, and reflection that enables students to become more active participants in their education, thus reflective practitioners. Snyder, Lippincott, and Bower (1998) state, “these mixed purposes give teacher educators better tools to support the growth of students” (p. 140). Portfolios are widely used in teacher education programs. Initial experiences with portfolios in teacher education programs date back to a 1983 mandate for their use in a Florida State Board of Education competency based teacher education program. During their probationary year of supervised teaching, candidates prepared portfolios to demonstrate their competency in selected areas (Gwenith, 1983). Five years later, in 1987, Stanford University developed the Teacher Assessment Project, (TAP) in an attempt to initiate alternative teacher assessment into their teacher education program. The TAP research explored the role that portfolios can serve in the

Voluntary, national certification of accomplished teachers. While the primary focus in this study was on the role that portfolios can play in the evaluation of schoolteachers, it is important to keep in mind that a teacher’s portfolio can (and should) serve purposes beyond evaluation, such as promoting the development of exemplary practices. (Wolf, 1991, p. 15)

The TAP was a four-year project that was designed to develop a way to assess and certify master teachers. The TAP used portfolios as a means of assessing teacher competencies. The TAP explored both a fine-grained scoring system as well as a more holistic process for scoring teachers' portfolios and found that the holistic approach allowed teaching to be examined in a more coherent fashion, and avoided chopping the act of teaching up into many disconnected pieces as can happen with overly analytical scoring schemes. The TAP developed a scoring procedure for an individual's portfolio that used multiple evaluators. Some scorers were trained to score particular sections of the portfolio (e.g., student evaluation), and evaluated the same sections across many different portfolios. Other scorers examined the entire contents of a single teacher's portfolio. Thus, scoring represented an amalgam of judgments from different raters and different vantage points (Wolf, 1991).

Beginning in 1988, the Ohio consortium was funded to conduct a portfolio project through a Carnegie grant. Organized by Lee Shulman of the Teacher Assessment Project, the consortium attempted to develop a process of increasing reflectivity skills of first year teachers and to examine alternative modes of teacher assessment and their potential impact on teacher education and teacher induction programs. The consortium consisted of the University of Dayton, Wright State University, and Central State University, and assessed 28 randomly selected portfolios for their levels of reflectivity. Within the limitations of the study, they found that student's maturity corresponded positively to reflectivity scores (Cole, et al. as quoted in Santora, unpublished manuscript p. 9). Teacher Education students were directed to develop portfolios containing artifacts that would indicate growth in five categories: professional responsibility, command of subject matter, content-specific pedagogy, class organization and class management, and student-specific pedagogy (Shulman as quoted in Santora, unpublished manuscript p. 9). Although each university implemented the portfolio process differently, there was enough agreement about the contents to allow scoring of the portfolios across institutions

for levels of reflectivity (Cole as quoted in Santora, unpublished manuscript p. 9). It is important to note that although there is no longer any centralized portfolio program among the universities, each of the universities have sustained the use of portfolios as a significant part of preservice teacher growth (Santora, p. 9).

Bruner believes that narrative-story telling is one of the most ubiquitous and powerful forms of human communication and learning. Portfolios tell the story of the student. As our classrooms become more constructivist in nature, there will be greater opportunities for students to share information and ideas. Although portfolios are a popular addition to the teacher education curriculum, research efforts have focused more on portfolio assessment than on anything else. The term “portfolio” is actually multi-dimensional and is defined in many ways.

- Containers of documents that provide evidence of someone’s knowledge, skills, and/or dispositions (Bird, 1990).
- Vehicles for ongoing assessment that are composed of purposeful collections which examine achievement, effort, improvement, self-evaluation, and goal setting” (Tierney, 1991).
- Not expected to be a comprehensive account of all of a teacher’s accomplishments, but a *selective* one that highlights the distinctive features of that individual’s approach to teaching, at the same time, however, the portfolio should be more than a few snapshots, but should reflect a person’s accomplishments over time and in a variety of contexts (Wolf, 1991).
- A learning environment in which the learner constructs meaning (Paulson & Paulson, 1994).
- A fusion of processes and product. It is the processes of reflection, selection, rationalization and evaluation, together with the product of those processes (Winsor & Ellefson, 1995,).
- An Inventory of experiences (Todd, conversation. 1999).
- The portfolio is a cumulative record of progress that fosters reflective thinking and can be used for advisement, assessment, and eventual placement (Mokhtari, Yellin, Bull, & Montgomery, 1996).

These varied definitions allude to the many benefits portfolio development may have on a student's education.

Although there are many uses for portfolio, a tension exists between formative and summative use of the portfolios. Barton and Collins (1993) believe the first and most significant act of portfolio preparation is the decision on the purpose of the portfolio. Bird (1990) stated:

Professional portfolios should contain the five intertwined clusters of teaching activity which reveal and illuminate the classroom teacher's role and practice in multiple dimensions--teaching a class, planning and preparation, student and program evaluation, interaction with other educators, and interaction with parents. (p. 250)

Many instructors look to portfolio development as a product, a way to summatively evaluate their students at the end of the semester. By doing so, the portfolio becomes merely a new way to evaluate students, usually using the same evaluation criteria used in the past. Instead, if we use the portfolio as a formative tool, a means through which students are able to begin to think about their work, and how they want to present themselves to the world, the portfolio becomes a way of empowering students. Thus, contributing to a new way of learning and ultimately a new way of teaching. Formative use allows "numerous opportunities for the learner to think flexibly and non-linearly about how and to what degree learning and change over time have occurred" (Krause, 1996, p. 130).

Because portfolios are dynamic and fluid they allow and encourage students to communicate in richer ways. If we are to effectively use portfolios in teaching preservice teachers, we must look beyond portfolios as end products and instead use them as a process through which students learn. Krause (1996) contends that the portfolio itself has the potential to inform learning. According to Courts and McInerney (1993), "Portfolios

should help learners become integral and conscious participants in the learning process” (p. 85).

The level of prescription associated with an instructor’s use of a portfolio also emerges as a tension within the literature. Murphy (1997) and Callahan (1997) are concerned with overly prescriptive portfolios reducing the professional status of teachers if the contents are narrowly prescribed or if high stakes are attached. Both authors contend that overly prescriptive portfolios tend to limit the teacher’s authority to make decisions about what is worthy of teaching and assessing. In this narrow focus, educators may lose sight of the learner. In her essay, Murphy cites many examples about the benefits of student ownership, learner-centered environments, and independent learners. Both Murphy and Callahan, voice the need to use the portfolio to promote and empower the student in the classroom.

A further tension emerges as we consider the variation in prospective teachers’ ability to recognize quality work and judge their own efforts. Although the research suggests the portfolio as a formative learning tool this presents a barrier for less sophisticated learners and suggests the need for instructor scaffolding. LeMahieu, Gitomer, and Eresch (1995) found that

Although the purpose of student selection is to engender and support a reflective and self-evaluative capacity, the developers recognized that this is possible only if students have deep understandings about the nature of quality in their work and are able to make judgments that accurately reflect a valid assessment of that quality. (p. 13)

Deming (1986) suggests a quality control cycle to facilitate this scaffolding in which students are participants both in setting and applying the standards. Deming’s philosophy of quality control maintains that quality be controlled locally, not by centralized authority.

Sizer (1984) also contends that the portfolio became a tool to stimulate students' abilities to reflect, reason, and develop intellectually. Similarly, Stowell, Rios, McDaniel, and Kelley (1993) suggest that the portfolio provides a representation of student growth as teachers; and helps establish a foundation for goal setting, reflection, and introspection. Essentially, portfolios have the power to transfer much of the responsibility of learning and decision making to the student. When used in a formative manner portfolios can empower students in many ways. When students are required to reflect on what information they need, how they will learn it, and what they have learned, they begin to view learning as a process within their control. Responsibility emanates from setting learning goals, developing plans to accomplish them, using the information, and documenting attainment of those goals (Johnson and Rose, 1997).

Ause and Nicastro (1996) provide three benefits of portfolios in education: empowering students, the creation of new communities of teachers working together for a common goal, and the closing of the gaps between institutions. They contend that the greatest advantage for students is the opportunity portfolios provide for empowering students to reflect on their learning process and progress. Barton and Collins (1993) add:

The portfolio allows faculty to view student work in the context of teaching as a complex activity with interrelated elements. A brief set of exam questions, no matter how carefully structured cannot capture this complexity. Through a consistent emphasis on relating the parts to the whole, the portfolio provides a larger context to structure each piece of evidence it contains. Faculty may use this structure as a lens to focus, but not reduce their vision of the specific evidence that constitutes the complex act of teaching. Advisement is strengthened by this process as each portfolio entry helps the faculty advisor to focus on students' overall professional development, not just their course work and personalities. Moreover, they contend, portfolios help students become more articulate. (p. 201)

Mokhtari, Yellin, Bull, and Montgomery (1996) conducted research on the impact that portfolios have on preservice teachers' knowledge and attitudes. Their findings suggest that exposure to and use of portfolios in teacher education programs can play a critical role in positively influencing preservice teachers' belief and attitudes toward using portfolios.

In her study of how 42 elementary preservice teachers constructed meaning about portfolios during the introductory phase of an assessment system, Krause (1996) explored the transfer effects of an instruction intervention such as a meaningful and relevant portfolio-like experience on students' comprehension of portfolios (p. 131). Krause randomly divided the students into three groups, one intervention group and two control groups. The intervention group participated in a guided portfolio experience, entitled *My Life in a Bag*, which gave students an opportunity to collect, select, and reflect on personally meaningful items. Krause found that the students who participated in the *My Life in a Bag* activity demonstrated significantly increased knowledge and understanding of the portfolio process following an intervention. In addition, she found that after the intervention students were significantly more likely to reflect conditional (when and why portfolio knowledge is useful) and procedural (what it is and how to do it) knowledge of the process.

In their 1998 study examining preservice science teachers' emerging understanding of subject-specific pedagogy using web-based portfolios, Zembal-Saul and Severs found that portfolio development can provide an effective vehicle for examining preservice teachers' emerging understanding of subject-specific pedagogy. However, the data did not strongly support nor refute added benefits to prospective teachers when the portfolios are developed/authored in an hypermedia environment. The researchers found limited evidence that the web-based environment in which the portfolios were crafted appears to support deep reflection. However, they found that the technology appeared to support critical reflection in that the students studied discovered that more traditional

text-based artifacts were not as powerful in demonstrating their ideas. Thus, they were forced to create new artifacts that often required them to synthesize course projects, school-based experiences, and other activities.

Although these are only a few examples of the use of electronic portfolios in education, they present a typology for the use of portfolios in many different learning contexts including: evaluation, first year teachers' reflectivity skills, elementary education students' understanding of the portfolio process, and secondary education students' understanding of subject specific pedagogy. Missing is an example of an institutional portfolio program where preservice students develop web-based portfolios linked to their coursework, teaching internships, and the state standards.

Portfolios can also be used by the organization to illustrate how the prospective teachers' course work and fieldwork reflect the teacher preparation program's focus. Similar to the NCATE requirements, the program theme is operationalized through the goals, objectives, and expected outcomes for each prospective teacher. LeMahieu, Gitomer, and Eresch (1995), observing at the Pittsburgh Public School District Portfolios in Writing Program, note that the use of portfolios in large-scale assessment is difficult, although not impossible. They quote Baxter, Shavelson, Goldman, and Pine (1992) who reported that while judges can agree reasonably well about performance on specific tasks, estimates of students across tasks are highly unstable. According to LeMahieu, Gitomer, and Eresch (1995) a relatively large number of performance tasks are needed (at least 8) to obtain stable individual estimates.

Agee (1991) contends that many institutions choose to use a thematic portfolio which grows out of the higher education institution's mission and is informed by best practice in the field. This thematic portfolio has value for prospective teachers in two ways. First, it provides clear teaching and learning goals: second the portfolio contributes to a common commitment to an educational vision of the classroom shared by the teacher preparation faculty, the prospective teachers, and the cooperating teachers in the field.

The portfolio theme promotes greater program coherence and collaboration among teacher education staff.

Finally, recent literature on teacher education portfolios raises the issue of the importance of educating faculty in the use of teacher preparation portfolios and the need to prepare preservice students in designing professional portfolios (Carroll, Pothoff, and Huber, 1996). However, little is known about either of these areas and more research in both areas is essential if program level change is desired. In order for portfolios to be embraced by students, university faculty must show support for the innovation.

Wolf (1991) provides insight into considerations central to an institutional portfolio program. He suggests that:

The institutional portfolio has three important features making it distinctive and promising:

1. It requires ongoing formal or informal consultation and collaboration among teacher preparation programs in the state.
2. An institution of higher learning must report on its partnership with area schools, thus promoting collaboration.
3. Multiple measures - especially the prospective teacher's portfolios and the graduates' and cooperating teachers' evaluations - promote holistic assessment of program effectiveness and encourage self-reflection by the teacher education staff.

A portfolio also represents an attitude that assessment is dynamic, and that the richest portrayals of teacher (and student) performances are based upon multiple sources of evidence collected over time in authentic settings. (p. 129)

Hill and Land (1998) contend that using situated contexts helps to assure that knowledge is not separated from either the process or context of applying it. The portfolio program implemented in the College of Education offers students an opportunity to develop web-based portfolios that contain illustrations of their proficiency of a collection of state mandated accomplished practices. Thus, giving

the students the opportunity to self-select illustrations of their work developed through their year long graduate program. Simultaneously, the implementation at the program level provides the opportunity for program level inquiry.

Reflective Aspects of Portfolio Development

Active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends constitutes reflective thought.

(John Dewey, 1933, p. 127)

Dewey believed that reflection was a necessary component of teaching and that reflection should be intentional and purposeful. Similarly, Schön (1983) believes that reflection involves experiencing understanding of oneself as a learner in a variety of contexts; organizing, monitoring, and evaluating one's learning to derive a renewed state of understanding about one's performance. If portfolios are vehicles for constructing knowledge then the activity of reflection is central to the development of teacher portfolios.

A variety of tools have been used to promote reflection. Pultorak (1993), found that the "reflective interview involved reflections from individuals concerning the caliber of their own teaching for a given lesson and created a more self-evaluative position and that reflective growth is more apparent during reflective interviews than in written products" (p. 36). In exploring the use of portfolios, Lyons (1998) contends:

The real power of a portfolio process for teacher interns or master teachers may well be in the acts of constructing, presenting, and reflecting on the contents or the evidence of a portfolio. This reflective, interpretive activity can result in the surety of the realization, "Yes, I am the teacher. I am ready to take responsibility for a class." Here the portfolio serves its most significant purpose: as a scaffolding for reflective teacher learning. Instead of presenting a set of courses and credits earned for purposes of credentialing and certification, the teacher apprentice-or expert- stands at the center of his or her own learning, defining and defending the authority of a credential. (p. 5)

The research of both Pultorak and Lyons implies that discussions with preservice teachers can help them become more reflective about their practice. Student participation in selection of information that is placed into the portfolio is one of the key features of an accurate representation of achievement and ability (Defina, 1996; Anthony, 1991). A student's ability to make informed decisions about what best represents him/her as an educator reflects a high level of professional knowledge. Arter (1995) contends that to date there exists very little hard evidence that demonstrates the impact developing a portfolio has on a student's self-reflection or critical thinking abilities, other than logical argument and anecdotes.

According to Ross (1989) "strategies for fostering the development of reflection include (a) communicating that knowledge is socially constructed, (b) modeling reflection, and (c) providing guided practice in reflective thinking and teaching" (p. 23). Ross concluded that although the ability to reflect about practice does not develop in one course, one course can provide an introduction to reflective thinking and can help students begin the elaboration of their appreciation systems. Ross (1989) believes that if reflection is to be more than a slogan, we must document our effectiveness in helping students develop reflective abilities. The instructor should design assignments that provide opportunities for students to reanalyze conclusions made previously in the course in light of new evidence. This requires a synthesizing of new evidence into previously held positions. Lin, Hmelo, Kinzer, and Secules (1999) echo the need to teach reflective skills: "Reflective thinking ultimately involves understanding one's own process of learning" (p. 46). In addition, Ross noted:

Without appropriate support, students have difficulty engaging in high-level reflective thinking. In their conversations with middle school history teachers they learned that with the support of information technology, many students can efficiently find information and memorize facts; but unless appropriate scaffolds are provided, they cannot explain why that information is relevant and important to understanding a particular historical period. Nor can they identify what is difficult for them to understand or about what they need to learn more. Students' inability to recognize the limits of their own knowledge and understanding also hinders them from taking actions to remedy this situation. (p. 44)

Teaching prospective teachers how to reflect is essential given the role of reflection in the work lives of effective teachers. Schön (1988) points out that reflective teaching requires careful planning and continual reflecting in practice and reflecting on practice about both the intellectual and ethical dimensions of classroom teaching and learning. In addition, he suggests that in order to promote reflective development one must offer continual coaching and practice, encouraging the student to reflect on his or her own practice. Unfortunately, engaging faculty in assuming these roles is difficult. Schön believes that a faculty member can only engage in the reflective coaching of teachers by working uphill against the institutional system and culture of the school. Because the epistemology and status system built into the modern research university, focusing on classroom practice is likely to be considered a second-class activity as compared to prevailing models of acceptable research veer away from it.

In their 1990 research on promoting and measuring reflective pedagogical thinking, Sparks-Langer, Simmons, Pasch, Colton, and Starko found that coaching has a positive effect on promoting reflection among teacher education candidates. Those teacher education candidates who received coaching scored higher in interviews geared to measure reflective thinking than those who did not receive coaching. Another example of this coaching may be found in the teacher education program at Bank Street College. Opportunities to engage in reflective practice have been woven throughout courses, activities, and ongoing dialogue in the Bank Street programs. In each case, the process involves the effort to develop the kinds of alert observation, constant questioning, and the

exploration of real world situations against the background of both theory and personal experience that Mitchell (founder of Bank Street College, in 1930) called for 65 years ago.

Teacher education programs provide fertile soil for promoting reflection. Lin, Hmelo, Kinzer, and Secules (1999) write:

In order to make conscious decisions about the uses of information, students have to step back and reflect on how they actually make decisions and solve problems and how a particular set of problem solving strategies is appropriate or might be improved. (p. 43)

In addition, Flavell (1987) believes that metacognitive reflection is more likely to be invoked in learning environments in which complex problems are embedded because of increased demand for conscious decision making and questioning. He also notes that people intuitively see the need for reflection when learning situations require sophisticated decision making and reasoning. Student creativity and reflection are important consequences of the portfolio development process. The power of the portfolio is in proactive decision making and reflection. Similarly, Lin, Hmelo, Kinzer, and Secules (1999) stated, “The basics required for success in our increasingly changing society are no longer simply reading, writing, and arithmetic, but the ability to think reflectively in order to make sense of information and to adapt learning flexibly to new situations” (p. 43). Bransford and Nitsch (1978) agree, “People who are able to learn and adapt are those who frequently reflect on the quality of their understanding and seek to go beyond what they know” (p. 44).

Sparks-Langer, Simmons, Pasch, Colton, and Starko (1990) developed a framework for reflective pedagogical thinking in their work in the Collaboration for the Improvement of Teacher Education (CITE), a pre-student teaching program that promotes students’ reflective thinking about curriculum, methods, and sociopolitical issues. This framework involved 7 levels of reflective thinking ranging from level 1, the lowest, with no descriptive language, to level 7, where the explanation includes

consideration of ethical, moral, and political issues. Their levels mirror Van Manen's (1977) idea of critical reflection. For the purposes of their study, the authors selected students at three different achievement levels to ensure variability in the interview sample. This study indicated that CITE students were beginning to apply pedagogical principles in making teaching decisions and showed greater gains in reflection than those students not in the CITE program.

In her dissertation, Huebner (1996) built on the research of Van Manen to examine the reflective development of preservice teachers. She argues that learning how to engage in reflection is especially needed because general research on teacher reflectivity suggests that beginning teachers lack critical levels of reflective thought both initially and with developmental coaching. She noted the following:

Constructivism encourages reflection in that the process of constructing individual understanding necessitates individual introspection. To build knowledge without reflecting is like building a bridge with your eyes closed. You need to examine, test, and revise what you are building in order to continue, otherwise you won't see the weak spots. Candidates who are encouraged to think more deeply about their practice are more likely to observe actions and reactions that may have otherwise gone unnoticed. (p. 10)

Huebner (1996) defines reflective practice as "the ability to think before, during, and after instruction in such a way that both class and individual student needs are considered, acted upon in the best of interests, and evaluated for efficacy" (p. 26). She argues that assessing reflective development happens along a continuum. In her dissertation Huebner examined the reflective development of candidates in a fifth year teacher education program using [traditional] teaching portfolios. Huebner identified three continua that characterize candidates' development over time. The continua suggest that teacher candidates develop from: (1) a state of confusion towards clarity, (2) a technical to a practical level of understanding, and (3) from a focus-on-self towards a focus-on-learning. Huebner asks the following questions:

1. How are students, who are keeping teaching portfolios in a teacher education program, demonstrating a development from a level of confusion-to-clarity in their thinking and articulation of their practice?
2. How are students, who are keeping teaching portfolios in a teacher education program, demonstrating a development from a level of technical reflection towards a level of greater conceptual awareness in their thinking and articulation of their practice?
3. How are students, who are keeping teaching portfolios in a teacher education program, demonstrating a development from focus-on-self towards a level of focus-on-learning in their thinking and articulation of their practice? (page v)

For her study, Huebner chose to work with teacher candidates and professors from a secondary education program at Santa Grazia College, a small private college in California. After eight months of data collection in the form of portfolio review, interviews, classroom observation, surveys, and actual meetings with the teaching candidates, Huebner found that the most prominent change in continua was along the line from confusion-to-clarity. Huebner noted:

Overall, this study provides evidence from both candidates' portfolios and surveys and was reinforced by interviews, classroom observations and meetings that the Santa Grazia teaching candidates showed reflective development along all three continua over time. The most prominent continua was the development from confusion to clarity. All candidates showed positive movement from a state of confusion about issues surrounding teaching and learning towards one of more clarity. This development manifested itself in candidates' reflective commentaries in the following ways: developing an increased awareness about environment, showing a more developed understanding of pedagogical content knowledge and assessment, making specific recommendations for self-improvement, and acknowledging initial naiveté and replacing it with a more realistic picture of teaching and learning. In order to train teacher candidates to be more reflective in their practice, teacher education programs must design contexts that will help candidates to develop habits of mind that facilitate reflective reactions. (p. 31)

As demonstrated, and as will be explored in this study, the teaching portfolio can act as a vehicle through which students reflect about their learning, teaching, state and national standards and begin to make connections between them. This occurs as the prospective teacher selects an illustration and forms an accompanying rationale

statement. Through the development of a rationale statement with each FAP illustration, students state why they chose a particular illustration and how the illustration connects to the accomplished practice. Wolf (1991) explored the power of the illustration/reflection connection.

What is necessary, along with actual samples of performances, are descriptions and interpretations of the evidence and the teacher's reflection on the significance...On the other hand, reflections alone are not sufficient either. For without connecting these reflections to actual samples of performance, they tell us what teachers say they do, but not necessarily what they actually do. (p. 9)

Shulman (1987) describes the importance and complexity of this activity:

Through interviews, observations, structured tasks, and examination of materials, we have attempted to understand how they commute from the status of learner to that of teacher, (The metaphor is commuting is not used idly. The journey between learner and teacher is not one-way. In the best teachers, as well as in the more marginal, new learning is constantly required for teaching.) from being able to comprehend subject matter for themselves, to becoming able to elucidate subject matter in new ways, reorganize and partition it, clothe it in activities and emotions, in metaphors and exercises, and in examples and demonstrations, so that it can be grasped by students. Furthermore, to educate is to teach in a way that includes an account of why you do as you do. While tacit knowledge may be characteristic of many things that teachers do, our obligation as teacher educators must be to make the tacit explicit. Teachers will become better educators when they can begin to have explicit answers to the questions, "how do I know what I know" how do I know their reasons for that I do? Why do I ask my students to perform or think in particular ways?" The capacity to answer such questions not only lies at the heart of what we mean by becoming skilled as a teacher' it also requires a combining of reflection on practical experience and reflection on theoretical understanding. (p. 33)

In addition to these metacognitive features of reflection, Philion (1997) and Yagelski (1997) look to reflection as a constructive way for students to begin to control their learning. According to Yancey (1997), reflection promotes better teaching. Public portfolios seem to enhance the reflective process. Burch (1997) Paulson and Paulson (1990) and Hawisher and Selfe (1997) propose the idea that portfolios enable students to

understand themselves better as learners, while Beerens (2000) believes that reflection and revisions become more motivating when there are public audiences to evaluate and coach students' work and thinking.

Elder and Paul (1994) add to our understanding of reflection in their series of papers written on the subject of critical thinking. Their working definition of critical thinking is the ability and disposition to improve one's thinking by systematically subjecting it to rigorous self-assessment.

Persons are critical thinkers, in the fullest sense of the term only if they display this ability and disposition in all, or most, of the dimensions of their lives (e.g. as a parent, citizen, consumer, lover, friend, learner, and professional). We exclude from our concept of the critical thinker one who thinks well in only one dimension. (p. 34)

They contend that introducing critical thinking successfully into instruction there are, broadly thinking, two things that must be understood: (1) the basic principles of critical thinking and (2) ways and means for using critical thinking as a fundamental tool for deeply learning the logic of content. (p. 34)

Paul and Elder (1994) suggest:

Critical thinking is not something *additional* to content, but rather *integral* to it, something which in fact "defines" the manner in which content is organized, conceptualized, and applied by experts in the field. One learns critical thinking by doing critical thinking. (p. 34)

In their fourteen part series Elder and Paul (1995) provide a guide that helps people come to terms with the long-term nature of the developmental process of becoming critical thinkers and the basic stages through which they will pass. They make the following assumptions: (a) that there are predictable stages through which every person who develops as a critical thinker will pass and (b) that passage from one stage to the next is dependent upon a necessary level of commitment on the part of an individual to develop as a critical thinker, and it is not automatic. Regression is also possible. According to Paul and Elder (1995),

Our present approaches to critical thinking are typically unrealistic. They are not based on a realistic model of the process by which students could actually advance as critical thinkers. They naively assume that teachers are already critical thinkers. It is time that we look at critical thinking in a developmental manner and recognize that until people are challenged” to examine their uncritical beliefs, prejudices, and dispositions they are not genuinely ready to begin to develop as critical thinkers--that until people are willing to regularly “practice” critical thinking, they are not ready to develop significantly as thinkers. (p. 35) Consequently, "We must recognize that in the present mode of instruction it is perfectly possible for students to graduate from high school, or even college and still be largely unreflective thinkers. (p. 34)

Authentic Assessment

Grant Wiggins (1988) coined the term authentic assessment to describe assessments that are performance based, realistic, and instructionally appropriate. Given the constructivist nature of portfolio development an understanding of authentic assessment is key to the portfolio development process. Before the learner can be actively involved in constructing his or her own knowledge, assessment must change to become a developmental, formative, and authentic process. There are many ways to describe the assessment of students, and we use many terms to label this practice. For example, Kathleen Cushman (1999) uses the term enlightenment *not evaluation* to describe her approach in the assessment of her students.

Sound assessment is anchored in tasks, materials, and contexts involving students and teachers through classroom instruction (Johnson & Rose, 1997). Martin-Kniep (1998) defines authentic assessment tasks as those that require students to engage with real or plausible problems and challenges. These problems are contextualized and require that students use knowledge and skills to engage in disciplined inquiry and present their learning to an audience that could naturally use or care about the information presented. Martin-Kniep defines process assessment as the assessment of students’ thinking about

their learning or performance, and outcomes as statements that define what students ought to know, be able to do, or value. In the collect, select, reflect model of portfolio development, students must build a case for the illustrations they choose to include in their portfolio: why did I choose to use this illustration and how does it address my competency in a particular accomplished practice?

Moon (1997) and Aschbacher and Herman (1991) have both noted that a shift to performance assessments requires a deeper level of conceptual involvement and intense reflection not only on the part of students, but also from teachers and other educators. Teachers are also being asked to engage with students in new ways (such as monitoring small group work, conferencing with students over portfolios, coaching performances in simulations) and to assume more authority for evaluation than previously, but with little assistance or practice in designing and using new instructional and assessment strategies. In an environment that has typically rewarded swift, tidy work, many teachers, like their own students, require much reassurance that they have permission to take time to ponder and discuss new concepts, participate in a “grungy” process, as one teacher put it, and make mistakes along the way. Even with such reassurance, however, many teachers are reluctant to lower their tenuous comfort zone--by risking the loss of what little control, respect, motivation to learn, and academic success that they are able to command among students in the current school environment (as quoted by Aschbacher, 1994, p. 28).

Reisetter and Fager (1995) noted:

Constructivism serves as an appropriate theme for the design of an assessment program used in teacher preparation. Three points serve to address the appropriateness of this approach:

1. Constructivism provides for a coherent view of teaching in order to measure the coherence of such a view instruments need to follow suit.

In order for an assessment to follow the constructivist philosophy, it needs to be consistent with instruction.

2. Constructivism contends that learners must be actively involved in their own representations of knowledge.
3. Students benefit from integrated schematic structures in the learning process. (p. 7)

Van Sickle and Hoge (1991) contend that attention to this complex type of learning and assessment enables students to develop higher order thinking skills and to develop strategies for learning. When assessment follows constructivist form, then consequently the student will have a more active role in the assessment process. By its very definition, constructivism indicates that assessment should become an ongoing developmental process. According to Nickerson (1989), "If higher order cognitive functioning is a major goal of education, assessing such functioning is likely to be futile until better methods are developed for measuring success in this regard" (p. 24).

Reisetter and Fager (1995) suggest:

It is crucial to develop assessment instruments that serve the final goals of education programs, that focus on the kind of content, skills, and processes that teacher educators consider essential, and that these instruments permit students to demonstrate competency on significant goals and using important information. (p. 6)

Using authentic forms of assessment will not only provide information about an individual student's skills, but can also be used to observe the complexities of teaching in context, that is, situations that parallel the real world. This is evident in the use of activities such as reflections, which encourage transfer of information and integration of new knowledge. Using portfolios enables students to participate in their own evaluation, allowing them to make decisions about what work is an appropriate example of a specific practice while hopefully making connections among examples. This self-evaluation process encourages students to become partners in their education.

Matovinovic and Nocente (2000) believe that when students are involved in authentic situations, the concepts are contextualized and the connections between them are more apparent. The authors conducted a study of high school science students that integrated the use of technology in a constructivist environment. The project was developed out of a need to address a concern regarding the traditionally ineffective integration of technology in the high school science curriculum. This project involved a general science course given to two groups of tenth-grade students in a high school with a science and technology focus. They found that the constructivist approach toward learning ensured that students are actively involved in their own learning in meaningful ways, are encouraged to monitor and reflect upon their own learning, and are continually building upon their prior knowledge base.

CMAP Assessment Model

Given what we know about authentic assessment, what specific research has been conducted to facilitate portfolio assessment? Paulson and Paulson (1990), in their paper presented to the Northwest Evaluation Association, recommended that portfolio assessment requires a multidimensional, cognitive process model. They call this the Cognitive Model of Assessing Portfolios (CMAP). The CMAP was structured after Robert Stake's (1967) responsive evaluation where evaluation is tailored to the activity and understanding is refined overtime. Stake (1975) stated, "More ambiguity rather than less may be needed in our reports. Oversimplification obfuscates." In a later article about CMAP Paulson and Paulson (1994) noted:

CMAP may be used as a lens to view, think about, and make decisions about portfolio projects. The [CMAP] model is designed to be broadly descriptive, yet provide a framework for presenting both quantitative and qualitative data in a coherent fashion. The model does not necessarily

produce convergence in a single, bottom-line, snapshot kind of result. Rather, its purpose is to provide a comprehensive view of complex learning outcomes in context. (p. 6)

The CMAP views portfolio assessment from a constructivist paradigm. The CMAP views a portfolio simultaneously from three different perspectives:

- (1) the stakeholder, people influencing or being influenced by the portfolio.
- (2) process, the activities involved in constructing the portfolio, and
- (3) the record of change it presents over time, history. (p. 2-3)

In order for the project to be successful, it is imperative that all stakeholders (stakeholders defined by Paulson and Paulson, 1994, as individuals who play an active role as participants in shaping the project) be involved in the process from the beginning. CMAP was developed because

Portfolios are by nature complex and holistic pictures of learning and we wanted to provide an analysis model that preserved as much complexity as possible. Second, we were concerned about the aggregation of portfolio data. Efforts to aggregate data usually involve standardizing the events being aggregated. Our concern was that attempts to aggregate might change the very thing being aggregated (Paulson and Paulson, 1994).

Paulson and Paulson (1990) contend:

While testing is top-down (based on Hansen's definition of testing as representational and imposed), something done to someone by another, portfolios are bottom-up, reflecting the desire of someone to communicate documentable information. By imposing standardization, you destroy the individuality of the portfolio thus subverting the very process you are trying to promote. (p. 11)

Paulson and Paulson (1994) argue that portfolio assessment is better suited to the constructivist model, in that efforts to apply the positivist model to portfolios invariably impose meanings that are different from those of the learner. "The portfolio is a way of including students in the assessment process. It is a place where it is perfectly legitimate

for the student to deliberately try to influence others' beliefs in what they know" (Paulson and Paulson, 1994).

Summary

This chapter examined the literature relevant to systemic innovation and change. In it I reviewed the research of Rogers, Fuller, and Hall regarding innovation diffusion and change theory. An explanation of constructivism, Cognitive Flexibility Theory, and authentic assessment were presented as learning environments and assessment techniques which may facilitate change. The chapter discussed the electronic teaching portfolio with its focus on reflection and technology to act as a catalyst for systemic, curricular, and student change in a college of education. Chapter three discusses the proposed model for the study and illustrates the relationships between the project and the literature reviewed.

CHAPTER 3 METHODOLOGY

The purposes of this study were two-fold. First, the study explored the diffusion of an innovation in the form of electronic portfolios in the Secondary Teacher Education Program in the College of Education at the University of Florida. Second, this study explored the influence the e-Portfolio Project had on the professional growth of preservice teachers. Of interest are the facilitators in the implementation of such a program, the development of students as professionals, as well as changes in a student's use of technology that occurred during this study. This chapter describes the research site and the participants, explains the research methods and data analysis methods, defines the relevance of the methodology to the research questions, and discusses the reliability of the research. The research findings are likely to provide the groundwork for colleges of education considering a program wide innovation in the form of electronic portfolios.

The electronic portfolio is an innovation to the preservice teacher education program in the college of education. Implementation and program development are both formative and dynamic. As a result, the methods selected for this study are both formative and dynamic. In the mid 1970's Vygotsky proposed what he called "genetic" research methodology that would deal with qualitative data rather than quantitative data. He was particularly interested in observing thinking processes as they developed and in

trying to determine the instructional techniques that were most effective in promoting learning (Kantowski, 1979). In the case of the portfolio project underway in the College of Education, it was not appropriate to examine the program without addressing and correcting problems as they became evident. Building on the research of Vygotsky, “The Teaching Experiment” was introduced by Menchinskaya in 1969. In this model, the teacher constructs methods of teaching based on a hypothesis outlined in the basis of observations and preliminary experiments, and studies the effect of those methods of instruction. The instruction may be preplanned or agreed upon by the researchers and the teachers during the course of the experiment. Often changes are made as the research continues (Kantowski, 1975). This methodology is closely aligned with the electronic portfolio project in that the goals and methods of implementation were designed prior to the project’s implementation. Throughout the first year of the project these goals and methods were continually reexamined and refined and changes were implemented immediately, thus making the portfolio project student centered, formative, and dynamic. Consequently, this study applied methodology employing an interactive, “dynamic” approach parallel to the one used by Menchinskaya in “The Teaching Experiment.” Kantowski noted, “Kalmykova’s model has great potential for the development of instructional sequences. It is so simple, yet ingenious: observe behaviors that lead to success and those that do not; isolate differences; propose a model using successful techniques; test the model” (1974). This theoretical frame complimented the portfolio project and the way in which it was diffused throughout the ProTeach curriculum. The dynamic nature of this research is better suited to the evaluation of a project under development than methods of forming a hypothesis, evaluating, and writing a report.

Qualitative research involves studying things in their natural settings. In examining the implementation of the portfolio project, I sought to identify variables in the school's culture, which enhanced or impeded the development of the project.

To understand the changes that took place in the college as a result of the electronic portfolio project it is necessary to define the term portfolio. Although chapter 2 includes a variety of definitions, the definition that is most closely aligned with the conceptual framework of the Electronic Portfolio Project under investigation is that of Winsor and Ellefson (1995), "A fusion of processes and product. It is the processes of reflection, selection, rationalization and evaluation, together with the product of those processes" (p. 68). Snyder, Lippincott, and Bower (1998) stated, "these mixed purposes give teacher educators better tools to support the growth of students" (p. 140). It is the combination of collection, selection, and reflection that enables students to become more active participants in their education, thus, becoming more reflective practitioners.

Since the purpose of this study was to explore innovation diffusion in a College of Education Secondary Education Program, the research methods best suited to this study were qualitative. Qualitative methods permit the researcher to study issues in depth and detail in their natural settings (Patton, 1990). In examining the implementation of the portfolio project, I sought to identify variables in the school's culture that enhanced or impeded the development of the project.

Table 3-1 explains the research questions, the data collection procedures employed and the method of analysis.

Table 3-1. Research Questions, Data Collection, and Analysis

Research Questions	Data Collection	Analysis
1. How does the Secondary Education Program impact the innovation effort, that is. the e-portfolio Project? 2. How does the innovation effort impact the Secondary Education Program? 3. How do students exhibit professional growth when developing a portfolio in response to a set of accomplished practices? 1. In what ways does the student's rationale statement reflect understanding of the appropriateness of the illustrations for the accomplished practices? 5. In what ways do students' illustrations change to include a variety of media as they develop their electronic portfolios over time?	<ul style="list-style-type: none"> • Student interviews • Field notes • Student Portfolios • Participant observation <ul style="list-style-type: none"> • Field notes • Exit interviews • Student portfolios • Participant observation <ul style="list-style-type: none"> • Student portfolios 	<ul style="list-style-type: none"> • Case Study • Innovation Diffusion Theory (Rogers, 1983) • Teaching Experiment (Mechinskaya, 1969) <ul style="list-style-type: none"> • Case Study • Teaching Experiment (Mechinskaya, 1969) <ul style="list-style-type: none"> • Document analysis

To answer the questions: “How does the Secondary Education Program impact the innovation effort, that is the e-Portfolio Project?” and “How does the innovation effort impact the Secondary Education Program?” data collected during the project were the primary sources of information. The “teaching experiment” provided a broad frame for the evaluation of the electronic portfolio project. Kantowski (1974) noted an essential feature of this type of research is its “dynamic” aspect. Processes are observed “in the making” at various stages of development under the influence of instruction so that “movements” or changes in the processes at these stages can be detected. This theoretical frame complimented the portfolio project and the way in which it was diffused throughout the ProTeach curriculum. Based on the “Teaching Experiment” Figure 3-1 demonstrates the differences between the traditional model of implementation and the portfolio model. Students developed their portfolios at home or in the lab using the virtual support mechanisms put in place to assist them with little assistance from their professors, so it was crucial that all support structures be easy to use. In addition, as new questions and suggestions arose from students or faculty they were addressed immediately and, if warranted, additional tutorials or “frequently asked questions” were added to the existing support structures thus enhancing the project and available support. The portfolio project is in development and its success is dependent upon participant feedback and subsequent change. For example, the availability of email has enabled conversation and support to be ongoing and immediate. One student commented about the way email had assisted her with the development of her portfolio: “I spoke with you. You responded to emails just great, because you were always checking it” (SE4). Email

conversations such as this contributed to the formative development of the e-Portfolio Project. Formative research not only helps to implement suggestions, but also allows for the detection and correction of errors along the way. When the goal is change, formative research of this kind becomes part of the system under study.

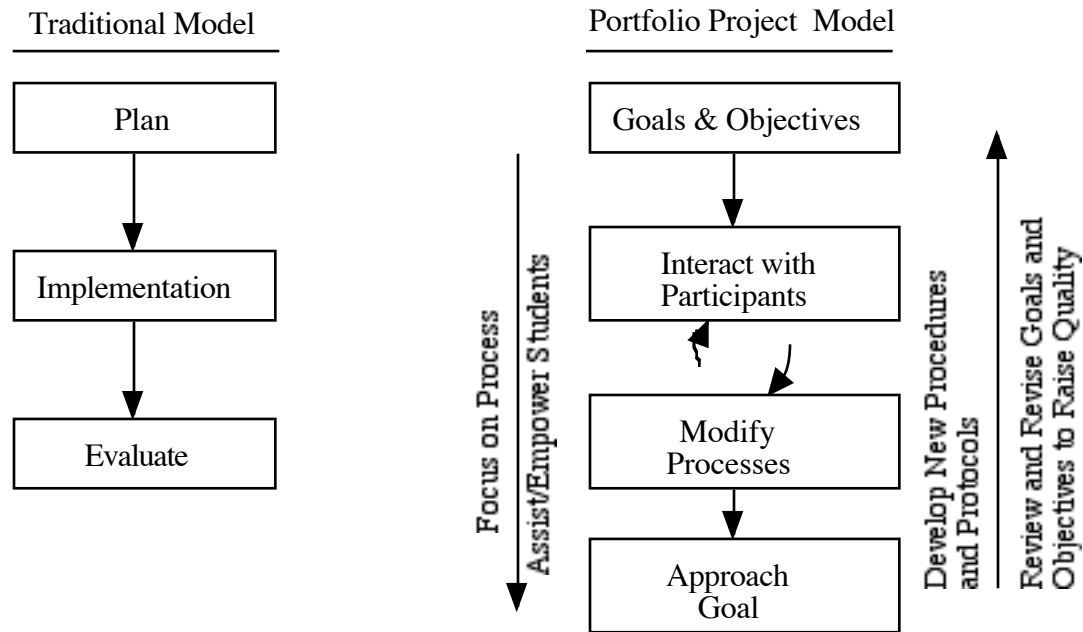


Figure 3-1. Portfolio Project Model

As Kantowski stated in her 1974 study, “there is always a danger of frustrating students, particularly good ones, by giving them problems for which they feel inadequately prepared. The developmental nature of the study was constantly emphasized and the subjects¹ were continually reassured.” The portfolio project was implemented in much the same way. The researcher looked at this project as one that has many elements that were to be addressed simultaneously. Many of these elements dealt with the attitudes of participants. It was important that the students never felt abandoned in this project and

¹ Subjects are referred to as participants in this dissertation study.

that their efforts were continually supported. Students' reactions will be discussed in depth in chapter 4.

In addition, the research of Rogers (1995) on Innovation Diffusion Theory served to guide the implementation of electronic portfolios on a curricular level throughout the Secondary ProTeach Program. I used the categories communication, integration, and reflection to identify useful domains and to inform interpretation of the data. In chapter 4 I describe the ways in which Rogers' research on innovation diffusion contribute to the understanding of the implementation of the e-Portfolio Project and the way in which it was implemented in the Secondary ProTeach Program. Rogers' model depicting the variables determining the rate of adoption (figure 3-2) helps to inform an understanding of the data.

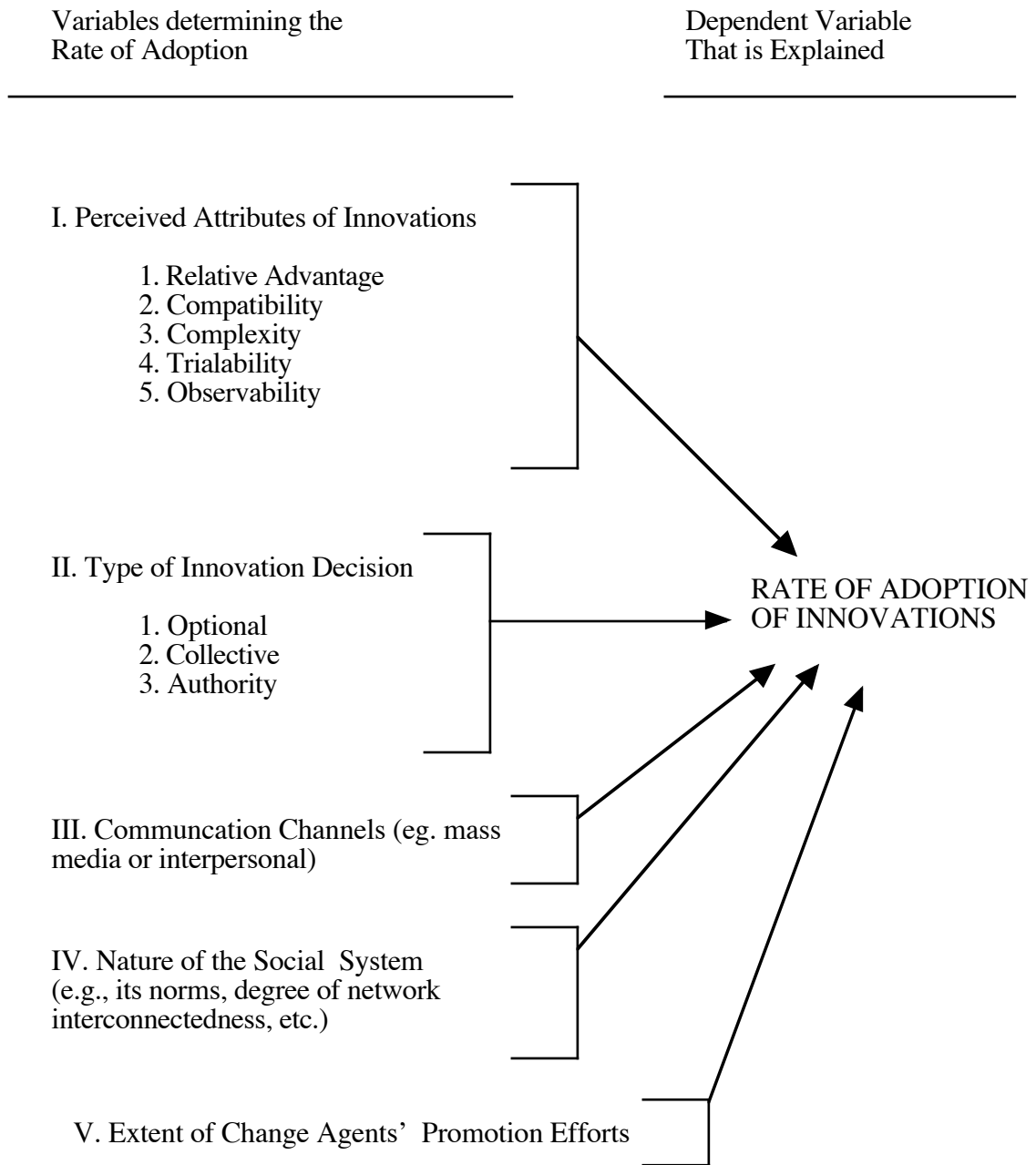


Figure 3-2. Variables Determining the Rate of Adoption (Rogers, 1995, p. 207)

The case study method was also used to address the first two questions of this study. Case study methods work well for this particular type of study because the focus is on a program or group in a real life context (Yin, 1994) and it is well suited to a study interested in process (Merriam, 1998).

The case study method was used to answer the third and fourth questions: “How do students exhibit professional growth when developing a portfolio in response to a set of accomplished practices?” “In what ways do a student’s rationale statements reflect understanding of the appropriateness of the illustrations for the accomplished practices?” To explore these questions the students’ electronic portfolios were examined, exit interviews conducted, and field notes reviewed. The portfolios were examined over the one-year period of development and revision to understand how the portfolios evolved. I also collected and analyzed student questions and comments. In addition, audiotapes from student exit interviews were transcribed and analyzed.

Addressing student questions such as: What do you think of my portfolio? Or I’m not really sure I understand how to write a rationale statement, would you give me some feedback?” contributed to greater insight into students’ problems and misunderstandings leading to additional observations by the researcher. Portfolio evaluations were conducted with the belief that each student is unique and approaches the project from a unique perspective, with varying degrees of proficiency. While portfolios were reviewed and student experiences were examined at the individual level each content area group was analyzed as a whole to describe the group differences that occurred during this study. For example, although each English education student was analyzed individually, the group of English education students was evaluated as a whole to learn what may have contributed to the successes and failures that may have occurred. Descriptive interpretations were constructed explaining features and patterns of each student’s and groups of students’ level of participation and professional development.

A document analysis was conducted to answer the fourth question: “In what ways do students’ illustrations change to include a variety of media as they develop their electronic portfolios over time?” Since the beginning of the project in the fall of 2000, the researcher had access to all the students’ electronic portfolios. The students’ portfolios were saved to a compact disc weekly to retain a “snapshot” of all electronic portfolios. This was done to record the changes students made to their portfolios over the course of their year long graduate program. Of particular interest in this study were data on content revision and technology centered improvements. A chart was developed to report the students’ movement along a technology continuum. This chart will have historical significance as the portfolio project continues to be researched.

Setting of the Study

Description of the Site

The secondary education program is a one-year graduate program beginning in the fall semester and continuing through the following summer. During the first semester (fall) students take a block of methods courses (12 hours), and the second semester (spring) the students begin their student teaching while attending courses pertaining to their subject area. During the third and final semester (summer) students enroll in content courses and a common course in secondary education curriculum. Although students take courses as a group every semester, most of their courses are taken as content blocks with one professor. Thus, each content area group of students works primarily with one professor throughout the Secondary Education Program.

The electronic portfolio project was designed as a forum for preservice teachers to demonstrate their proficiency with the 12 Florida Accomplished Practices. The state of

Florida requires that all preservice teachers enrolled in state accredited colleges of education show multiple demonstrations of proficiency for each of these 12 practices. Rather than placing the responsibility of collecting this information and presenting it to the state on professors or administrators, the college decided to require that each student maintain his or her own record. The electronic portfolio was determined to be the appropriate vehicle for presentation and dissemination of this information. It was the college's goal that developing and maintaining the e-portfolio would enable students to:

- Present growth and learning over time.
- Self-select the illustrations for each of the 12 FAPs.
- Present evidence of reflection in the form of rationale statements.
- Present visible signs of connecting theory and practice within their education program.

The University of Florida requires that all students have 24-hour access to a computer. This requirement has helped the project in that it is assumed that the technology is available to students and it is their responsibility to access it. We made certain that there was no additional financial burden placed on the students for access to software as all the software necessary for portfolio development, revision, and publication is free and available to students on both the PC and Macintosh platforms.

Selection of the Site

This study was conducted in the Secondary ProTeach Program in the College of Education at the University of Florida. The site was selected based on several criteria: (a) the secondary education program is a bounded (Merriam, 1998) one year program culminating in a master's degree in teacher education. The bounded nature of the program makes possible observation of the portfolio project from start to finish and offers

the opportunity to observe growth over time, (b) studying the same group of students over time makes learning about the problems and making the appropriate changes throughout this first year of implementation possible and pragmatic, (c) the size of the sample enabled the researcher to become intimate with the participants. Intimate involvement means building trust between the researcher and the participants (LeCompte & Schensul, 1999). Trust building provides credibility to the study (Lincoln & Guba, 1985).

Description of the Subjects

The participants in this study were graduate students majoring in secondary education. The Secondary Education Graduate Program is a NCATE accredited one-year master's degree program culminating in teacher certification. The secondary ProTeach faculty under girds their programs with knowledge drawn from research on effective teaching, teacher reflection, and subject area learning (<http://www.coe.ufl.edu>).

Sixty students were enrolled in the secondary education program, of which 57 participated, completed, and published an electronic portfolio: 27 English education students, 18 social studies education students, 5 math education students, 5 science education students, and 2 foreign language education students. Both male and female students participated in this study. All student data was kept confidential and each student assigned a code to protect their anonymity.

Data Collection

To chart the progress of the dissemination of the portfolio project throughout the college of education the researcher gathered multiple sources of evidence as she followed a group of preservice teachers throughout the development, publication, and revision

process of their electronic portfolios. Project data collected consisted of field notes compiled from email correspondence and informal conversations, transcriptions of taped exit interviews, informal surveys, the student developed portfolios, and participant observation notes taken throughout the duration of the project.

Field notes

Field notes consisted of the emails received from students, and informal dialogues that occurred in the computer lab, the director's office, or in the secondary education classrooms. Daily email correspondence from students were collected to help understand the frustrations and exhilarations they faced throughout the development and revision process of the portfolios, address emerging needs, and document the portfolio development process.

Interviews

Exit interviews focusing directly on the portfolio project were conducted with voluntary project participants at the end of their graduate studies. Data were collected on-site when possible, or via the telephone, with 25 of the students participating in this project. The students interviewed were both male and female, and were students from the secondary English, mathematics, social studies and science programs. These interviews utilized a standardized open-ended interview described by Patton (1990).

The basic purpose of the standardized open-ended interview is to minimize interviewer effects by asking the same question of each respondent. Moreover the interview is systematic and the necessity for interviewer judgment during the interview is reduced. The standardized open-ended interview also makes data analysis easier because it is possible to locate each respondent's answer to the same question rather quickly and to organize questions and answers that are similar.

There are three major reasons for using standardized open-ended interviews as part of an evaluation:

1. The exact instrument used in the evaluation is available for inspection by decision makers and information users;
 2. Variation among interviewers can be minimized where a number of different interviewers must be used; and
 3. The interview is highly focused so that interviewee time is carefully used.
- (p. 285)

Each participant was asked the same questions in a one-to-one interview (Appendix B).

The interview questions asked students about their experiences with the portfolio project, understanding of the accomplished practices, use of technology, collaboration with others throughout the project, and the reflective aspects of portfolio development. The interviews lasted from 20 minutes to 1 hour with the average interview lasting 30 minutes. Interviews were tape-recorded and all interviews were conducted in private. Once the data was transcribed from the audiotapes the tapes were erased. The taped interviews were transcribed into typed protocols.

Surveys

At the beginning of the first semester of the project informal surveys were administered to determine the students' baseline knowledge regarding technology use, the Florida Accomplished Practices, and their definition of reflection. An example of this survey is found in Appendix C.

Student Portfolios

As the director of the portfolio project, the researcher had access to all student portfolios. The portfolios were examined for completion, quality, and complexity of the illustrations. In addition, the portfolios were systematically examined using the research questions as a guiding framework. Additionally, revisions of the portfolios were examined to allow emergent patterns to surface (Lincoln & Guba, 1985). Portfolios were

reviewed weekly to examine changes in students' work, provide students ongoing and formative feedback regarding their rationale statements, and to alert students to problems in their portfolios.

Participant Observation

Because of the self-directed aspect of this project, students chose where they worked on their portfolios. Many students chose to work at home. However, some students chose to work in the computer lab, or in the Office of Educational Technology. When possible, observations of the student's behavior as they worked on their portfolios were made and recorded.

Data Analysis

Data analysis in this study encompassed an on-going careful analysis of multiple sources of data. According to Patton (1990):

One important strategy of conducting evaluation research is to employ multiple methods, measures, researchers, and perspectives but to do so reasonably and practically. Combinations of interviewing, observation, and document analysis are expected in much social science fieldwork. Studies that use only one method are more vulnerable to errors linked to that particular method (e.g. loaded interview questions, biased or untrue responses) than studies that use multiple methods in which different types of data provide cross-data validity checks. (p. 188)

The term triangulation is defined as the "combination of methodologies in the study of the same phenomena" (Denzin, 1970). The combination of multiple methods is helpful to insure the validity of the study because the strengths of one method can offset the weaknesses of another. The multiple methods used in this study to collect data were student interviews, analysis of portfolios, student observation, and field notes.

Theoretical Saturation

Glaser and Strauss (1967) noted that the process of data analysis could be considered finished when the analyst reached “theoretical saturation.” They added, however, that when studying an innovation, it was difficult to determine such a point. In the e-Portfolio Project the innovation is still underway and has not been fully diffused throughout the program. The secondary education program was used as the basis for this study because the researcher felt studying the implementation over the course of a one-year program could provide the researcher a beginning and an end and supply information for the elementary and early childhood programs currently underway. Throughout the study, there was continuous data collection, analysis, and revision in an attempt to achieve “theoretical saturation.”

Issues of Reliability and Validity

Reliability of Results

Reliability issues are concerned with factors such as generalizability and repeatability of the study. Sherman and Webb (1988) contend that repeatability of a study is dependent on comprehensive and elaborate description.

To enhance the reliability of my study I addressed the following issues:

- Researcher’s position. As the director of the electronic portfolio project in the College of Education and an outside consultant on similar projects, I am considered an authority on the topic.
- Triangulation of data. While the bulk of the information gleaned in this study was from the exit interviews of students, additional data sources were used such as field notes, student portfolios, and student surveys.
- Audit trail. An extensive audit trail that defined the project, what was done, and when it was done was collected over the course of the study. The audit trail is in the form of project white papers housed in the portfolio office, typed project

- notes, a portfolio manual, and multiple status reports supplied to current administration.
- Mechanically recorded data. LeCompte and Goetz (1982) recommended using audio and videotapes to record interviews and events accurately. All interviews were recorded and transcribed.

Validity of Results

The idea of the study resulted from an interest in how an innovation is diffused in a graduate program in a college of education through the implementation of an electronic portfolio project. Consistency of the research results was attained through a triangulation of data sources (interview, survey, documents, field notes).

Internal validity. According to Merriam (1988), credibility deals with the question of how one's findings match reality. "One of the assumptions underlying qualitative research is that reality is holistic, multidimensional, and ever-changing; it is not a single, fixed, objective phenomenon waiting to be discovered, observed and measured" (Merriam, 1988, 167).

To enhance the credibility of my study I addressed the following issues:

- Peer feedback. Communication with peers regarding the findings of the study was essential to checking my biases and the validity of the study.
- Participant involvement. Throughout the course of this study I had frequent feedback and communication from participants to ensure that my interpretations were correct, allowing participants to clarify data and/or refute interpretations.
- Triangulation of data. While the bulk of the information gleaned in this study was from the exit interviews of students, additional data sources were used such as field notes, student portfolios, and student surveys.

External validity. Rich, thick description contributes to the transferability of the study (Lincoln & Guba, 1985). Merriam (1988) states, external validity of a qualitative

study can best be thought of in terms of reader or user generalizability. Does the work enhance the reader's understanding of the innovation under study? What insights can the reader gain that can be applied to their setting? In the following chapters these questions will be discussed and answered. The findings of this study will help to inform other colleges as they face change or implement similar projects in their schools.

CHAPTER 4

THE ELECTRONIC PORTFOLIO PROJECT AT THE UNIVERSITY OF FLORIDA

This study explored two layers of questions: innovation at the systemic level and how the innovation under study affected the students enrolled in the Secondary Education Program in the 2000-2001 academic year. This chapter will explore the diffusion of an innovation in the Secondary Teacher Education Program in the College of Education at the University of Florida. The innovation under study is the Electronic Portfolio Project implemented into the Secondary Education Program in the year of 2000. The focus of this chapter is on innovation diffusion at the program level. Specifically, this chapter will discuss findings related to the following two questions:

1. How does the Secondary Education Program impact the innovation effort, that is, the e-Portfolio Project?
2. How does the e-Portfolio Project innovation impact the Secondary Education Program?

The findings are drawn from an analysis of field notes, email correspondences, and exit interviews. Collectively, these three sets of evidence contain the details surrounding the first year of the project which is the period under study.

The diffusion research of Rogers (1995) and the portfolio evaluation model, based on the teaching experiment research originating from Kalmykova (1967), served as the framework for addressing the research questions under study. Rogers' variables

determining the rate of adoption of an innovation provide the framework for presenting the findings of my research. The five variables identified by Rogers (1995) to determine the rate of adoption are: the perceived attributes of the innovation, the type of innovation decision, the communication channels, the nature of the social system, and the extent of the change agent's promotion efforts. Of these five variables perceived attributes of the innovation, communication channels and the nature of the social system apply to the first question under study while perceived attributes of the innovation, type of innovation decision, communication channels, and extent of the change agent's promotion efforts apply to the second question.

To answer the first question: "How does the Secondary Education Program impact the innovation effort" I examine and discuss how the following variables related to the rate of adoption as defined by Rogers (1995, see figure 3-2):

- Perceived attributes of the innovation: compatibility and trialability
- Communication channels
- The nature of the social system: the culture of the Secondary Education Program and the characteristics of adopters.

Rogers (1995) defines rate of adoption as the speed with which an innovation is adopted by members of a social system. I will provide evidence that through the cyclical process of introduction, implementation, interaction, feedback, project modification, and goal revision (Figure 3-1) ongoing project renewal was achieved. In other words, through the examination and revision of the aforementioned project elements I will provide evidence that the Secondary Education Program impacted the e-Portfolio Project.

Perceived Attributes

Rogers outlines five perceived attributes of an innovation that facilitate or inhibit diffusion. These five attributes are: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. Although early research of innovation was conducted with farmers, later studies of teachers and school administrators (Rogers, 1985) indicate that educational innovations have similar attributes that predict rate of adoption. Of the perceived attributes that predict the rate of adoption, compatibility and trialability are most pertinent to the impact the Secondary Education Program had on the innovation effort, others relate to the impact the innovation had on the program (relative advantage, complexity, and observability) and will be discussed later.

Compatibility with needs

Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 1995). An idea that is more compatible is less uncertain to the potential adopter and fits more closely with the current environment. Such compatibility helps the adopter give meaning to the new idea so that it is regarded as familiar. An innovation can be compatible or incompatible (1) with sociocultural values and beliefs, or (2) with previously introduced ideas or practices. The more compatible an innovation is to the existing culture and/or program the less of a change in behavior it will require.

Similarly, there are elements of the Secondary Education Program that fit compatibly with the e-Portfolio Project thus contributing to its rate of adoption. Some of these existing elements aid in the diffusion of the innovation, other elements may hinder

the diffusion process, while still others may both help and hinder the diffusion. The preexistence of portfolios in the program is one such example. For example, in the Secondary Education Program some program areas required students to develop traditional paper portfolios. By building upon the existing portfolio requirement already established within the program, there was potential to blend with a portfolio culture already in existence. Fusing the electronic portfolio requirement with the traditional portfolio requirement already established in some program areas through shared discussions could have made the e-Portfolio Project more compatible with the existing program. Encouraging faculty to engage in portfolio discussions at faculty meetings and in their classes with their students might have encouraged faculty to participate more in project development. Their contributions could have led to increased faculty participation and feedback in the portfolio project evaluation loop. Through these discussions students and professors might claim some ownership of the project instead of viewing it as an externally imposed task. Unfortunately, little mention of the portfolio was made in faculty meetings or in classes. In addition, even though all secondary education students were required to develop an *electronic* portfolio, some of the programs continued to require students to develop *paper-based* course portfolios. This duplication of work seemed to contribute to the students' frustration and confusion about the e-portfolio's purpose in the program. This frustration was evident in the exit interview comments:

Since we already began to develop a portfolio we were under the assumption that that was the portfolio we would use throughout the rest of the program, but when that course was over and we were told that we were going to have to make an electronic portfolio. That was frustrating.
(PA1.3)

Another example of project compatibility pertains to technology integration.

While some faculty believe that project success is dependent upon adding a course to the ProTeach curriculum designed to teach students how to develop and maintain their e-portfolios, some believe that the addition of a course would serve only to isolate the project not integrate it into the Secondary Proteach Program. Students' comments confirm the importance of integration. When asked if there should be a portfolio course the majority of the students interviewed (85%) said no. They argued that better integration into their current courses, in particular their technology course, would be sufficient to helping them understand the project and what is expected of them. In addition, they believed it would contribute to the increased cohesion of the Secondary Education Program and the e-Portfolio Project.

No course, I personally would have been frustrated. At some point I would have gotten it, and would have had to continue sitting in a class thinking "why am I here?" It would have just alienated me to it. I don't think I would have been as proud of it, and as comfortable with it and as confident in it if I had sat through a class where somebody had held my hand. Better integration in our courses would probably be sufficient.
(PA2.2)

Although three of the five program areas include a technology course, there was little, if any, integration of the portfolio into the technology courses. Many of the students interviewed suggested that the portfolio become part of the technology course:

I don't know how many students have technology classes like I did, but it could easily be incorporated into that class. It can be introduced at the beginning of the semester, and then halfway through we have to have so much done. (PA4.2)

A course wouldn't be effective, we can't really meet the requirements of the portfolio unless we are doing them in tandem with the ProTeach program. (PA2.3)

No, I don't think you need a class, I think it should be part of the technology course. (PA1.1)

Students believed there was a logical connection to the technology course and portfolio construction.

Even though I took a technology course in the fall of 2000 the portfolio wasn't incorporated into that course at all. (PA4.3)

Students did not seem to understand why the portfolio was not introduced or even mentioned in their technology course.

By building upon the existing structure of the program i.e. integrating the project into the technology class and eliminating the development of multiple portfolios in a one-year program, it could be argued that the project's rate of adoption would have been faster and less frustrating to participants.

Trialability

Trialability refers to the ability to experiment with an innovation. When adopters have an opportunity to experiment with an innovation on a limited basis, it creates a safety net, allowing them to become comfortable with an innovation before committing to full adoption. For example, inviting the portfolio project director to conduct class discussions about the portfolio would give professors an opportunity to learn more about the portfolio project and engage in student and faculty discussions with an "expert" on hand to field questions and project complaints. According to Rogers, (1995) new ideas that can be tried on the installment plan are generally adopted more rapidly than innovations that are not divisible. The portfolio project was designed and implemented with the understanding that adoption would be a slow and arduous process. The primary focus of project efforts was therefore placed on the students rather than the faculty. It was

hoped that if the faculty would have the opportunity to see the benefits gained by students (essentially giving faculty an opportunity to “try-out” the project) we would avoid what Hall and Hord (1987) describe as adopters feeling overpowered by the innovation.

Communication Channels

The communication channels used to diffuse the innovation impacts both the project and the program and consequently affects the rate of adoption. Information regarding the project was communicated to students and faculty during an initial introduction at the secondary education ProTeach orientation and through subsequent in-class visits, email, and an online web presence.

If an innovation is to reach adoption, ongoing communication among stakeholders is necessary. Rogers determined that at the knowledge stage of the innovation communication occurs through cosmopolite channels, meaning that members must go outside of their community for information. Most of the first year communication in the portfolio project occurred through cosmopolite channels. Figure 4-1 illustrates the flow of communication during this first year of the project as well as the degree and types of communication that occurred. Figure 4-1 also illustrates the communication goals which are necessary for complete adoption and diffusion. Multidirectional communication builds a culture among ALL adopters of an innovation. Initially most of the communication was centered around the change agent, with limited communication occurring between students and faculty and faculty and administration. Communication that occurred through localite channels (communication that remains within the social system) between students and faculty and students and administration was usually centered around complaints and project dissatisfaction.

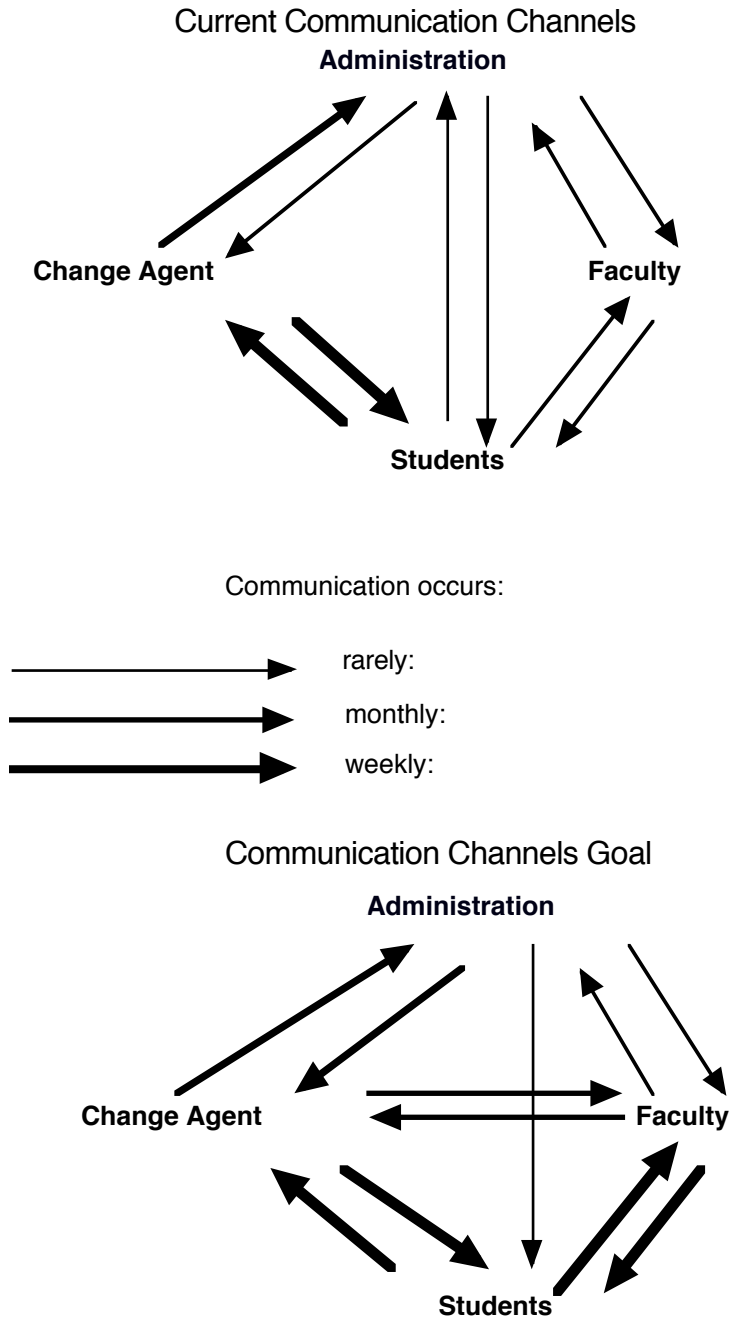


Figure 4-1. Current Communication Channels and Communication Channel Goals

Lack of communication between students and professors contributed to students' perception that the e-Portfolio Project was an add-on to the Secondary Education Program. For many students brief mention by a professor or an in-class discussion might

have made the project seem more cohesive, planned, and less of an add-on. Students' comments confirm the need for better and increased communication:

The fact that our professors never mentioned it in class was a problem. We had to add two illustrations to our portfolio for our final grade, but then it wasn't spoken about again in class, not at all and that was hard. (PA3.2)

Another noted:

I think more assistance from your specific advisor would help, they didn't seem very involved in the project. (PA3.4)

Although workshops were scheduled each semester, brief mention of the portfolio through an outsider conducted workshop was not sufficient to achieve full project diffusion.

During this first year as students became more familiar with the process of portfolio development they began to act as mentors and collaborators among their peers. As a result, the communication that occurred through these localite channels contributed to an increased spirit of collegiality. Many of the students interviewed believed that working with their peers helped them become more successful in the development and completion of their e-portfolio.

I helped out some of my classmates to understand the process of building the portfolio and stuff like that and it reinforced the knowledge for me too. (PA2.7)

In addition, early and continuous communication regarding the innovation throughout the program may contribute to project benefits such as:

- Increased opportunities for student reflection;
- Increased understanding and operationalization of the FAPs;
- Increased student buy-in of the project.

Combined, these elements may contribute to the students' progressing along what Hall (1979) and Fuller (1969) describe as the *task, self, impact* continuum. For example, when students begin the development of their portfolio early in their graduate program their concerns shift from fear about using a computer to build a portfolio to how they can effectively use technology in their teaching as evidenced by the following comment.

Developing my e-portfolio was the first step in becoming comfortable with technology. Doing the portfolio gave me ideas about using the computer in my classroom. (PA1.1)

The collegial interactions among students fostered increased student buy-in of the portfolio project. The opportunities that students had to collaborate and mentor each other throughout the portfolio development process had a positive affect on the project and its diffusion throughout the Secondary Education Program. The program had the potential to impact the e-Portfolio Project via increased and productive communication between all members of the community.

Nature of the Social System

Hargreaves (1994) and Fullan (1993) assert that there is a tension between structure and culture and this tension must be considered and understood when attempting to incorporate change in an existing cultural system. The nature of the cultural/social system in the College of Education was a crucial factor in the diffusion process. It is important to note that the e-Portfolio Project did not happen overnight, many months of planning, discussing, developing, and revising went into the initial stages of the project occurring prior to the fall 2000 semester of implementation. According to Rogers (1995), past diffusion investigations overlooked the fact that relevant activities and decisions usually occurred long before the diffusion process began.

Events and decisions occurring prior to this point have a considerable influence upon the diffusion process. In our project, a summer workshop was held in which the portfolio project was presented to a focus group of faculty. The workshop included an information session and a brainstorming session designed to solicit faculty suggestions prior to full-scale implementation. Although the faculty was supportive of the project, they raised some questions and concerns regarding various issues. These concerns, and the response to faculty concerns are addressed below:

- Faculty time
- Portfolio assessment
- Privacy
- Choice of illustrations

Faculty Time

For a majority of the faculty time was a primary concern. They felt that integrating portfolios into their curriculum would require more time than they could spare. Faculty believed that they would need time to “teach” students how to develop *electronic* portfolios and additional time to evaluate these portfolios. They were not interested in adding complex and time-consuming tasks to their already challenging schedules. These concerns were valid and needed to be addressed in order to encourage the support of faculty. It was agreed that faculty could minimally provide a brief mention in their classes and possibly discuss elements of the portfolio such as writing rationale statements and appropriateness of assignments. It was also stressed to the faculty that multiple levels of support were put in place to ease the technological burden of this task.

However, where their efforts would be most necessary was with coaching students in the reflection process.

Portfolio Assessment

The research on change suggests that change places additional demands on faculty in terms of time and increased need for professional development (Freidus & Grose 1998; Hall, 1979; Rogers, 1995). The faculty of the College of Education were concerned that the inclusion of e-portfolios into the curriculum would require time they simply could not spare. This concern led to the question: “Who will evaluate our students’ portfolios?” It was decided collectively that evaluation must occur in both a formative and summative manner. For example, the illustrations the students choose to include in their portfolios are graded at the course level: the professor assigns a project or paper, etc., the student completes the assignment, submits it to their professor, the assignment is graded by the professor and returned to the student with the comment that the illustration is “portfolio ready.” Over the course of their graduate program students acquire an expanding collection of “portfolio ready” assignments. It is in part from this collection of work that the students select their illustrations and articulate, in the form of the rationale statement, why the illustration is an appropriate demonstration of a particular practice. In an effort not to overload the faculty it was agreed that it was not necessary for a professor to summatively review all the student portfolios. Instead, periodically throughout the first year of the project the director of the project would evaluate the quality of all secondary students’ portfolios. In addition, the rationale statements were examined and students were provided feedback and coaching in an attempt to help them improve their rationale statements, in effect, scaffolding the students

through the developmental process of becoming critical thinkers. This assessment decision was made in an effort to encourage faculty support and buy-in of the project. It was thought that once faculty saw the value of the e-portfolio they would be inclined to participate more in the evaluation, coaching, and feedback process.

Privacy

There are elements of the portfolio that should always be closed to the public, it was therefore decided that there would be three levels of privacy to a student's e-portfolio: an academic section, accessible only with a password, a private section, accessible only to the student, and an open section, accessible to everyone. The academic section could contain FAP illustrations not for public display, for example, their students' work, pictures of their students, documents containing student names, etc. that should always remain private. This section would be available only to those who had the password (the students themselves, professors, and external reviewers). The private section was identified to students as a scrapbook of sorts, a place for work in progress or older versions of work no longer used or relevant to the portfolio and they would be the only ones with access to this section. As the project evolved and the students published to their portfolios it became increasingly clear that this private section was unnecessary. The students did not understand the purpose of the private section and questioned why they would put work there instead of the hard drive on their home computers or burn the data to a CD-rom. We found that students never published any work to this folder during the first year of the project, and when a new server was set up at the end of the first year this "scrapbook" folder was eliminated from all the students' portfolio folders.

Choice of Illustrations

The issue of choice was a topic of much debate at this summer workshop. The faculty was evenly divided on the issue, as some faculty did not want the responsibility of mandating portfolio elements, others argued for complete student ownership, while still others maintained that their particular course assignments were unique and should be a required portfolio illustration. For example, one faculty member believed that her course might be the only place in the program where the students created complex unit plans dealing with issues regarding diversity in the special education classroom and as such assignments completed in this class must be included in the portfolio. However, an essential question to ask and answer is: “Whose portfolio is it?” It was decided collectively that the choice of illustrations must remain with the student. This decision supported the students’ comments early in the year when most of the students surveyed stated the final choice of work should be remain with them. Many students, however, felt that their professors should guide them in this decision commenting:

Both, the students and the teacher are integral to the success of a portfolio, drawing from different forms of expert knowledge that the teacher and student possess. (PA2.1)

I think the guidance from the professor in general categories or elements would be helpful and is needed, but a portfolio as a personal reflection is just that - personal and the ultimate decision of what to include should be mine. (PA2.9)

Feedback from students indicated that they believed they should be the ultimate decision makers regarding the contents of their portfolios. These statements echo the position of researchers who believe that the true instructional value and power of doing portfolios comes when students use criteria and self-reflection to make decisions about what they

want to show about themselves and why (Arter & Spandel, 1995). Only one student felt that the professor should be the final determinant in the portfolio contents:

My professor - this is a specific assignment and he would know best what a principal is looking for. (PA4.7)

The fact that this student viewed the portfolio as an assignment rather than as *her* teaching portfolio documenting academic and professional achievements indicates a focus on product rather than process. This focus quite possibly reduced the effectiveness of developing an electronic teaching portfolio.

After implementation, I met with the secondary ProTeach faculty during a ProTeach meeting and presented a scaled down model of the project, recently revised based on the suggestions received over the summer. Most of the secondary faculty had already designed their assignments in alignment with the FAPs, and revised their syllabi to include the FAPs addressed in their courses. Building on the work the faculty had already done, I introduced the project and described what the course matrices (Appendix E) would look like. The matrix places all of the courses on one axis and all of the FAPs on the other. A completed matrix would provide a picture of the extent to which the Accomplished Practices were being addressed in each Secondary Education Program. I requested that the faculty provide electronic copies of their syllabi and course assignments to link to a matrix which would be developed for each program area. I presented a sample portfolio to the faculty, describing its contents and its potential as a learning tool. Although all of the faculty quickly provided information regarding which FAP is met by each course, only one faculty member provided actual illustrations and syllabi to add to the matrix during this first year. The efforts of the professors to support students was appreciated. One student noted:

Some teachers, instead of just having an x on the matrix, had linked examples of work that we could use. Some other teachers only had that x with no linked example and I would think back to the class and have no idea where we met that accomplished practice. I guess we did if it says we did but I had no idea where we would have. More of those professor linked examples would have helped a lot! (PA3.5)

Based on his research on the Concerns-Based Adoption Model (CBAM) Hall (1979) argues

Change should be viewed as a process rather than an event. Change is not automatically accomplished for the individual teacher by a memo decreeing that change will occur, by the holding of a two-day August workshop, or by a Congressional mandate. Rather, change entails an unfolding of experience and a gradual development of skill and sophistication in use of an innovation; it is a developmental process which takes time. (pg. 204)

Characteristics of Adopters

Rogers (1983) proposed that innovations found to be beneficial and relevant to the culture will be adopted by most members of the community, but the rate of adoption will vary depending on adopter characteristics. Diffusion through a social system is determined by the relevancy of the adoption as well as the characteristics of the adopters. He classifies adopters into groups which describe their innovativeness. The groups consist of innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%), and laggards (16%). Adopters possess a variety of characteristics, and are dispersed among various groups. It is crucial in the diffusion of any innovation that there be communication in and among these groups. Each adopter group plays an important role and is necessary for project improvement and diffusion. Rogers (1983) found that the personality characteristics which correlate positively with change are: venturesomeness, cosmopolitaness, positive attitude toward change, greater achievement, less fatalistic,

greater aspirations, able to deal in the abstract, more rational, more intelligent, and access to resources.

Dean of the College of Education. The Interim Dean of the College of Education at the time of implementation had been the Director of the School of Teaching and Learning and was very supportive of the project. Support at this level of administration aided the project's success. Ultimately the dean believed in the portfolio project and trusted that it would enhance the ProTeach curriculum. In addition, the college was preparing for NCATE reaccreditation and was struggling with curricular issues such as increased technology integration, student self evaluation, and authentic assessment. Moreover, the portfolio was viewed by the dean as a response to the changing requirements of state and local accreditation, and he was eager to support its implementation. According to researchers of change (Rogers, 1995; Havelock & Zlotolow, 1995; Hall 1979) all stakeholders possess characteristics that facilitate or hinder the change process.

The dean had control over resources facilitating the implementation of the Office of Educational Technology (OET) in the fall of 2000. OET directly impacts the portfolio project in that the office is responsible for all virtual and face to face support to students and faculty. The Assistant Director of OET is the e-Portfolio Project Director and is responsible for diffusing the innovation to the members of the secondary education community. The dean of the college of education is venturesome, willing to venture outside of his local circle to build cosmopolite (cosmopolitanism is the degree to which an individual is oriented outside a social system, Rogers, 1995) relationships. This characteristic contributed to change agent contact and communication, both of which are

necessary if innovation diffusion is to occur. Moreover, the potential for additional communication links throughout the program could positively affect integration.

The Director of the School of Teaching and Learning. The Director of the School of Teaching and Learning was newly appointed to the position in the fall of 2000. However, as director of the Elementary ProTeach Program, she was familiar with the portfolio project and had been involved in the summer planning and design session. As the Director of the Department in which the e-Portfolio project was housed it was her responsibility to facilitate the implementation of the innovation in that department, and to promote it to the faculty and students in that department.

Faculty. Most of the faculty in the Secondary Education Program would be identified in Roger's delineation as being members of the late majority and laggard groups who never began to integrate the e-portfolio project in their courses this first year of implementation.

These individuals are the foundation of the change process. Understanding their roles and allowing all members the opportunity to contribute their ideas and concerns is essential to successful adoption. According to the Rogers, late majority and laggards face an innovation with a skeptical and cautious air. "This will prove to be one more thing that we work hard to integrate in our courses that will disappear when the next "great thing" comes along, so I will wait and see what happens" was a sentiment voiced by some faculty. These groups want to be certain that an innovation will not fail before they commit to it. Their skepticism and feedback was essential to project improvement and renewal. Goodlad (1990b) argues that if schools are to become the responsive, renewing institutions that they must, the teachers in them must be purposefully engaged in the

renewal process. In complexity theory terms, if you avoid differences you may enjoy early smoothness, but you pay the price because you do not get at the really difficult issues until it is too late (Fullan, 1999). Ellsworth (2000) notes that “one of the major classical camps of diffusion research arose in recognition that a flawed process can doom the diffusion of an otherwise effective innovation. Likewise, the ultimate goal is for a single adopter to “buy into” the innovation and use it in a way that improves some aspect of their lives or the lives of those they serve.” Late majority and laggards are often localite (rarely communicate outside their social system) in their communication channels.

In the 2000 - 2001 Secondary Education Program 60 students were enrolled and were taught by five full time professors; one adjunct professor; three professors who were not secondary education faculty, but taught common courses to the secondary education students; and three graduate teaching assistants. In addition, the full time secondary professors act as site observers during the students’ internships providing internship evaluations. The faculty have the most direct access to students and as such can play a large part in the diffusion process.

Probably the most fundamental barrier to developing and diffusing the portfolio project was the fact that it was not woven seamlessly throughout the Secondary Education Program. Consistent with change research (Hall, 1979; Rogers, 1983) each secondary education faculty member approached the portfolio project differently and integrated portfolios into their curriculum in varying degrees. This variation contributed to students’ frustration, procrastination and confusion. Integration of the portfolio into the Secondary Education Program was slow during the first year. For example, some

professors made an A grade possible only through the students' development of their portfolio including at least one illustration for each FAP, others implemented a portfolio requirement where students must complete their index page and two illustrations for course completion, while some professors did not integrate portfolios into their courses at all and portfolio development was left to the discretion of the students.

Professors who assigned due dates for the portfolio periodically throughout the program had students engaging in the process early and these students were able to move past a focus on technology mastery to a focus on portfolio content. Emails and office discussions reflect the refocusing of concerns.

Teacher isolation was never accounted for and it seems that the isolation of the faculty may have contributed to the resistance and the lack of integration. This isolation seems to be the very thing that perpetuates the existing model in the curriculum and the lack of innovation that may occur. Initiating portfolio discussions at faculty meetings is a step that can be taken which would help to promote discourse and contribute to universal understanding.

Among the faculty and graduate students teaching in the Secondary Education Program a variety of adopter groups and adopter characteristics are present. For example, it is the early adopters who implement the e-portfolio project in their courses using deadlines, and grades as motivators for students' completion of the portfolio. While the early adopter faculty did not serve as mentors or models for the late majority or laggard faculty during this first year, their students served this purpose. These students were able to lend assistance and coaching to their peers who had not had the benefit of curricular integration or curricular incentives. These students served as role models for their peers.

Early adopter faculty had the potential to work as change agents for the innovation. One program area began the project early and deadlines were laid out by the professor.

Students in this program were frequently reminded to work on their portfolios. The comments from this group of students justifies the necessity of integration:

During the class our professor was always reminding us: “you have to get this done so you can use these things in your portfolio,” or “Remember to put that stuff in your portfolio.” (PA2.4)

Many of the students who were not part of this group cited them as a successful model and actually felt penalized by the fact that their professors did not address the portfolio project. The following comment is an indication of student frustration:

I know that the one group finished their portfolios before a lot of us had even started. (PA4.4)

Not surprisingly, some students commented that they benefited from this group’s early adoption:

They were tutoring me. They were ahead of everybody almost, so they had practice. They knew what was working and how to avoid mistakes. Because of this I avoided a lot of delays, they would say don't do this, make sure you do it this way, so, I avoided a lot of problems just by talking to them. (PA1.4)

Rogers found that when the number of individuals adopting a new idea is plotted on a cumulative frequency over time, the resulting distribution is an S-shaped curve.

Although most innovations have an S-shaped rate of adoption there is a variation in the slope from innovation to innovation. Figure 4-2 plots the adoption curve for the first year of the portfolio project. The first growth shoot of student development occurred during the 30 days prior to the end of the fall semester when deadlines were put in place in some programs. The curve indicates a steep line of adoption during this period. The curve levels off somewhat during the spring semester when students were working in their

internships and did not work on their portfolios until the end of March at which time another development spurt occurred. Portfolio development began again in a rapid jump at the end of the summer A (May-June) semester just prior to graduation, this was the period when students HAD to begin and finish their portfolios so they could graduate.

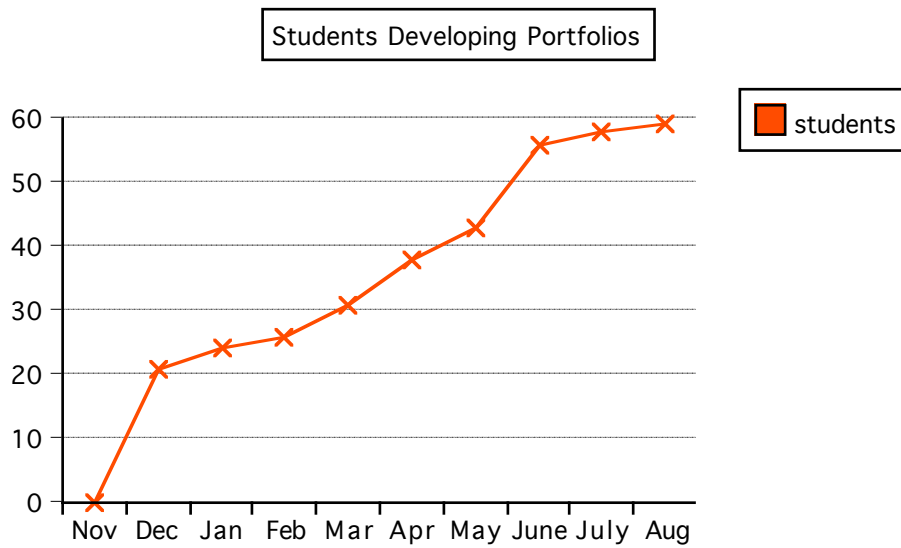


Figure 4-2. S- Shaped Curve of Adoption and Normality

This section discussed the impact the Secondary Education Program had on the e-Portfolio Project. Evidence collected throughout this year shows that through student and faculty feedback and collaboration the portfolio project was improved and a portfolio culture slowly began to emerge in the Secondary Education Program.

The Extent to which the Project Impacted the Program

To answer the second question: “How does the innovation impact the Secondary Education Program,” I will continue to examine and discuss Rogers’ variables relevant to this question. They are:

- Perceived attributes of the innovation: relative advantage, complexity, and observability;
- Type of innovation decision;

- Extent of the change agent's promotion efforts.

In examining these variables, I will provide evidence that the Portfolio Project promoted the stated goals of the Secondary Education Program.

The mission of the Secondary Education Program is to prepare reflective professionals who create, organize, and disseminate knowledge; promote democratic values; and serve diverse communities. I will show that the project enhanced students' reflective practice in both their coursework and their student teaching assignments, i.e. their professional preparation; increased professional awareness as evidenced by their understanding of the FAPs; and encouraged connections between program and professional practice, as demonstrated in their rationale statements.

Perceived Attributes

Relative Advantage

Rogers (1983) notes that relative advantage of a project, the extent to which the innovation in question is better than the tool or practice it replaces, must be considered when determining the potential of an innovation. Relative advantage for this study pertains to meeting the goals of the secondary education mission. Consistent with Rogers' research, if the program is to impact the portfolio project resulting in successful adoption, the project must have the potential to enhance student reflective practice, increase student professional awareness, and enable students to make connections between program goals and professional goals. In order for the project to impact the Secondary Education Program in such a way, the program must support the e-portfolio project through curricular integration and ongoing communication among stakeholders.

The e-Portfolio Project began in the fall of 2000 and was implemented as a way to increase student understanding of the FAPs, to better integrate technology into the ProTeach Secondary Education Program, and as a means of promoting student self evaluation and reflection.

Have our students become more reflective? Part of the process of developing a portfolio includes reflection regarding the appropriateness of the illustration. In the header of each illustration students add a rationale statement. The rationale statements are three to four sentences in length and provide the opportunity for the student to articulate why the illustration was chosen and how it demonstrates proficiency in the practice. These reflective statements contain the evidence that the student has in fact operationalized the assignment and understand and can articulate, in their own words, the purpose of the illustration. Ideally, to understand the level of the students' understanding about a practice one should be able to simply read the rationale statement.

Predictably, early versions of student rationale statements did not demonstrate that our students were moving beyond what Elder and Paul (1996) describe as stage one of critical thinking: the unreflective thinker; thinkers who lack the ability to explicitly assess their thinking and thereby improve it. Nor did these statements provide evidence that students were “reflecting in practice and reflecting on practice” (Schön, 1988) about both the intellectual and ethical dimensions of classroom teaching and learning.

Examples of early rationale statements provide evidence of this:

Provide students with opportunities to demonstrate proficiency through a variety of assessments. (PA2.8 statement 1.1)

The following poem was used in a lesson plan designed to teach students how to use higher order thinking when reading and interpreting poetry. (PA2.1 statement 4.1)

The research on reflection (Schön, 1988; Ross, 1987) suggests that discussion with one or more colleagues is an effective way to make connections between practice and theory as well as to make sense of the overall teaching experience. Coaching and feedback is also essential in helping students develop skills of reflection. If we are to produce reflective practitioners, it is important to provide them with feedback in the reflection process. Lin, Hmelo, Kinzer and Secules (1999) argue that support is necessary for high-level reflective thinking. Students who began their portfolios in the fall or spring semester were provided extensive feedback to help them improve the quality and depth of their rationale statements. The following are examples of the above rationale statements revised by students after feedback and coaching:

I chose this lesson plan to demonstrate the variety of assessments I use to evaluate my students. Not all students can demonstrate their proficiency through quizzes alone, so I included a variety of assessments. Students will write journal entries, write a first draft of a science fiction story, take a quiz, and read for comprehension. (PA2.8 statement 1.1)

Poetry often frustrates readers because to understand a poem, one must solve the riddles of imagery, language, and structure that impart the poem's meaning. I believe that poetry is writing's highest art, requiring a complicated creative and intellectual thought process on the part of the writer and the reader. Teaching students to read, understand, and appreciate poetry means introducing a most Understanding a poem often requires Poetry The following poem was used in a lesson plan designed to teach students how to use higher order thinking when reading and interpreting poetry. (PA2.1 statement 4.1)

Through the students' further reflection and subsequent revision of their rationale statements we witness a vast improvement in their reflective dialogue. The students agree that this feedback/coaching is a necessary element of the developing their portfolios and one that seemed to be missing from their courses. The improvement of rationale statements provide evidence that through the opportunity to write reflective statements,

and with the necessary coaching on these statements our students are becoming more reflective. Their reflective ability develops over time, with coaching and with experience.

Have our students demonstrated increased understanding of the FAPs? In the past professors listed the FAPs on their syllabi and connected some of their assignments to the FAPs. However, simply putting standards on a syllabus is not enough to guarantee that students understand them or their purpose. Furthermore, the responsibility of reporting student understanding and operationalization of the FAPs was placed on the individual professor. Although the FAPs were on the syllabus we couldn't guarantee that our students were reading, understanding, and operationalizing them, and even if they were, we were still faced with the dilemma of proving that this was, in fact, happening. Rather than continuing to place this burden on the faculty, the intent of the portfolio project was to include the students in the reporting process. It was to become the responsibility of the students to collect artifacts from their secondary education classes, select appropriate artifacts for inclusion into their portfolios, and reflect on these artifacts informing the reader of why an artifact was selected and how it related to a given practice. Throughout their graduate year secondary education students produce and gather a variety of illustrations for inclusion into their portfolios such as lesson plans, presentations, tests, written papers, etc. that demonstrate their increasing abilities as future teachers. For each of these illustrations, students describe how they have demonstrated an understanding of the FAP in the assignment.

Students seem to better understand and operationalize the FAPs when they became participants in the decision making process involved in the selection of FAP

appropriate illustrations and when they had to articulate how their course work and student teaching related to the particular FAP. This is supported by the following student comments:

I knew that I had done an analysis of my teaching videos, but I never would have thought to call it continuous improvement. But that was what it was, me improving on the way that I was teaching. Before I began to develop my portfolio I just thought about the assignment as something I had to do for a class. Connecting the assignment to a particular practice gave it grounding in my professional education. (PA3.1)

I think that developing an e-portfolio definitely made me more aware of what I needed to do for the FAPs. Otherwise, honestly, I probably wouldn't have looked at them so closely. (PA1.1)

These comments reinforce Dollase's (1996) belief that the portfolio has the potential to be transformative encouraging student learning through decision making and explanation. Based on student feedback, through the development of an e-portfolio and the through the process of collecting, selecting, and reflecting our students have gained an increased understanding of the FAPs.

Have students begun making curricular, programmatic, and professional connections? An important purpose of the portfolio project in the college of education is to assist and encourage students to make connections between their learning about teaching and their teaching. Many students commented that developing their portfolio helped them understand the purpose of what they were studying in their courses, things that initially seemed abstract and meaningless became relevant and purposeful. Developing their portfolios reminded students of the experiences and accomplishments they had in their graduate program.

Developing the portfolio made me more aware of different things that I did in my graduate program that now I can put a name to. Things I might not have thought about outwardly. Now that I have a name for it I can

say, I really need to focus on this, I need to pay attention to it. I think is important because, personally, you do all of these things in this program and sometimes and think “Why are we doing this, when are we going to use this?” It is satisfaction, this is very important because I did learn a lot of things and I will be able to use these or they have helped me develop teaching skills. (PA3.3)

The integration of technology into the Secondary Education Program is another area of focus. Through the development, publication, and maintenance of an electronic portfolio, students use technology throughout each semester of their program. Beginning in the first semester when a student creates and publishes his or her index page to the electronic portfolio web server and each subsequent semester when illustrations are added and revised, students are making complex decisions regarding the use of technology and are engaging in a complex task with limited instruction and guidance. From these performance-based experiences students gained confidence about using technology and became empowered to expand their knowledge and use of technology.

In terms of benefits from technology, I feel more confident, I can now walk into an interview and say, “yes, I can use a computer.” (PA2.2)

Creating the portfolio and learning how to use the computer and different programs like Fetchtm and ClarisHomepagetm, gave me an opportunity to learn how to use the computer well enough to be able to explain it to others. That made me feel much more comfortable with using computers. Before that I had only used Wordtm or Netscapetm. (PA2.7)

Not only were the students learning new technologies, they were able to explain the process to their peers, and in some cases doing so helped them think about how they could use technology in their future classrooms.

I helped the other students in my program learn the technology necessary to develop an e-portfolio and that kind of forced me to think about things and gave me ideas of how to teach my future students about technology. (PA1.3)

Through the development of an e-portfolio and its connection to standards, self-reflection, and technology integration as evidenced through students' feedback it is undeniable that the portfolio project has the potential to enhance the Secondary Education Program and the professional development of preservice teachers.

Substantive concern. In order to achieve greater impact in the Secondary Education Program the goal of the portfolio project is to get both students and teachers to view developing an e-portfolio as an ongoing process. Working to encourage formative portfolio development will promote more reflection, increased coaching among peers and professors, and more time to perfect portfolio development skills. The portfolio has less impact if it is viewed as an assignment to be completed at the end of the program.

I saw it as a task that I had to get done. I'm not sure that it affected my philosophy on teaching. (PA4.1)

I figure I can bang out my portfolio in 10 days. (in office conversation).
Moreover, without the opportunity for sustained practice, whether it is practicing reflection or using technology, students will not have the chance to improve and demonstrate growth in these areas.

Complexity

Complexity is the degree to which an innovation is perceived as difficult to understand and use. Rogers (1995) makes the following generalization (he notes however, that the research evidence is not conclusive): "The complexity of an innovation, as perceived by members of a social system is negatively related to its rate of adoption" (Rogers, 1995, p. 242). Although the concept of developing a portfolio was not new to most students, the idea of developing an *electronic* portfolio was perceived as being a very complex and unique task. Many students had the perception that learning the

technology involved in developing an e-portfolio was beyond their abilities and as a result they avoided the task. It was crucial to address student fears and false perceptions early in the project, for once the students began their portfolios they learned that mastering the technology was not as difficult as they thought it was going to be. For this reason hands-on workshops were conducted for each program area with the belief that the earlier the students have an opportunity to interact with the technology the less fear they would have of the process.

It was just the fear that was holding me back, and causing me to avoid beginning my portfolio. (PA2.1)

With a project that big I got over that fear of doing the wrong thing, now any time I have to tackle a project like that I am less afraid of using technology. (PA2.8)

Templates were created for students in an attempt to maintain consistency across portfolios, but also to scaffold students through the development of web pages, a task with which many students had little or no experience. It was hoped that these templates would act as a scaffold to more difficult tasks. This strategy seemed to work, and before long students were building pages without the use of templates and were scanning in pictures in lieu of using canned clipart.

Mastering the technology enabled students to concentrate on the higher order skills that portfolio development requires such as selecting illustrations and connecting them to the appropriate FAPs, reflecting on their selections, and articulating why they believed the selection was appropriate.

Observability

Observability is the degree to which the results of an innovation are visible to others. The results of some ideas are easily observed and communicated to others,

whereas some innovations are difficult to observe and describe to others. Observability of an innovation is positively related to its rate of adoption (Rogers, 1995). The students who were early adopters in the portfolio development process served as change agents for the project. Their efforts in adopting the innovation were observable to others through their peer mentoring, their portfolios linked to the portfolio example page, and project enhancement resulting from user feedback.

The opportunity to observe their peers had an impact on the student's rate of success. During the implementation year of the project, the secondary students had no precedent to follow, nor were there many examples upon which to pattern their portfolios. However, students made use of what they had access to and many students stated that during the development process they watched, "snooped," looked at others' online portfolios, and looked at the matrix to generate ideas, or trigger a memory to better understand what was expected of them. One student admitted:

I snooped, if I saw someone in the computer lab working on their portfolio, a person I felt comfortable with in general, I snooped, I saw what they were doing or I asked what they were doing. (PA2.1)

The student portfolio examples that were available for observation were helpful to both the students who shared their work as well as to the students who used the examples for support. The opportunity they had to share their knowledge and ideas helped students grasp the importance of collaboration. One student commented on the benefit of this collaboration:

Our group was really open about sharing our work because those ideas helped us. Sometimes I would think: I don't know what I am doing, but when I looked at an example that really helped. Also, people would come up to me and say: "I looked at your website and I wanted to ask you something about it." This was great because they came to me or I came to

them because we wanted to share ideas and get a better understanding of what we were supposed to do. (PA2.4)

The opportunity to consider examples makes the process somewhat easier for late adopters who procrastinate before beginning development of their portfolio, therefore reducing the complexity of the task. Later adopters had access to more examples and additional support making portfolio development easier for them. When asked how illustrations were selected for the portfolio one student admitted:

Honestly? I waited toward the end a little bit later than most students and I looked at other students' portfolios and did it by example. (PA4.5)

However, while procrastinating may have made the rote part of the task (linking, building webpages) easier, the cognitive and reflective aspects of portfolio development remains something that requires revision, collaboration, and coaching, all of which require time to engage in reflection (Schön, 1990, Ross, 1987).

Type of Innovation Decision

According to Rogers (1983), the innovation decision process is the process through which an individual or decision making unit passes from knowledge of an innovation to forming an attitude about the innovation, to making a decision to adopt or reject the implementation and use of the new idea, finally to confirmation of this decision (p. 20). There are three types of innovation decisions:

1. **Optional Innovation Decision** - choices to adopt or reject an innovation that are made by an individual independent of the decision of other members of the system.
2. **Collective Innovation Decision** - choices to adopt or reject an innovation that are made by consensus among the members of a system. All the units in the system must conform to the system's decision once it is made.

3. Authority Innovation Decision - choices to adopt or reject an innovation that are made by a relatively few individuals in a system who possess power, status, or technical expertise.

The type of innovation-decision is a predictor of an innovation's rate of adoption. The more persons involved in making an innovation-decision the slower the rate of adoption. In 1999 the Director of the School of Teaching and Learning made the decision that all ProTeach students would develop and design electronic portfolios. The e-portfolio became a ProTeach program requirement beginning in the fall of 2000, at which time the college of education began implementation of the project.

The decision to make the e-portfolio a requirement in the ProTeach program was an authoritative decision made by the department director. According to Rogers (1995), the fastest rate of adoption of an innovation generally results from authority decisions. Although we have yet to see portfolios integrated throughout the entire program, the completion rate was high, 95 percent of secondary students completed and published e-portfolios while 97 percent of the secondary students completed a portfolio in some form. The fact that the portfolio was a program requirement contributed to the high first year completion rate.

Communication Channels

The communication channels used to diffuse the innovation play an important role in rate of adoption. Rogers' research discusses communication channels consisting of interpersonal networks and mass media. The communication channels used in this study consisted of interpersonal networks: consisting of face to face exchanges and electronic networks consisting of email and the Internet. Information regarding the project was communicated to students and faculty during an initial introduction at the secondary

education ProTeach orientation and through subsequent in-class visits, email, and an online web presence. If an innovation is to reach successful adoption, ongoing communication among stakeholders is necessary.

Rogers makes a distinction between homophilous groups (the degree to which two or more individuals who interact are similar in certain attributes such as beliefs, education, social status, etc.) and heterophilous (the degree to which two or more individuals who interact are different in certain attributes) groups. Homophilous groups communicate better with each other while heterophilous groups are more prone to communicate about an innovation. Rogers contends that a problem arises due to the potential for ineffective communication to occur because the participants do not “speak the same language.” During this first year as students became more familiar with the process they began “speak the language” of the e-portfolio, and began to act as mentors and collaborators among their peers, contributing to an increasingly synergetic atmosphere strengthening the lines of communication between and among students and programs.

Extent of the Change Agent’s Promotion Efforts

Rogers (1985) states that change agents would not be needed if there were no social and technical chasms between the change agency and the client system. A change agent is defined by Rogers as an individual who influences clients’ innovation decisions in a direction deemed desirable by a change agency. He identifies seven roles for the change agent in the process of introducing an innovation in a client system:

1. To develop a need for change.
2. To establish an information-exchange relationship.

3. To diagnose problems.
4. To create an intent in the client to change.
5. To translate intent to action.
6. To stabilize adoption and prevent discontinuance.
7. To achieve a terminal relationship. (Rogers, 1995, p. 336)

Essential to project diffusion is the amount of collaboration, participation, trust, and support between the change agent and the existing community. The office of Educational Technology (OET) was implemented in the fall of 2000. The function of the office is to facilitate faculty development, and to implement and support the e-portfolio project. Workshops for faculty were conducted out of the office to aid the faculty in the development of course webpages, assignments, and portfolio illustrations. In addition, workshops were conducted for all secondary education students in the development of their e-portfolio. As primary change agent for the project I worked toward generating action and project self-sustainability by meeting with faculty individually to discuss the project, and visiting classes as often as was permitted or time allowed to encourage course discussions, etc. In effect, working to generate commitment to the project from the stakeholders and to build a portfolio community. I would argue that all stakeholders must become change agents.

There exists a hierarchical relationship between students and professors. Although never mentioned, and often not discernible, the relationship is there. I would suggest that change agent status within the organization is positively related to the adoption of the innovation. If the change agent has equal status with the clients in the organization the innovation will have a greater chance of adoption, but more evidence is needed to

confirm the validity of this claim. There were many times during the course of the semester that discussions of the project occurred behind closed doors, in faculty meetings to which I was not invited, or in administrators' offices to which I did not have access. This led to misconceptions among faculty about the project. For example, in the spring semester one professor assigned the portfolio to his students for a grade. The assignment required students to "complete" their portfolios with one illustration for each FAP by semester's end. These students "completed" their portfolios as assigned, received a grade, and, based on feedback from their professors, believed their portfolio to be complete at the end of the spring semester. However, in the summer semester these students learned that their portfolios were not complete, they lacked an illustration for each of the 12 FAPs. Better communication between administrators and faculty members might have eliminated this misconception and the subsequent frustration of the students.

Support

Part of the responsibility of the change agent is to identify potential problems and to apply interventions. As the students were observed at various stages of development adjustments to the project were made based on feedback and observation. Returning to the portfolio evaluation model in Chapter 3 this process occurs in a series of cycles: conceptualization of goals and objectives, interacting with participants, modifying processes based on new information, continued interaction, and modifications made to the project as the goals were approached. During the project new procedures and protocols were being developed and implemented while the project was constantly reviewed and revised to raise quality.

However, despite the successful implementation of the portfolio project, there were some barriers met along the way. Zaltman and Duncan (1977) point out the barriers to an innovation and contend that acting to reduce these barriers is as important as developing the ability to assess and promote change within an organization. As Fullan (1993) reminds us: "Problems are our friends." Recognizing problems and not ignoring them, but addressing them as necessary elements in the change and diffusion process and designing interventions to aid the change process is imperative to the project's success.

During the implementation year it was important that students and faculty had access to all forms of support. When a problem or question arose it was crucial that it was addressed and resolved immediately. Students felt that the Project Director's efforts to keep them informed, motivated, and involved were sufficient:

If I needed help I felt like I could come down here to your office and get help. (PA2.5)

The biggest thing was to be able to come and see you in the office because I did most of my work in the lab. That was helpful and I don't think a lot of people took advantage of that. (PA2.5)

The variety of support available to students in the form of workshops, in-class visits, online support, portfolio office hours enhanced the project on many levels. The success of the e-portfolio project was dependent on an elaborate online support system designed to support two computer platforms, the matrix provided support in terms of connecting coursework to the FAPs and relevant student examples of assignments and rationale statements. When support was lacking students felt isolated and trapped.

To me it was frustrating because I didn't even know where to start. I think that if it had been in a class in a slow process, I mean I realize that you had office hours and you had times for us to come to, but that was just hard because it wasn't part of a class, it was just hard to make that extra time.

Plus, I wasn't familiar enough with putting things up on the web, to understand a lot of that or even knowing where to start. (PA1.2)

I didn't really feel that my efforts were supported because whenever I had a problem the portfolio office was the only place I felt I could go for assistance. First, I would review the online materials and if I still had questions I would go to the portfolio office. The ideal situation would be to have some of the other teachers know more technology than they do, then they know right now. I know that would be hard, but at least to know a little bit. For example, I would go to a teacher and ask questions and the response would be: "I don't know." That makes it really hard because we don't know either. (PA3.5)

Workshops

Students were introduced to the e-Portfolio Project at the Proteach orientation and early in the first semester a hands-on workshop was conducted where the students were oriented to the concept of an e-portfolio and given time and assistance to develop their e-portfolios. These workshops were implemented to demystify the portfolio process, introduce students to the support available to them, and give students an opportunity to begin their portfolios early in their program, thus encouraging them to continue to work on their portfolios habitually throughout the remainder of their graduate program. During the initial portfolio workshop students were asked to complete a survey in order to obtain baseline information. This information was necessary to learn how to support students throughout the year-long project. These surveys asked open ended questions about the FAPs, portfolios, reflection, and students' technological abilities (Tables 4-1, 4-2). Although only 13% of the students self-assessed their skill levels as novice (Table 4-2) at the beginning of the project most of the students interviewed stated that fear of technology inhibited them from beginning their e-portfolios.

Table 4-1. Entrance Survey Results.

Students' Familiarity with:	yes	no
Portfolios	45	8
Reflection	47	7
FAPs	19	34
Developing a web pages	45	7

Table 4-2. Self-assessed Technological Ability

	Advanced	Intermediate	Novice
Technological ability	16%	70%	13%

Because so much information was given to students during this initial workshop students were understandably overwhelmed. In order to better understand the process students needed time and encouragement to practice what they had learned, instead, once they left the computer lab many students did not think about their portfolios again that semester. Had the process been reinforced throughout the fall semester students may have been more inclined to continue to work on their portfolios in the spring semester. Ongoing participation in the portfolio project by all stakeholders would have contributed to greater project success as a formative element of the Secondary Proteach Program rather than a summative element.

While the initial hands-on workshops were considered helpful, there were elements which may have reduced their effectiveness. Below are the problems that occurred in the workshops and the interventions that were applied (or planned) to eliminate these problems. Drawn from the research on the *“Teaching Experiment”* the research model was revised as the project was in progress.

Problem: time constraints. Due to time constraints workshops were conducted during one class period at the beginning of the semester. These periods ranged from 50 -

90 minutes and students often arrived late, without passwords allowing access to the lab computers, or disks on which to save their work. Attending to these factors took valuable time away from the portfolio development process for which these workshops were designed and contributed to feelings of frustration, especially for students who came to the workshops prepared.

Interventions applied. Participants were broken into two groups: students with little or no knowledge of the process of building webpages and students who were familiar with the process of building webpages. After an initial orientation given to the entire group on the requirements of the e-portfolio students are divided into the two groups. The workshops are timed so that by workshop's end the students have uploaded portions of their portfolio to the portfolio server. This eliminated the need for disks and all students left the workshop with elements of a published portfolio.

Problem: access to students. Gaining access to students was often difficult, particularly at the beginning of an already hectic semester. However, the later the project workshops occurred in the semester the less effective they became, often erupting into unproductive gripe sessions.

Future intervention. Establishing a bond with the instructors for each of the technology courses, and focusing on building a portfolio culture via the technology courses.

Problem: lack of faculty involvement. Lack of faculty participation in the workshops and subsequent misunderstandings of project requirements contributed to student frustration and may have contributed to the students' perception of the portfolio as more of an add-on than an integral part of the program.

Intervention applied. Personally inviting faculty to attend and participate in student workshops, and establishing a bond with the technology instructor.

Problem: lack of follow-up or classroom integration after the initial workshops. Research on change stresses that efforts must be ongoing (Fullan, 1993; Hord, Rutherford, Huling-Austin and Hall, 1987; Rogers, 1995). Without the opportunity to practice what they learned, students did not have the opportunity to learn from their practice. It was our goal that students move beyond the purely technical aspect of the portfolio development to include a more reflective element in their portfolios. One way to help students move beyond the purely technical is through program integration which encourages (and sometimes requires) students to begin working on their portfolios early in their program and as a result gain more opportunities to reflect on their work. This enables students to move past the “I just want to get it done (task) stage” to the “how does it improve my teaching (impact) stage.”

Future interventions. Many of the students recognized the importance of working on their portfolios over time, but thought the only way to encourage/enforce this was through deadlines and due dates:

Having due dates throughout the program would improve the quality.
(PA4.1)

If the departments required a content deadline, then each person would be on a schedule of completion. Personally I felt like my department did that, but I heard a lot of complaints from proteachers in other departments, now, I can't tell you what their experience was like but they were a lot more frustrated then I was. (PA2.1)

Online support

Of the many support elements put in place to assist the students among the most helpful, according to the students, were the matrices (Appendix E) and the sample student

portfolios posted to the portfolio website. More than one student noted the extra time the professor put into the development of the matrix:

I also used the matrix. Our professor did a really good job of linking assignments to the matrix. I wish that all of the professors would have done that. (PA3.3)

Other comments also provide evidence of the matrix as an effective support mechanism:

I really talked to everybody in class, we shared ideas, and then I looked at the matrix examples, and that is pretty much where we all got our information. (PA2.4)

Many students mentioned the student portfolio examples linked to the portfolio website as being helpful in terms of just-in-time support.

The things I found that were most useful to me were those things that were on the website, because I tend to work really late at night so if I had a question it was a little late to ask somebody, and I found that looking at other students' examples were very helpful. It gave me ideas of what I could do with my own portfolio. (PA1.3)

Substantive concern. It has been suggested that perceptions are difficult to change (Purkey, 1971) and consequently can have an adverse effect on the rate of adoption. Attempts were made to change students' perceptions through early and ongoing support, via hands-on workshops, online tutorials, predeveloped templates, etc. However, without the opportunity for continued practice it was often difficult for students to remember what they learned. For example, students learned how to develop and publish their portfolios to the portfolio server the first semester, but because they did not have many opportunities for practice, they soon forgot what they learned and continued to remain fearful of the process. It is imperative that students have numerous opportunities in the program to address their fears and by doing so change their

perceptions becoming ready and eager to focus on the reflective aspect of portfolio development.

Summary

The first two questions have been answered in this chapter. The results from this study revealed that the Secondary Education Program had an effect on the innovation diffusion of the e-Portfolio Project, and the innovation had an effect on the Secondary Education Program.

In the following chapter I will focus on innovation diffusion at the individual level, specifically, the experiences of the secondary education students and how their e-portfolios changed to include richer forms of communication over time.

CHAPTER 5

THE STUDENTS' EXPERIENCES

The focus of this chapter is on innovation diffusion at the individual level, specifically concerning the experiences of the secondary education students. This chapter will discuss findings related to the following three questions:

3. How do students exhibit professional growth when developing a portfolio in response to set of accomplished practices?
4. In what ways does a student's rationale statement reflect understanding of the appropriateness of illustrations for the accomplished practices?
5. In what ways do student's illustrations change to include a variety of media as they develop their electronic portfolios over time?

The findings are drawn from an analysis of field notes, email correspondences, exit interviews, and student portfolios. Collectively, these sets of evidence contain the details surrounding the first year of the project which is the period under study. Finally, a document analysis of students' portfolios was performed to examine changes in illustrations throughout the development period of the portfolio.

The teaching experiment research originating from Kalmykova (1967) served as the framework for addressing the research questions under study. Researchers are beginning to realize that teachers operate in a complex environment where decisions are made all the time based on experience, curricular goals, and individual student ability (available online at

<http://commtechlab.msu.edu/sites/letsnet/noframs/bigideas/b9/b9theor.html>). The dynamic and fluid nature of the teaching experiment supported the complexity of the e-Portfolio Project and the complexity of teaching and encouraged ongoing feedback, revision, and project refinement based on new information obtained from the student participants. The data obtained from this study may serve to inform others as they attempt to implement a large scale project such as this one.

To answer the third question of this study: How do students exhibit professional growth when developing a portfolio in response to a set of accomplished practices, student exit interviews, email correspondences and student surveys were examined. There are a number of elements that contribute to a student's professional growth. Winsor and Ellefson (1999) believe reflection upon practice and beliefs is critical to professional growth and helps teachers learn who they are as teachers and become aware of how they teach. In addition to these elements Groce, Henson, Woods (1999) include collaboration with colleagues as evidence of professional growth. In Florida, we include an understanding of the Florida standards that guide the teaching profession as well as an understanding of technology as evidence of professional growth.

Reflection upon Practice

Reflection and self-discovery are critical if preservice teachers are to move past the self (Hall & Loucks, 1978) or survival (Fuller, 1969) stages improving their comprehension beyond a simplistic level of understanding. In order for a portfolio to contribute to students' professional growth as defined above, it should provide a forum for students as they move beyond a focus on self to begin to reflect on their graduate program and their teaching, and as they make the transition from student to teacher.

Winsor and Ellefson (1999) state that the elements that contribute to the development of reflection in preservice teachers are opportunities for reflection upon practice and self-evaluation. Becoming reflective does not just happen. Student concerns must be taken into consideration and strategies should be introduced to help students develop skills necessary for functioning at higher levels of use. Fuller (1969) found that students' initial focus on any project, whether it be teaching or technology, is very ego centered. The students in this study were understandably overwhelmed during their secondary education graduate program when much of what they were experiencing was new and VERY challenging. This was confirmed by the comments of the students participating in this study:

We had known about it [the portfolio requirement], but it was never emphasized. That contributed to my complacency because at that time I had other things to worry about in ProTeach. (PA1.4)

I wasn't really reflecting on my work, my biggest concern was to get it done. The portfolio didn't impact my teaching because I was more involved in "how do I get this done?" (PA4.5)

Instructors were also challenged. At a recent retreat for ProTeach instructors a common concern was voiced: "I know my students have learned about, developed, and evaluated lesson plans prior to entering my course, yet when I ask them to develop lesson plans in my class they are unable to do so. Because of this, my teaching remains focused at the beginning stages of lesson plan development" (2001, comments by ProTeach instructors). Bruer (1993) states: The basic skills required for success in our increasingly changing society are no longer simply reading, writing, and arithmetic, but the ability to think reflectively in order to make sense of information and to adapt learning flexibly to new situations. By giving students the opportunity to reflect on the lesson plans they have

developed, i.e. by connecting them to one or more FAPs, and through the writing of a rationale statement, students have the opportunity to operationalize what they have learned to discover its significance. Moreover, if a professor gives students feedback on their rationale statements they then have the opportunity to gain greater understanding, and can apply this new understanding in the future to more complex situations. Lin, Hmelo, Kinzer and Secules (1999) argue that without appropriate support students have difficulty engaging in high-level reflective thinking. In addition, they believe that technology can have a powerful role in reflection, particularly via the internet and the use of hyperlinks. Once the students began to develop their portfolios, reflecting on their graduate experiences and writing rationale statements, it seemed the process had begun to act as a scaffold assisting them to “make sense of new information.”

Writing the Rationale Statements

One of the fundamental tenets of the secondary education program is reflection. The portfolio project adopted this goal. It is through the development of an e-portfolio that students have an opportunity to engage in reflection and subsequently gain a greater understanding of the teaching process and their relationship to it. According to Copeland (1993) there are four assumptions of engaging in reflective practice:

1. Reflective practice involves a process of solving problems and reconstructing meaning.
2. Reflective practice is manifested as a stance toward inquiry.
3. The demonstration of reflective practice is seen to exist along a continuum.
4. Reflective practice occurs within a social context.

On its own, developing a portfolio did not encourage all students to engage in high level reflection of their practice and teaching theories, for some of the students the

portfolio was begun too late in the program to achieve that goal. However, as is evidenced by the comments of some students, the act of writing the rationale statement and ongoing coaching on these statements helped them achieve greater understanding and enlightenment:

The rationale statements have a great function to make someone self-reflective. I believe when I first wrote them I even thought they were good, but their purpose wasn't right, their focus wasn't correct, so, in that regard, I had to examine my sense of focus. It was nice because it made me really consider what the practices were and really consider whether or not I had met them. (PA2.1)

Students need time to reflect

The process of reflection requires opportunity, time, and assistance from others (Henderson, 1996). Similarly, in the development of a reflective portfolio students must be encouraged to revisit their illustrations and assignments and reflect more deeply on them.

Once I did the assignment, after I typed it up and turned it in for class I really didn't think about it again, but then I had to put it in my portfolio, and I had to first decide where it fit. That decision made us think more about the lesson, we had to decide how it applied to the FAP, and then we had to explain our decision. I couldn't leave it alone, I kept rethinking and revising. (PA2.4)

This comment indicates that the student is gaining a deeper understanding of her assignments through selection and reflection and is beginning to operationalize what she has learned in her teacher education program.

Students commented frequently that the reflective part of the portfolio required time and coaching. Because the portfolio was not actively promoted in some of the secondary program areas the students in these programs seemed to feel as though they were penalized because they were not “encouraged” to work on their portfolios.

I think I would have been more reflective had I had more deadlines earlier as the portfolio program went on. There wasn't as much reflection as would have occurred if I had set it up and kind of got running early in the program and then at the end filled it in and reflected a little bit more. I can't say there was a huge amount of reflection going on. (PA4.2)

It would have been a much more reflective experience if I had worked on it earlier and more often. (PA3.5)

This supports Shulman's (1992) claim that successful student portfolios permit analysis and reflection of learning over time, are content and context specific, help to unpack the complexities of teaching, and generate extensive detailed conversations about teaching.

Many students claimed that it was through the writing of the rationale statement where what they learned in the Secondary Education Program became visible. Comments such as the ones below confirm this statement.

I believe that writing the rationales was a valuable thing to do because it made me think about the multiple reasons for an assignment, that each assignment can cover many different FAPs or objectives. Writing the rationale made me think specifically about why we did this and what we are supposed to know as we go into teaching. (PA3.4)

We wrote the rationale statements so that we show that we know how our assignments related to the FAPs. I think had I not written the rationale statements I wouldn't have known where I was going with the assignments. How it connected to the FAP. For example, I would pick out something and then when I went back to look at it I couldn't even come up with a rationale statement, so that made it obvious that it didn't fit. That is how writing the rationale statements helped me. (PA3.5)

Some students took the process even further, making connections to their success as a student teacher:

I went through all the lesson plans that I had written and I dug into all the journals that I had written during my internship and my practicum. I liked having to show the illustrations because it really made me see how the FAPs tied into what I had been doing. If I hadn't taken the classes that I did and if I hadn't been exposed to the FAPs, I don't know how happy I would be as a teacher right now. Everything that I have learned and everything that I was exposed to has really prepared me. I keep telling my

coworkers that I don't know if I would be teaching right now if I hadn't learned all the stuff that I did in the program. (PA4.4)

Students who began to work on their portfolios early in the graduate year were able to spend more time reflecting on their illustrations and modified their portfolios based on new information. These students moved beyond what Fuller (1969) described as the self or survival stage, where a student is focused on his or herself, to the task stage where the focus begins to center more around the task of teaching. This is evident in the comments of one student:

The portfolio, in shaping my way of teaching, was an incredibly beneficial experience, for a lot of different reasons, one basic reason was that it allowed me to look at the timeline of the teaching that I had done, and for that matter the coursework that I had done, to look at all of that work, and fit it into a timeline or a framework or paradigm to look at myself as a teacher, and also the way I progress as a teacher, and also the way I would create ideas around which to teach. When I was teaching, I was trying to make the connection between what I was teaching and what was printed there, I can't say I did that every time but I did try to do that. (PA2.1)

Developing a teaching portfolio provided students with opportunities to discuss and write about their experiences in their classrooms and their student teaching experiences. Ideally, the students' reflections should contribute to the improvement of their teaching. When students look back on their work, assess their development at various points throughout their graduate program, and articulate what they learned they begin to think as professional teachers, developing into reflective practitioners, and thus developing a "habit" of reflection.

Developing a habit of reflection

Although fifty-seven percent of the students interviewed stated that the act of developing the portfolio helped them become more reflective, twenty-four percent

specifically stated that the development of a portfolio helped them develop a habit of reflection.

This is something that I am going to use in the future so it is good that I started doing it last year. That way I am sort of already in the habit, I am already thinking about why I made the decisions I did. (PA2.4)

Another student phrased it differently:

The connections [between teaching and the FAPs] are inherent and I don't really think about it. But because I absorbed that information of the FAPs as I was learning how to be a teacher and developing my portfolio, it becomes the nature of teaching, the nature of my teaching. (PA2.5)

One student described the experience as helping him become accustomed to thinking about the subject matter standards:

Once you are out in the teaching world you have to show in lesson plans that: "yes I am doing things that are meeting the Sunshine State Standards." The use of the FAPs and the e-portfolio were a good practice for that. (PA2.6)

In addition, taking the time to think about their teaching and the courses they take in the Secondary Education Program helped students extend their thinking to hypothetical situations.

The reflection allowed me to be prepared and think about situations that actually had not emerged while I was student teaching. So I guess the self-reflective process in the portfolio allowed me to prepare for the unexpected situations by role playing, thinking it through, imagining them. Now that I am here [teaching] it's useful in my own concept of how to teach children in a way how to meet the very same standards that I have to meet. This needs to be communicated to students right up front, writing the rationale statement is really about self-reflection, it is not a title, it is not a synopsis, it is more of a thinking about it. I slaved over those things, but if you don't do that you are just plugging things in. Plus there must be feedback. That [feedback] has to be there. (PA2.1)

The purpose of having students develop rationale statements to include in their portfolios was to encourage them to begin to think deeply about their assignments and

begin to make connections between theory and practice. As Arter and Spandel (1995) state the true instructional value and power of doing portfolios comes when students use criteria and self-reflection to make decisions about what they want to show about themselves and why. This is evidenced in the following student's comment:

Once I went back and started revising the rationales, as I tried to explain my choices I had to change a couple of the lessons, because then I looked at them and I thought "you know, when I first connected these I thought that they worked, but now that I am looking and really studying the FAPs I don't think that it fulfills itself in the aspect I first thought it did." It made me concentrate a lot more on the lessons that I was designing and gave me a better understanding of the FAPs. (PA2.7)

For this student there were multiple levels of learning occurring, not only did she begin to learn the significance of the FAPs, but she also began to "concentrate more on the lessons she was writing." Reflection, revision, and subsequent understanding began to occur more often in more students.

Collaboration

The ability to collaborate, both on a large and small scale, is becoming one of the core requisites of a post modern society (Fullan, 1993). Working with peers may also give students an opportunity to view ideas, concepts, and experiences from a different perspective. Korthagen (1992) believes that students' verbal interaction with one another is not only stimulating, it acts as a principle catalyst for reflective development. Collaboration and interaction with peers is an essential element in the success of the project. Peers acted as consultants with each other and participated in the sharing of knowledge and information.

Jensen and Shepston (1997) reported that preservice teachers who were able to engage in meaningful collaborative experiences with other teachers were better able to

identify examples of best practice or distinguish between examples and non-examples of best practice in the real world than those preservice teachers that did not meaningfully engage in collaboration (as quoted in Groce, Henson, and Woods, 1999).

Opportunities for collaborative experiences enhanced the portfolio experience for many of the students. Collaborative experiences were varied, occurring either as whole class brainstorming sessions, two or three students helping one another, or virtual collaboration through email. Most of these collaborative activities took place within each program area as few students collaborated with students outside of their program area.

Most of the time we would go to the lab and work on our portfolio with another person or the whole group. We would work on it together because we always ask the question about whether or not something would fit or what would be a good rationale. It was very helpful, we had a very small group and we were very close so it was very helpful. (PA3.3)

Even the students who professed to be “independent learners” found it helpful to work with other students during the development of their portfolio.

We would all be in the computer lab in a row and someone would have a crisis and another person would come by and help. Most of the collaboration was just basic stuff. (PA2.5)

The students found it helpful to be on both the giving and receiving end of the collaboration. They found that teaching their peers helped them learn.

I helped out a couple of people, like running through the commands and stuff like that and it just reinforced the knowledge for me too. (PA2.7)

I think that anytime you have to explain something it makes a big difference in your understanding (PA4.2)

Friends would get together in the classes and then together after class in the computer lab to make sure everybody knew how it works and if one person was better at something than another person they would show them how to do it. We spent a lot of time together just trying to help each other and trying to decide how to make things work and what to use for the FAPs. (PA4.5)

These comments indicate that a portfolio culture may be beginning to emerge in the college.

While most of the students succeeded and even thrived as a result of their collaborations, a few did not. Sometimes collaboration was a result of procrastination and frustration on the part of the students causing them to enlist the help of a collaborator who might do the work (build the portfolio) for them. While this was more the exception than the rule, there are examples which support the idea that “collaboration” does not always increase or encourage understanding, reflection, and excellence rather it may sometimes be an easy way out of doing the work. When this happens the portfolio is reduced to a summative assignment or a hoop to be jumped through. The following comment is evidence of this type of thinking:

To me it was very frustrating because I didn't even know where to start. I think that if it had been in a class in a slow process, I mean I realize that you had office hours and you had times for us to come in, but that was hard because it wasn't part of a class, it was just hard to make that extra time. I think that if it had been part of a class it wouldn't have been so frustrating for me. If I could have sat there and step by step we could have gone through everything weekly with a class I think it would have been a lot better. It didn't really make me like technology just because I was trying to hurry up and do everything. (PA1.2)

[Interestingly, this student had taken a technology class for her discipline the previous semester where she developed and published webpages.] When I asked her: “Did you learn the technology?” she responded: “I learned a little bit more than I knew, but as far as really learning how to do it no. Like I said I had to spend most of my time at the end getting everything together getting ready to upload. I spent a lot of time figuring out what to use and what went where, and that time could have been cut down if it was better organized in the classes, so really I didn't have time to learn how to do it. I tried to get everything done and then I gave it to a friend to upload for me. Because it was a time constraint thing too, that didn't allow me to learn the technology.” (PA1.2)

One student who began his portfolio early in the graduate program looks at this phenomenon from the view point of portfolio mentor:

I also ended up helping a number of the students in my program, helping them to design their portfolio, letting them look at mine and teaching them some of the skills they needed to do the work because a couple of people in my program were a bit stubborn and didn't want to teach themselves or they just didn't know what to do so whatever time I had available I tried to make myself available to help out other people because it was knowledge that I already had that some of my friends didn't have. (PA1.3)

We have learned from the research of Hall et al (1973) that individuals and groups move along the adoption curve in varying degrees. While it is important to support all participants in the process not all participants will adopt the innovation within the first or second year of implementation. Innovation diffusion takes time, and additional longitudinal studies must be conducted to determine if developing an e-portfolio contributed to long term effects regarding the students' use of technology in their secondary education classrooms.

Understanding the Standards that Guide the Teaching Profession

Preservice teachers exhibit professional growth through increased understanding of the standards that guide the profession. One of the goals of the portfolio project was to help students develop a greater understanding of the FAPs. Simply reading a list of FAPs from a syllabus does not promote a deep level of understanding. Students must understand the FAPs enough to engage in reflection upon them and their relationship to coursework and to student teaching in order to develop a comprehensive portfolio. One hundred percent of both the English and the mathematics students interviewed reported an increased understanding of the FAPs through the development of their e-portfolio, in contrast to the science and the social studies students of whom 75% and 60% respectively

agreed that the portfolios helped them understand and operationalize the FAPs.

Additionally, 40% of the social studies students interviewed stated that they did not learn that much about the FAPs through the development of their portfolio because they did not begin their portfolios until late in the spring semester.

Students' ability to critically examine their work is a key component of the e-portfolio and essential to a preservice teacher's professional development. It is the student's responsibility to collect, select, and reflect on their work determining what to include in their portfolios and articulating why each artifact was chosen for inclusion. A student's ability to make informed decisions about what best represents him/her as an educator reflects a high degree of professional knowledge, though ideally, each student should receive feedback from professors, the project director, and peers.

It is through the process of selecting an illustration, connecting it to a FAP, explaining the connection (written in the rationale statement), and making appropriate and necessary revisions that students become more inquiry oriented and more reflective. The longer students wait to begin their portfolio however, the fewer opportunities they will have to reflect on their work as it is presented in the portfolio and explained in their rationale statements.

For many students developing a portfolio made the FAPs more "conscious" and helped them understand and recognize what the state expects of its teachers, the complexity of teaching, and examine the appropriateness of their choices.

The FAPs weren't explained to me at all, I would sit down and try to figure out why they were talking about, because we really hadn't gone over them. I think the FAPs are valuable, and requiring us to give reasons why is also valuable. Some people that I talked to had a problem with that for some reason, but if you can't explain what the assignment has to do with the FAPs then you need to rethink it. (PA1.1).

This student has learned that the strength of the artifact is evidenced through the strength of the rationale statement. For example, if a rationale statement mentions specific elements of the artifact that pertains to the FAP the viewers of the portfolio will have a greater understanding of the student's perspective on that assignment, what they learned, and the connections the student can make to the FAP.

The Challenge of Technology Integration

Across the nation, there is a growing focus on integrating technology into the curriculum. It is both difficult and daunting for students with little or no technological proficiency to contemplate developing an extensive web-based portfolio. Although eighty-four percent of the students surveyed self assessed themselves as intermediate to highly skilled users of technology words like *fear*, *frustration*, and *anxiety* were heard repeatedly by students when describing the thought of developing an e-portfolio. This supports the data of Whetstone and Carr-Chellman (2001) who found that regarding use of a computer an overconfidence exists in preservice teachers when compared to actual practice.

Most of the students felt overwhelmed by the idea of putting together extensive portfolios and publishing them to the portfolio web server. Because of their fear most students procrastinated starting their portfolios and became more anxious as deadlines drew nearer. Fuller (1969) suggests that early communication with students should focus on their fears and concerns and should be relevant to their position along the self, task, continuum. More than one student confessed that fear caused their procrastination summed up by this comment:

It was just the fear that was holding me back. It sort of alleviated fear more than anything. Again, it is absolutely essential, you cannot get rid of this program for that reason. (PA2.1)

After confronting their fears (usually accomplished by simply starting to work on their portfolios) many students found that:

I'm not so nervous about trying something new. I'm not so nervous about pressing the reset button, asking for help....I feel like I can do just about anything, in computers I can do it. (PA2.2)

Developing my portfolio helped because I now know more about technology and I am not as scared to use it as I might have been. I used to be, before this, I was nervous, and now they still make me nervous, but I know I can do it and it is not as hard as it seems. I am more willing to take risks. (PA2.4)

Many students did not realize that the opportunity to learn to use a computer for teaching, communication, and research was a luxury; time they would not have during their first year teaching. In her research of inservice teachers and their use of technology Schrum (1995) found that time to explore, digest, and experiment is perhaps the most critical need cited by the educators. There seems to be no easy way to find the time, unless it is built into the school day, or unless educators have equipment at home.

Developing an e-Portfolio seemed to help students acquire a sense of self-confidence and empowerment towards technology. Research shows (Becker, 1999; Sheingold and Hadley, 1990) that technology begins to have greater appeal among preservice teachers who have had exposure to technology in their education program. In addition, exposure to technology in their education program can play a critical role in positively influencing preservice teachers to use technology in their future classrooms. Eighty-one percent of the students interviewed stated that developing a portfolio positively influenced their feelings about computers, and forty-eight percent of the

students cited specific examples of how they might use technology in their future classrooms. This is supported by the research of Hall, Loucks, Rutherford, and Newlove (1975) who found that continued use and management of the tool becomes routine and the user is able to direct more effort toward increased effectiveness toward other elements of learning, in our case, the choice of illustrations, and the development of rationale statements. One student sums up the sentiments her classmates when she stated:

Now I feel a little more comfortable about using technology, I think I will be more willing to use computers in the classroom. (PA1.1)

Whether it is through developing course webpages:

I would like to have a class webpage that my students could go to. That is definitely something I got out of the portfolio. (PA2.3)

or having their students build their own webpages:

I would like it if my students could do that, if they could make their own web page, because as I was putting my work in my portfolio I was thinking if other teachers found my page it would be a great resource. It made me feel good because I helped other people, you know, share my information and I thought it would be nice if all my students had the opportunity to do something like that. (PA2.5)

or have their students develop portfolios:

You can have them make portfolios. There's a whole other way that it is connected, learning the skills that it took to do that, but then learning the content. That's what I want to happen with my kids. (PA2.1)

Conquering their fears contributed to the students' feelings of empowerment:

It's that empowerment of being able to do this to express yourself in a way a looooot of people can see. A whole lot of people. It's not really as scary as it seems, and also the fact that I made the whole thing, the entire portfolio. I think I really realized the importance of being able to do that and knowing where everything is going and most of my students probably won't know how to get on the internet. (PA2.5)

Doing my portfolio made me more comfortable using a computer and if I am going to be more comfortable with it then I will be more comfortable using it with my students. (SSE5)

I selected one preservice teacher as an example of the experiences of students as they faced the concept of developing an e-portfolio. PA2.2 began her portfolio during the first semester of the program and moved along the self, task, impact continuum. Her story is that of a student progressing through feelings of frustration to empowerment.

At the beginning of the project PA2.2 was frustrated and certain that the task was beyond her abilities. Her comments during the first semester were: "I don't know the first thing about computers, and I will NOT be able to complete a portfolio." She wanted a way out, she felt that maybe the idea had merit, but only for the students who were more technologically proficient. Her frustration was predictable, and understanding her point of view and her frustration enabled me to work with her to help her address and face her fears and frustration. Fortunately she came to me with her fears, concerns, complaints and I spent time with her to help her realize that she could do the task, it wasn't beyond her. I explained to her that her frustration was understandable, and important because it would help her face new things and not back away from future challenges. Hall's intervention 1 (acknowledge that little concern about the innovation is legitimate and appropriate) is important, but equally important is the acknowledgment that fear and frustration about the innovation is legitimate and appropriate.

During the spring semester PA2.2's frustration turned to excitement and her comments changed from "I don't know why I have to do this, I don't understand it" to: "Gail, I have to show you something. Please take a look at my links page, I learned how to scan, I am so excited, this is wonderful!!" She couldn't put it down: "The reason I spent so much time working on my portfolio was because I was having so much fun!"

During the final semester (summer) of the project she began to act as mentor to students that had procrastinated. She tried to help them in ways that I had tried to help her. She spoke to students about "hitting a wall, and breaking through the wall to see what was on the other side." She told them her story, her fears, and her excitement over her achievements.

Finally, she used her portfolio professionally "I did use it in both my interviews. I put my URL on my applications and in both of my interviews I asked if they had seen it yet. One of them had looked at it already and, the other one hadn't. And, in an interview where I am

teaching now, the principle asked what I knew about technology, and I asked her if I could show her my portfolio, so I actually went to my portfolio site on her computer. I think it weighed heavily in my favor, especially if she was interviewing anyone else who could not do the same things. Also professionally, if I go for national certification, I have to keep some sort of portfolio. Now, I don't have to lug around a box of paper, I can do it online. I am confident enough to know that I can do it verses well yeah I could do it on line but what if it crashes? What if I do it wrong? I don't have those concerns anymore. I also know that I can still access it, so when I get ready to start a portfolio for national certification, this will have a whole new use for me.

Her example was not unique, rather it sums up the experiences of students as they developed their portfolios. One important difference was that PA2.2's experience began that first semester and evolved throughout her program. It is more beneficial to work with students on portfolio development over time then in the last semester of their program. The formative development of her portfolio gave PA2.2 time to move from a point of frustration, to a point of excitement, to becoming a mentor to her peers, to using the portfolio professionally and thinking how her portfolio would help her advance professionally as she worked toward national certification. Moreover, PA2.2 taught me that trust was a crucial element of the support structure, especially for novices. I was often frustrated that students did not take advantage of the online support structures I had spent so much time developing. It became clear that the novices did not trust the online tutorials, (or their ability to use them effectively). There is a certain amount of scaffolding that is necessary before students will take advantage of these tools. Novices often need a person to talk to, to sit next to, or to whom they can come for assistance. Many students chose to work in the computer lab for that reason. "I did most of my work in the lab because it was helpful to be able to come and see you in the office immediately when I had a question" (PA2.7). More office hours were added during crucial times when

I knew students would be able to spend additional time working on their portfolios. For example during the public school's spring break when students would not be student teaching ten additional office hours were added to the schedule. Identifying students' peers as knowledgeable colleagues gave students the feeling that there was support from someone whom they trusted, and related to, someone who "speaks their language."

Students that were more experienced with technology were able to experiment with their portfolios and think of innovative ways to integrate their portfolios in their student teaching. For example, one student used the portfolio as a teaching tool, publishing his lesson plans and assignments to his portfolio every week. His frequent use and reliance on his portfolio as a teaching tool helped during times when the portfolio server was undergoing change as he alerted our staff to anomalies in the server.

Selection of Illustrations

The portfolio project was established on the principle that the students would have ownership of the portfolio and would choose appropriate illustrations. Professors would suggest possible illustrations from their classes, but the final decision was left to the student. The student must tell his/her story of learning, growth, and development. The students' ability to choose the appropriate illustration and to articulate why each illustration was selected is an important element of the e-Portfolio Project. One student explained how she chose the illustrations to include in her portfolio:

It was hard because I had to understand the FAPs, well enough to understand which lessons apply to each one. Once I was sure I understood the FAP, I would look at the lessons I had done from my different classes, and ask: "which one of these am I most proud of to have as my first illustration?" (PA2.2)

Although all students stated that the FAPs were listed on their syllabi they agree that the FAPS need to move beyond a line on the syllabus to in-class discussions. All students interviewed spoke of the importance of integrating the FAPs into the program:

We never talked about it beyond what was in the syllabi. I would like to be more familiar with the FAPs in other contexts. (PA3.1)

If it was part of my classes it would seem more relative to what I am doing. The connection would have actually been greater. (PA4.1)

Once we did an assignment and turned it in for class we really didn't think about it again, but then we had to put it up there (online portfolio) we had to first decide where it fit so that made us think a lot about both the lesson and the FAP. We had to decide how it applied, and then we had to explain that. It (the ep) makes you think about what you are doing, how well you are doing, what you should change, what you think about it and also makes you realize how much work you put into it. (PA2.4)

A program goal was to empower our students to make decisions about their work so that they begin to operationalize and make connections between what is happening to them as students and what is happening to them as interns and future teachers. Some students recognized their limitations and believed that “breaking through the brick wall” was an essential part of their experience as preservice teachers and doing so enabled them to make connections to their profession.

Once I broke through the brick wall regarding technology and saw what was on the other side, I knew the same thing could happen in my student teaching, I felt as though I could handle anything. (PA2.2)

Portfolio Development and Professional Practice

Developing a portfolio seemed to enhance a student's self-assurance as a future teacher. Words like *confidence*, *empowerment*, and *ownership* seemed to punctuate students' conversations about the portfolio experience. Students interviewed suggested that the portfolios added to their confidence as a future teacher and as a technology using

teacher. Comments like “I feel like I can conquer the world” or “I can do anything” were more the rule than the exception in portfolio interviews. A frequently articulated theme emerged throughout the exit interviews:

I dreaded the portfolio, I didn’t want to do it, but after I finished I saw its value, it allowed me to see the relevance of my coursework, and reflect on my teaching and learning to teach. (office conversation)

In their exit interviews students listed reasons why they believed that developing a portfolio was beneficial to them professionally:

- Feelings of empowerment
- Making additional connections teaching to content standards.
- Developing a professional resume
- Showing what they know about teaching
- Showing what they know about technology
- Similar requirements exist in their professional practice,

At least one district in Florida requires all teachers to develop portfolios which are connected to the FAPs. It is a portfolio program similar to that in the College of Education at the University of Florida, but these portfolios demonstrate a teacher’s accomplishment of the FAPs at the professional level.

Developing my Proteach portfolio was very helpful because they have a program here at Naples called in-task. This is where teachers add illustrations to their portfolios that are connected to the FAPs. I am showing them your site [COE portfolio site] because their's (Naples) is not as in depth, and the teachers do not understand what meets what practice. The person in charge of the project said "Wow that's so great, can I show it to other people? (PA2.4)

Interestingly, this first year teacher has become a portfolio mentor in her school, giving practicing teachers advice of the FAPs and portfolio development. Another student who now teaches out of state has found that his state has a similar requirement:

In my first two years of teaching I have to develop a portfolio as part of my assessment process here, and it is something that I will start to utilize a little more once I get settled in here. I will change it [the Proteach portfolio] with some of the things I am doing now. (PA1.3)

Some students began making connections between the portfolio and the teaching occurring in their internships. When asked to reflect upon the impact developing a portfolio that is connected to the FAPs had on his teaching one student commented:

There is a very real connection in terms of the asking myself what am I doing? What am I teaching these kids? What can I do to give them a good education? It really makes you think about what you are doing how you categorize what you are doing, how much you are going to do in this area as opposed to that area When I was teaching, I was trying to make the connection between what I was teaching and the FAPs, I can't say I did that every time but I did try to do that. The sheet (with the FAPs on it) was a guidepost. A lot of the course assignments I did I evolved for my portfolio, when I say evolved I didn't change anything, what I did was clarify things, sharpen things, and I sharpened my focus. I used it as an excuse to make them [the rationale statements] more advanced. (PA2.1)

Other students spoke about issues specifically related to their future careers as teachers, or issues that might occur in their future classrooms:

In the portfolio, I liked going back and doing these things and trying to classify them. I would look over them and see "Why was this important? By doing this assignment how did this help me in my future teaching career? (PA3.3)

Developing the portfolio helped me think of things that I might not have thought of, that would never have occurred to students such as: "What are the ethical issues of using video?" The reflection allowed me to be prepared and think about situations that actually had not emerged while I was student teaching. So I guess the self-reflective process in the portfolio allowed me to prepare for the unexpected situations by role playing, thinking it through, imagining them and also, now that I am here it's useful

in my own concept of how to teach children in a way how to meet the very same standards that I have to meet. (EE1)

Still others began to discuss the impact that their portfolio had for them in their job search. A few students shared their interview experiences with me:

In my job interview the principal asked me what I knew about five of the 12 FAPs. When I answered his question, telling him everything I knew about the FAP, he would rate my answer on a scale of 1-5. Honestly, I don't think I would have gotten four 5's and one 4 had I not had to develop my e-portfolio and write rationale statements for each of my illustrations" (office conversation).

I went to my job interview the principal asked me what I knew about technology. I asked if I could show her my online portfolio, and she seemed very impressed. She offered me a teaching position right then. I told her I had another interview the next day, and she made me promise not to make any decisions without first talking to her. I believe my e-portfolio weighed heavily in her decision, and I am now teaching at her school" (PA2.2).

The professional identities developed by the students throughout their graduate year seemed to be influenced by their reflection. During interviews, some students looked back at their graduate program and reflected upon what they did, what they learned, and the decisions they made. Others looked ahead to see how developing an e-portfolio might help them in their careers.

Students' Understanding of the Florida Accomplished Practices

To answer the fourth question of this study: In what ways does the student's rationale statement reflect understanding of the appropriateness of illustrations for the accomplished practices, student portfolios were examined over time.

Perhaps the most startling aspect of the portfolio project was the students' inability to write an informative rationale statement. Most of the early rationale statements were descriptions of the illustrations rather than reflective comments. Overall,

students had difficulty developing their rationale statements. To address this issue, students were provided extensive feedback when possible. This was done periodically throughout the spring semester (halfway through the graduate ProTeach program). This feedback was presented as suggestions for improvement. The research of Henderson, (1999) and Schön (1983) and others confirms that students need coaching and scaffolding to bring them to a greater understanding of their teaching and learning processes, consequently helping them become more reflective. According to Schön (1983) coaching leads to the process of reframing/looking at educational experience from a new perspective. Korthagen (1992) adds that reframing from a cognitive psychology perspective means that the person's cognitions about a situation or a phenomenon are restructured.

Initially, students' rationale statements were extremely simplistic. Students often felt frustrated and didn't know exactly what was expected of them. However, after coaching episodes occurring in the director's office, in the computer lab, or via email, the students' ability to self-reflect improved and they began to understand the portfolio had a greater purpose than simply a means through which they published assignments to the web. Ross (1987) notes that reflection requires feedback for appropriate scaffolding and the implementation of strategies for fostering the development of reflective students. Strategies for fostering the development of reflection include (a) communicating that knowledge is socially constructed, (b) modeling reflection, and (c) providing guided practice in reflective thinking and teaching.

I'll tell you something, we were very frustrated when we started doing this as students in the College of Ed. We thought we could get by with a rationale statement that was one or two sentences long, that doesn't work because the purpose of the rationale statement is to self reflect, to ask

yourself “Why did I include these lesson plans or these tasks under that accomplished practice?” It also requires you to ask “Why am I wanting to be a teacher?” In the rationale statement you have to apply what you are doing directly to your practice and your theory of teaching. There is a very real connection in terms of the asking myself what am I doing? “What am I teaching these kids? What can I do to give them a good education?” (PA2.1)



Figure 5-1 Student Perspective on Reflection

It does give you a sense of accomplishment like "I did learn something in this program. (PA3.2)

Most of the feedback that students received on their portfolios occurred between the students and the project director. Students' portfolios were periodically evaluated so that students could receive feedback on their work thus, giving them an opportunity to improve their rationale statements. The following are some examples of feedback that students received regarding their rationale statements:

Assessment - Your rationale statement does not sound like a rationale statement, it sounds more like a description, also, you make no mention of assessment in your statement. You should inform the reader how your illustration offers an example of assessment and why you chose to use this illustration.

Learning Environment - Your rationale statement does not sound like a rationale statement, it sounds more like a description. How does your

classroom test demonstrate your knowledge of positive practices for maintaining positive learning environments?

The following comments confirm that students appreciated the feedback:

I made some adjustments to my portfolio. Please read the new rationale statements I posted, I think I hit most of the glitches, but I could be wrong. Let me know because the feedback is a real help. (PA1.3 email)

One student voiced a similar sentiment in an email correspondence:

Thanks for your recent e-mail, Your comments are helping me to revise my e-portfolio with minimal hassles. Without them, I would have been intimidated by finishing a portfolio I haven't even looked at in 12 weeks, Still, I have some pertinent questions about the process that I could not find answers to on the portfolio page tutorials. What should a rationale statement look like? What should it communicate to the reader? How long should it be? (email)

Interestingly, many students began to have fun writing their rationale statements.

In the end I did enjoy developing a portfolio. I had a lot of fun, you know, figuring out which assignments I was going to put up and figuring out what my rationale was going to be, which one it correlated too. I went from hating it to liking it, to almost loving it. (PA1.4)

Some students remained concerned about the quality of their rationale statements, requesting feedback, and revising their portfolios until the day of graduation:

I am still having problems with the rationale statements, I don't know if I did them correctly. I went through and I revised them and I tried to make them so that they adequately fulfilled the reasons I chose the lessons, but honestly at the time I didn't really feel that I had a schematic to follow. (PA2.7)

Students who began their portfolios late in their program did not benefit from feedback that other students found helpful.

Students asked several questions which helped to improve the portfolio project.

For example, frequent questions were asked about the purpose of a rationale statement.

Through discussions with the secondary English education faculty, a tutorial was

developed for writing a rationale statements. This tutorial (Appendix D) was added to the online portfolio support center and students were notified of new tutorial via email. Collaborations involving faculty seemed to increase their interest in the project and may eventually contribute to increased faculty buy-in.

In addition to the tutorial other steps were taken to improve the quality of students' rationale statements:

1. Changing the header to include a description section (Appendix F)
2. Adding "Why you chose to use this as an illustration and how it is an example of the Accomplished Practice" to the rationale section of the header. (Appendix F)

Based on students' rationale statements written after the above interventions were taken these elements seemed to help students write rationale statements.

Communicating via Technology

To answer the fifth question of this study: Do students' illustrations change to include a variety of media as they develop their electronic portfolios over time? the students' e-portfolios were examined. The most tangible evidence the impact of the e-portfolio project had on students' ability to use technology is the students' actual portfolios.

Because most class assignments in the Secondary Education Program consisted of text and most of the performance indicators (the examples given to students regarding the types of illustrations) consist primarily of text project designers expected that student portfolios would reflect this preponderance of text. It was predicted that initial illustrations would not contain a wide variation of technology rich examples. Students

were not encouraged to use video or sound in their portfolios and those that did, did so by their own choice.

The most relevant example of technology in the program is through the wording of the FAPs. For example, accomplished practice 12, Technology states:

Uses appropriate technology in teaching and learning processes.

The preprofessional teacher uses technology as available at the school site and as appropriate to the learner. She/he provides students with opportunities to actively use technology and facilitates access to the use of electronic resources. The teacher also uses technology to manage, evaluate, and improve instruction.

One example of the students' ability to actively use technology and electronic resources is the students' e-portfolio itself, and many students used their portfolios as an example of technological proficiency.

The following chart indicates the types of technology illustrations found throughout the students' portfolios and the breakdown of technology types.

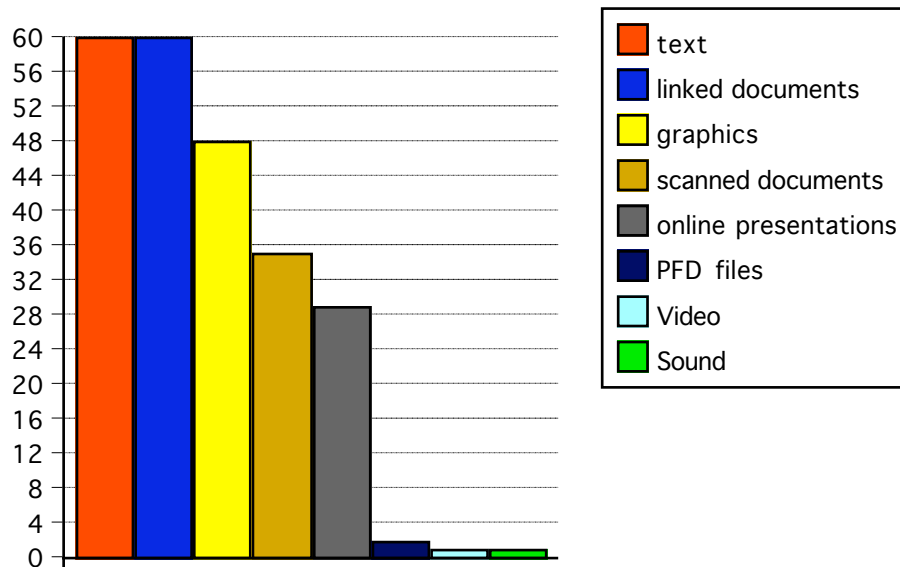


Figure 5-2. Types of Technology Used

As is evidenced by this chart, the students' portfolios consisted primarily of text and linked documents (hyperlinks) (100%), and 84 % of the students included graphics in their e-portfolios. Sixty-one percent of the students scanned documents for their portfolios and 51% percent added hypertext versions of PowerPoint presentations to their portfolios. Students learned how to scan and convert PowerPoint to hypertext primarily through the use of the online tutorials. In many cases, once students learned how to do these tasks they taught their peers.

Two students included sound in their portfolios while one student added video. When students used more complex forms of media interesting discussions began to occur. For example, the student who used video clips in his portfolio initially believed that in order to be effective the video had to be 30 minutes in length. Consequently, many discussions occurred in the portfolio office surrounding the inclusion of video such as:

- How long should the video be?
- What is compression?
- How to I upload video to my portfolio?
- What is the difference between analog and digital video?
- Can I use videos of my students?

These questions were addressed in this first year of the project simply because one student wanted to add video to his portfolio. The discussions that occurred surrounding this issue will benefit students who choose to use video in the future. Ultimately the student decided to include three short video clips to his portfolio as evidence of the FAP one, Assessment; two Communication; and four Critical Thinking. These videos are no

longer than a minute in length, no more than 5 MB in size, and are supported by well written rationale statements.

Overall, students did not use a wide variety of technology in their portfolios, their illustrations consisted primarily of linked text documents. Dexter (1999) states that teacher change is a process that requires a shift in a teacher's paradigm as he or she implements a new innovation that influences their pedagogy. Longitudinal studies must be conducted to examine the types of technology rich illustrations students include in their portfolios and future changes regarding students' technology use. Although the development of an e-portfolio gives students the opportunity to demonstrate a broader range of skills than standard types of assessments, students did not use a variety of technological examples, this may be because assignments were primarily text-based or because there was little modeling of complex technological assignments throughout the Secondary Education Program.

Other Interesting Observations

In addition to the questions that were the focus of this study other interesting observations were made during this implementation year that deserve mention. The portfolio experience was meant to amplify the connections between the students' classroom learning experiences and their professional development activities. Results from this study indicate that students' portfolios may have been stronger if their professors had been coaching them on their portfolios throughout their graduate year. Many students believed that their professors should assist them in the decision making process involved in selecting an illustration and should then provide feedback and coaching on the rationale statements. My data suggests that the faculty did not provide

the students adequate feedback during this first year of the project. Reviewing their portfolios with their professors throughout the graduate program may have helped clear up any misconceptions that students and professors may have been harboring. Perhaps if there had been some class discussions revolving around the issues of illustration selection there may have been a greater variety of illustrations. Furthermore, when faculty began to see the impact the portfolio had on students they began to gain a greater interest in the project. This study is unique from many studies of change as the students were viewed as primary focus of the change effort.

Blease and Cohen (1990) note that it is vitally important to provide breathing space, time to reflect on experience, and time to identify one's own uses for the new technology (p. 135). Not surprisingly the students that viewed portfolio development as an ongoing process had more time to reflect on the experience and the portfolio's potential. For example, some students used their portfolio in ways the project developers had not intended. For example, some students used the portfolios as a database of resources while others used their portfolios as a teaching tool while in their internships. These unintended uses of the portfolio proved motivating to students, opening up opportunities to identify their goals for their portfolio in addition to project goals. By encouraging students to use their portfolios to meet their needs they were motivated to work on their portfolio with greater frequency, and the quality of their work improved. Moreover, when the students shared their ideas with their peers the overall quality of students' portfolios improved.

Summary

The evidence presented in this chapter delineates the ways in which the process of developing an e-portfolio contributes to a student's professional growth and their understanding of the Florida Accomplished Practices. The portfolio acted as a catalyst for students' professional growth as evidenced by 1. their increased understanding of the FAPs, 2. their reflective development, 3. collaboration with their peers, and 4. increased technology understanding and use. For this reason it is crucial that the students begin their portfolios early in their first semester or during their minor in the undergraduate part of their program and revisit the portfolios regularly throughout the remainder of their program.

CHAPTER 6 LIMITATIONS AND FUTURE IMPLICATIONS

The purposes of this study were twofold. First, the study explored the diffusion of an innovation in the form of electronic portfolios into a teacher education program. Second, this study explored the influence the e-Portfolio Project had on the professional growth of preservice teachers. This chapter describes the limitations encountered during this research study and the implications this research study holds for future research. My intention in conducting this study was to present findings that might help educators gain greater understanding of the innovation process, and to provide the groundwork for colleges of education considering the implementation of a program wide innovation in the form of electronic portfolios. I had also hoped that my research would provide insight into the potential for growth in prospective teachers as they develop personal, professional portfolios.

Much of the recent portfolio research discusses portfolio implementation in an anecdotal manner, focusing on studies undertaken in a single class, or with a small population of preservice teachers. This study, however, investigated the implementation of an electronic portfolio project throughout a one-year secondary education graduate program. Because the program is a one-year (plus summer) program, I was able to examine student portfolio development throughout a student's Master's degree experience.

The Portfolio Project Model (Figure 3-1) applied dynamic assessment to the project based on the Russian Teaching Experiment discussed in Chapter Three. In this model a project is developed, goals and objectives are defined, interaction with participants occurs, and modifications and project revisions occur based on participant interaction and feedback. This interaction and feedback loop continues until project goals are met.

Limitations

There are several limitations to this study. All participants were secondary education graduate students and were required to develop an e-portfolio. The size of the sample and the fact that the participants were not randomly selected does not permit generalizability to all populations. However, the researcher believes that the results are generalizable to colleges of education who wish to attempt large scale change. Fullan (1999) states that change is a journey not a blueprint. Although change is complex and rarely predictable, there are key characteristics of change supported by the results of this study which may be applicable to future studies. Moreover, strategies are suggested which may be applied to other sites to aid future change agents in the process of change and reform. Although this study was limited to a one year secondary education graduate program, the implications for future research are vast.

Lack of communication regarding the portfolio project between secondary faculty and administration may also constitute a limitation. Because the project was not discussed regularly in faculty meetings, the faculty seemed to have a misunderstanding of the goals and requirements of the project. This misunderstanding may have contributed to the frustration and confusion of students throughout the developmental process of their

portfolios. Furthermore, this lack of communication may have contributed to another limitation: the lack of faculty buy-in of the project. Students suggested that had the project been better integrated throughout the secondary education program their portfolios would have exhibited greater reflection. The engagement of the instructors must become a dominant goal of the project as it continues to develop. The instructors are an essential element of an ongoing renewal process. If the project is to reach full diffusion, a high level of support for the project must occur.

Finally, because of the small size of the Secondary Education Program there were few faculty participating in this study. Consequently, when a single professor did not support the project in his or her classes this lack of support could adversely affect an entire program area for the duration of the graduate experience. However, this limitation may also be viewed as a strength. Because there were few professors it was possible to meet with each of them personally throughout the year-long program in an attempt to enlist their support. Because change occurs slowly and unevenly a longer implementation period may have yielded more dramatic results and a greater buy-in of faculty and consequently greater diffusion of the innovation.

The Teaching Experiment allowed these limitations to be addressed throughout the study. At a systemic level the project underwent periods of renewal based on feedback gained in formative evaluation sessions with students and faculty.

Simultaneous to the changes being made to the project the students also went through periods of self-renewal and self-discovery. Fullan (1993) reminds us that “teachers ability to deal with change, learn from it, and help students learn from it will be critical for the future development of societies: (p. ix)

Future Implications

The study of innovation diffusion is not new to the field of education. However, the inclusion of students into an innovation effort and the long term effects involvement in the project had on students may be of interest to some researchers. Areas of research that extend and build upon my study include longitudinal studies involving the first year participants, the investigation of content areas outside of colleges of education, and the faculty development portfolio connection.

Longitudinal Studies

Lyons (1998) states: “There is not yet a body of systemic data documenting [portfolio] uses or their long-term consequences.” For that reason, a question worthy of investigation relates to long term changes in our students practices as a result of involvement in this study. Longitudinal case studies are helpful in documenting long term change. According to Fullan and Steigelbauer (1991) students do not have the experience nor have they had the training to be participants in educational change, nor will they have the skills and knowledge to independently elect to take the change agent role. Involvement in this project has given our students the opportunity to gain the experience and skills to participate as change agents in the future. It would be interesting to learn if the teachers who participated in the portfolio project innovation become change agents in their schools. Studies of these teachers might reveal the long term benefits, if any, of the development of an e-portfolio attached to state standards. Another area of research might reveal ongoing professional benefits to our students after they graduated in areas such as collaboration and mentoring. Did the practice of collaboration, encouraged throughout

the portfolio project, motivate students to seek out mentors in their early years of practice? Similarly, did it encourage these teachers to become mentors?

Another area of interest involves the idea of retaining a lifelong record of development. For example, what happens when preservice teachers have the opportunity to keep and review their teaching philosophies over time? Does this reflection cause teachers to reframe their thinking about teaching? How does this reframing affect their practice?

Many students stated in their exit interviews that they were looking forward to having their students build portfolios. Did the students who participated in this study encourage their students to build an e-portfolio? Furthermore, in what ways did the development of an e-portfolio motivate our students to integrate technology into their teaching?

Content Areas

Areas of research that extend my study include content areas outside of education. This study should be repeated in a variety of content areas. For example, what might students from the College of Liberal Arts and Sciences or Fine Arts gain from reflection on practice and from the development of a professional e-portfolio over time? One wonders how other colleges might differ in their approach to innovation and reform. Because each implementation of this model is unique, more examples across varying content areas and grade levels will extend our understanding of innovation diffusion pertaining to e-portfolios and students' reflective development.

Faculty Development and e-Portfolios

Throughout the study a connection between the e-Portfolio Project and faculty development seemed to exist. A question suggested by this study concerns this connection. Of interest to future project developers would be the extent to which faculty development can enhance the innovation diffusion process and ease the tensions of faculty as they face change.

Summary

This chapter provided a discussion of the limitations of the study and recommendations for future research. The impact of this study can be broad as it is applied to areas of study outside the Graduate Secondary Education Program.

This project is an inquiry oriented project and as such, like the teaching experiment that precedes it, it must possess the qualities of reflectiveness and renewal. The continual evolution of the portfolio project in response to interaction, feedback, applied research is crucial to its success and sustainability. By continually reexamining the project based upon new information and new knowledge, the project has a great chance for continued diffusion and sustainability.

As Fullan (1993) reminds us “education has a moral responsibility for embracing change and that is to make a difference in the lives of our students regardless of background and to produce students who can live and work productively in increasingly complex societies.” Overcoming the uncertainties and barriers inhibiting the success of this innovation took a great deal of time and demands even more time, training, and ongoing support. Professors, students, and administrators agree that ongoing training is

essential if the innovation is to become fully adopted. Project sustainability is dependent on both students and teachers viewing portfolio development as an continuous process requiring ongoing dialogue.

APPENDIX A
COMPONENTS OF THE ELECTRONIC TEACHING PORTFOLIO

Portfolio Components	Evidence	Setting
Academic Courses taken	Links to courses taken and a page of an evolving transcript.	A student created links page.
Artifacts Illustrations of FAPs	Students must include 3 illustrations for each of the 12 FAPs (36) these must be representative of their entire program. These are selected by the student, based on class assignments.	Class assignments, each illustration has has header which contains the student's name, source of the illustration, semester it was developed, accomplished practice, description and rationale.
Reflection A rationale statement accompanies each FAP	Written reflections of why this illustration was chosen and how it is a demonstration of their proficiency in each FAP.	For each FAP illustration the student writes a brief rationale statement discussing why they chose to use the illustration and how it demonstrates the particular accomplished practice.
Teaching Teaching philosophy	Most secondary students do not enter the program with a fully developed teaching philosophy, however by the time they leave the program they will have an evolving teaching philosophy.	This is required in at least one of the students' courses, and with the knowledge and experience they gain in their courses and their internship this philosophy should evolve during their program.
Personal A biographical sketch, resume, and various other personal data students choose to put in their portfolios	Personal page references resume hobbies goals	All students must develop a personal page which may be as basic or comprehensive as they wish. A resume should be included in their portfolio but it is not required, additional pages may be added or deleted as the students desire.

APPENDIX B
STUDENT EXIT INTERVIEW QUESTIONS

The portfolio project at University of Florida was designed to increase students' awareness of Florida's accomplished practices. In your opinion what is the purpose of studying the accomplished practices in a teacher education program?

When the portfolio program was developed we worked hard to make sure that there was a lot of support available to students in the form of tutorials, workshops, course matrices, etc. Tell me about the ways in which you availed yourself of these support mechanisms

Some professors believe there should be a specific course designed to teach people how to create their electronic portfolios what you think about this?

You were asked to provide illustrations for each accomplished practice, how did you go about choosing the illustrations that you included in your portfolio?

Tell me, what do you believe to be the most important connections between your course work and your teaching as specified in the accomplished practices?

Describe the situation, in which your preconceived ideas about teaching, for example those things you learned in your classes, were in contrast to your professional experience.

In what ways did you collaborate or participate with other students during the portfolio development and revision process?
What was your relationship with your collaborators?

Elements of the portfolio were designed to help you reflect on your professional practice the rationale statement for example, prompts you to describe your thinking about your illustration. Tell me how you have become a more reflective practitioner.

Many students told me that during the process of attending to the accomplished practices their ideas about teaching changed, how has your thinking about teaching been affected by the development of your electronic portfolio?

When you decided to take education courses, or to become a teacher, you probably had notions about how it would feel to be in charge of your own classroom full of students. How have those notions evolved over your graduate experience?

How has the act of developing an electronic portfolio affected your relationship with technology?

In what ways will you use technology in your future teaching?

Describe the impact that the electronic portfolio project had on your response to the previous question.

What personal and or professional value does an electronic portfolio have for future teachers?

Finally, if you were in my place, that is, you were in charge of trying to make the electronic portfolio experience more meaningful for the next group of students what changes would you implement?

APPENDIX C
STUDENT SURVEYS

1. What is a portfolio?
2. List three reasons why you might develop a portfolio:
 1. _____
 2. _____
 3. _____
3. How is an electronic portfolio different from a paper portfolio?
4. What types of artifacts might you include in your portfolio?
5. What does the word reflection mean?
6. What does the word rationale mean?
8. What does the term alternative assessment mean?
9. What are the Florida Accomplished Practices?
10. Who do you feel should determine the contents of your portfolio, you or your professor?
11. How would you self-assess your computer ability (novice, intermediate, highly skilled, expert)
12. Have you ever made a webpage?
13. Do you prefer to work alone on a project or in a group?
Why?

APPENDIX D

RATIONALE STATEMENT TUTORIAL

Writing a Rationale Statement

What is a rationale?

1. Fundamental reasons; the basis. (Dictionary.com)
2. An explanation of controlling principles of opinion, belief, practice, or phenomena. (Merriam-Webster Online)

For each artifact/illustration you include in your portfolio you must write a brief rationale statement about why you chose it. A rationale is not a description nor is it a summary of the document, rather it addresses the how and why (your illustration exemplifies your best work) questions. Your rationale statement should be a brief justification about why you feel the selected artifact demonstrates proficiency in the corresponding Florida Accomplished Practice(FAP). In other words, your rationale statement should show your reader that you understand the FAP, how you have chosen to illustrate that understanding, what you are capable of doing in regard to the FAP.

When you write your rationale statement answer the following questions:

- Why did you choose to use this artifact? (not because you got an 'A')
- What is (or are) the connection(s) to the Florida Accomplished Practice?
- What does the illustration say about your understanding and demonstration of the Florida Accomplished Practice?

The following is an example of a rationale statement for the assessment portion of a cooperative unit plan:

[FAP 1. Assessment:](#)

Description: A Cooperative Unit Plan

Rationale: This illustration provides an example of assessment during a month-long unit plan. In this unit plan a variety of informal assessment techniques were used. These informal assessments included classroom discussions, reflection papers and portfolios.

APPENDIX E
MATRICES FOR EACH OF THE SECONDARY EDUCATION PROGRAMS

Matrix of Accomplished Practice Illustrations for the
Secondary English Education Program

Practices	AP.1	AP.2	AP.3	AP.4	AP.5	AP.6	AP.7	AP.8	AP.9	AP.10	AP.11	AP.12
Fall												
LAE 6365	X	X	X	X	X		X	X	X	X	X	
LAE 6366	X	X	X	X	X	X	X	X	X	X	X	X
LAE 6945	X	X	X	X	X	X	X	X	X	X	X	X
RED 5337	X	X	X	X	X		X	X	X	X	X	X
Spring												
LAE 6339		X			X		X	X		X		X
ESE 6345	X			X	X	X	X	X	X	X	X	
ESE 6945								X	X	X	X	X
Summer												
EDG 6931											X	

Matrix of Accomplished Practice Illustrations for the
Secondary Foreign Language Education Program

Practices	AP.1	AP.2	AP.3	AP.4	AP.5	AP.6	AP.7	AP.8	AP.9	AP.10	AP.11	AP.12
Fall	.	.	.	.	.	.	.	.	.	.	.	.
ESE 6345	X	—	—	X	X	X	X	X	X	X	X	—
FLE 6337	X	X	X	X	X	.	X	X	X	X	.	X
FLE 6946	X	X	X	—	—	—	—	X	X	—	—	X
FLE 6165	X	X	X	X	X	X	X	X	X	X	X	X
Spring	.	.	.	.	.	.	.	.	.	.	.	.
ESE 6945	X	X	X	X	X	X	X	X	X	X	X	X
ESE 6939	X	.	X	—	X	.	.	X	—	X	—	X
FLE 6336	X	X	.	X	X	—	X	X	X	X	—	X
Summer	.	.	.	.	.	.	.	.	.	.	.	.
ESE 6931	X	—	.	X	X	—	X	X	X	X	—	X
EDG 6939	.	.	.	.	.	.	.	.	.	.	.	.

Matrix of Accomplished Practice Illustrations for the
Secondary Mathematics Education Program

Practices	AP.1	AP.2	AP.3	AP.4	AP.5	AP.6	AP.7	AP.8	AP.9	AP.10	AP.11	AP.12
Fall	.	.	.	.	.	.	.	.	.	.	.	.
ESE 6345	X	—	—	X	X	X	X	X	X	X	X	—
ESE 6939	<u>X</u>	<u>X</u>	—	.	—	.	—	.	<u>X</u>	—	<u>X</u>	—
MAE 6138	X	—X	—X	X	—	—	X	X	—	—X	—X	—X
MAE 6947	—	X	X	X	—	—	—	—	—	—	.	—
Spring	.	.	.	.	.	.	.	.	.	.	.	.
ESE 6945	X	X	—X	—X	X	X	X	—X	—	—X	X	—X
<u>ESE</u> <u>6939</u>	.	X	—X	—	X	.	X	—	—	—X	—	—X
<u>EME</u> <u>5431</u>	—	<u>X</u>	— <u>X</u>	— <u>X</u>	.	—	—	<u>X</u>	—	<u>X</u>	<u>X</u>	<u>X</u>
Summer	.	.	.	.	.	.	.	.	.	.	.	.
EDG 6931	X	—X	.	.	—	—	.	—X	—X	X	—	—X
ESE 6215	X	X	—	—X	X	X	X	.	—X	—	—	—

Matrix of Accomplished Practice Illustrations for the
Secondary Science Education Program

Practices	AP.1	AP.2	AP.3	AP.4	AP.5	AP.6	AP.7	AP.8	AP.9	AP.10	AP.11	AP.12
Fall												
ESE 6345	-	-	-	-	X	-	-	-	X	X	-	-
SCE 6338	X	X	X	X	X	-	X	X	X	X	-	-X
SCE 6947	X	X		X	X	-	-	X		X	-	
Spring												
ESE 6945	X	X	X	X	X	X	X	X	X	X	X	X
ESE 6344	X	X	X	X	X	X	X	X	X	X	X	X
RED 5337	X	X	-	X	X	-	X	-	-	X	-	X
Summer												
ESE 6905	-	-	-	-	-	-	-	-	-	-	-	-
ESE 6215	X	X	-	X	X	X	X	-	X	-	-	-

Matrix of Accomplished Practice Illustrations for the
Secondary Social Studies Education Program

Practices	AP.1	AP.2	AP.3	AP.4	AP.5	AP.6	AP.7	AP.8	AP.9	AP.10	AP.11	AP.12
Fall												
ESE 6345	X			X	X	-	X	X	X	X	X	
SSE 6133	X			X	X		X	X	X	X	-	X
SSE 5945C	X	-X	-X		X			-X	-X	-X		-X
SSE 5320	X	-	-	X	-	-	-	-X	-X	-X	-	-X
EME 5432	X	-X	-	-X	-	-	X	-X	-	-X	-	-X
Spring												
ESE 6945	X	X	-X	-X	X	X	X	-X	-X	-X	-X	-X
ESE 6939	-	-X	X	-X	X	-	-	-	-	-	-	-X
EDG 6931	X	-	-	X	-X	-	X	-X	-X	X	-	-X
RED 5337	X	X	-	X	X	-	X	-	-	X	-	X
Summer												
SSE 6046	-	-	-	X	X	-	-	X	-	-	-	X
ESE 6215				X	X							X

APPENDIX F
FAP ILLUSTRATION TEMPLATE

Student Name:

Source of Illustration:

Professor:

Semester Completed in Program:

Acceptable Grade Received on Assignment (Y/N):

Group Assignment/Individual Assignment:

Accomplished Practice:

Description of Assignment:

Rationale (Why you chose to use this as an illustration and how it is an example of the Accomplished practice)

Student work to be inserted here

LIST OF REFERENCES

- Agee, D. (1991). Double Barreled Assessment: Teachers and Students as Partners. *Adult Learning*, 2(7), 7-8, 26.
- Arter, J. A. (1995). *Portfolios for Assessment and Instruction*. (ERIC Document Reproduction Service No. ED388890).
- Arter, J. A. & Spandel, V. (1992). NCME Instructional Module: Using Portfolios of Student Work in Instruction and Assessment. *Educational Measurement: Issues and Practice*, 11(1), 36-44.
- Aschbacher, P. & Herman, J. (1991). *Alternative Assessments in Schools: Report on Status and Results of Local Projects*. (ERIC Document Reproduction Service No. ED342799).
- Aschbacher, P. (1994). Helping Educators to Develop and Use Alternative Assessments: Barriers and Facilitators. *Educational Policy*, 8(2), 202-223.
- Ause, C. E. & Nicastro, G. (1997). Establishing Sound Portfolio Practice: Reflections on Faculty Development. In K. Yancey & I. Weiser (Eds.), *Situating Portfolios Four Perspectives* (pp. 333-333). Logan: Utah State University Press.
- Bartell, C. A., Kaye, C., & Morin, J. A. (1998). Portfolio Conversation: A Mentored Journey. *Teacher Education Quarterly*, 25(1), 129-39.
- Barton, J. & Collins, A. (1993). Portfolios in Teacher Education. *Journal of Teacher Education*, 44(3), 200-210.
- Becker, H. J. (1990). Curriculum and Instruction in Middle-Grade Schools. *Phi Delta Kappan*, 71(6), p. 450-57.
- Beerens, D. R. (2000). *Evaluating Teachers for Professional Growth: Creating a Culture of Motivation and Learning*. (ERIC Document Reproduction Service No. ED436590).
- Berman, P. & McLaughlin, M. W. (1976). Implementation of Educational Innovations. *Educational Forum*, 76(40), 344-70.

- Bird, T. (1990). The Schoolteacher's Portfolio: An Essay on Possibilities. In J. Millman & L. Darling-Hammond (Eds.), *The New Handbook of Teacher Evaluation* (pp. 241-256). Newbury Park, CA: Sage.
- Bransford, J. (1986). Teacher Thinking and Problem Solving. *American Psychologist*, 41(10), 1078-89.
- Brooks, J. & Brooks, M. (1993). *In Search of Understanding. The Case for Constructivist Classrooms*. [Revised]. (ERIC Document Reproduction Service No. ED431762).
- Brown, J. S., Collins, A. & Duguid, P. (1989). Situated Cognition and the Culture of Learning. *Educational Researcher*, 18(1), 32-42.
- Bruer, J. T. (1993). The Mind's Journey from Novice to Expert: If we Know the Route, we Can Help Students Negotiate their Way. *American Educator: The Professional Journal of the American Federation of Teachers*, 17(2), 6-15.
- Bruner, J. (1966). *Learning about Learning, a Conference Report*. (ERIC Document Reproduction Service No. ED015492).
- Burch, C. B. (1997). Finding Out What's in Their Heads: Using Teaching Portfolios to Assess English Education Students--and Programs. In K. Yancey. & I. Weiser (Eds.), *Situating Portfolios Four Perspectives* (pp. 263-277). Logan: Utah State University Press.
- Callahan, S. (1997). Kentucky's State Mandated Writing Portfolios and Teacher Accountability. In K. Yancey & I. Weiser (Eds.), *Situating Portfolios Four Perspectives* (pp. 57-71). Logan: Utah State University Press.
- Campbell, D., Cignetti, P., Melenyzer, B., Nettles, D., & Wyman, R. (2001). *How to Develop a Professional Portfolio: A Manual for Teachers*. Boston: Allyn and Bacon.
- Carroll, J. A., Pothoff, D., & Huber, T. (1996). Learnings from Three Years of Portfolio use in Teacher Education. *Journal of Teacher Education*, 47(4), 253-262.
- Cicchelli, T. & Baecher, R. (1989). Microcomputers in the Classroom: Focusing on Teacher Concerns. *Educational Research Quarterly*, 13(1), 37-46.
- Collins, A. (1992). Portfolios for Science Education: Purpose, Design and Authenticity. *Science Education*, 76, 451-463.
- Condon, W. & Hamp-Lyons, L. (2000). *Assessing the Portfolio: Principles for Practice, Theory, and Research*. Cresskill, NJ: Hampton Press.

- Copeland, W., Birmingham, C., De La Cruz, E., & Lewin, B. (1993). The Reflective Practitioner in Teaching: Toward a Research Agenda. *Teaching and Teacher Education*, 9(4), 347-359.
- Courts, P. L. & McInerney, K. H. (1993). *Assessment in Higher Education. Politics, Pedagogy, and Portfolios*. (ERIC Document Reproduction Service ED364174).
- Cushman, K. (1999). Educators Making Portfolios: First Results from the National School Reform Faculty. *Phi Delta Kappan*, 80(10), 744-50.
- Davis, R. B., Rombert, T. A., Rachlin, S., & Kantowski, M. G. (1979). *An Analysis of Mathematics Education in the Union of Soviet Socialist Republics*. Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education.
- Defina, A. (1996). *An Effective Alternative to Faculty Evaluation: The Use of the Teaching Portfolio*. (ERIC Document Reproduction Service ED394561).
- Deming, M. (1986). *Peer Tutoring and the Teaching of Writing*. (ERIC Document Reproduction Service ED276019).
- Denzin, N. K. (1970). *The Research Act, a Theoretical Introduction to Sociological Methods*. Chicago: Aldine Publishing Co.
- Dewey, J. (1915). *The School and Society*. Chicago: The University of Chicago Press.
- Dewey, J. (1933). *As We May think*. Chicago: The University of Chicago Press.
- Dimock, K. V. & Boethel, M. (1999). *Constructing Knowledge with Technology*. Southwest Educational Development Lab., Austin, TX.
- Dollase, R. (1996). The Vermont Experiment in State Mandated Portfolio Program Approval. *Journal of Teacher Education*, (47)2, 85-98.
- Duffy, T. & Cunningham, D. J. (1996). Constructivism: Implications for the Design and Delivery of Instruction. In D. H. Jonassen (Ed.), *Handbook of Research for Educational Communications and Technology* (pp. 170-198). New York: Simon Schuster Macmillan.
- Duffy, T. & Jonassen, D. (1992). *Constructing Knowledge with Technology*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.
- Elbow, P. & Belanoff, P. (1991). State University of New York at Stony Brook Portfolio-Based Evaluation Program. In P. Belanoff & M. Dickinson (Eds), *Portfolios: Process and Product* (pp. 3-16). Portsmouth, NH: Boynton/Cook.

- Elder, L. & Paul, R. (1994). Critical Thinking: Why we Must Transform our Teaching. *Journal of Developmental Education*, 18(1), 34-35.
- Elder, L. & Paul, R. (1995a). Critical Thinking: Why Teach Students Intellectual Standards, Part I. *Journal of Developmental Education*, 18(3), 36-37.
- Elder, L. & Paul, R. (1995b). Critical Thinking: Why Teach Students Intellectual Standards, Part II. *Journal of Developmental Education*, 19(1), 34-35.
- Elder, L. & Paul, R. (1995c). Critical Thinking: Content is Thinking/Thinking is Content. *Journal of Developmental Education*, 19(2), 34.
- Elder, L. & Paul, R. (1996a). Critical Thinking: A Stage Theory of Critical Thinking: Part I. *Journal of Developmental Education*, 20(1), 34-35.
- Elder, L. & Paul, R. (1996b). Critical Thinking: A Stage Theory of Critical Thinking: Part II. *Journal of Developmental Education*, 20(2), 34-35.
- Ellsworth, J. B. (2000). *Surviving Change: A Survey of Educational Change Models*. (ERIC Clearinghouse on Information and Technology).
- Fischer, K. M. (1997). Down the Yellow Chip Road: Hypertext Portfolios in Oz. In K. Yancey & I. Weiser (Eds.), *Situating Portfolios Four Perspectives* (pp. 338-356). Logan: Utah State University Press.
- Flavell, J. H. (1987). Speculations About the Nature and Development of Metacognition. In F.E. Weinert & R.H. Kluwe (Eds.), *Metacognition, Motivation, and Understanding* (pp. 21-29). Hillsdale, NN: Lawrence Erlbaum Associates.
- Fosnot, C. (1996). Constructivism: A Psychological Theory of Learning. In C.I. Fosnot (Ed.), *Constructivism: theory, perspectives, and practice* (pp. 27-49). New York: Teachers College Press.
- Foti S. & Ring, G. (2000). Portfolios: Beyond Assessment. *Teaching and Learning: The Journal of Natural Inquiry*. 14(2), 18-22.
- Freidus, H. (2000). *Fostering Reflective Practice: Taking a Look at Context*. (ERIC Document Reproduction Service (ED441787)).
- Freidus, H. & Grose, C. (1998). *Implementing Curriculum Change: Lessons from the Field*. (ERIC Document Reproduction Service (ED422606)).
- Fullan, M. (1993). *Change Forces: Probing the Depths of Educational Reform*. Philadelphia, PA. Falmer Press.
- Fullan, M. (1999). *Change Forces The Sequel*. Philadelphia, PA. Falmer Press.

- Fullan, M. & Hargreaves, A. (1991). *What's Worth Fighting For: Working Together for your School*. Toronto: Ontario Public Teacher's Association.
- Fuller, F. F. (1969). Concerns of Teachers: A Developmental Conceptualization. *American Education Research Journal*, 6(2), 207-226.
- Gardner, H. (1983). *Frames of Mind*. New York, NY: Basic Books.
- Glaser, B. G. & Strauss, A. L. (1967). *The Discovery of Grounded Theory, Strategies for Qualitative Research*. Chicago: Aldine Publishing Company.
- Glennan, T. K. & Melmed, A., (1996). *Fostering the use of Educational Technology: Elements of a National Strategy*. (ERIC Document Reproduction Service ED394492).
- Gonzalez, G. (2001). Editorial by Gerardo Gonzalez. Retrieved November 17, 2001 from <http://www.indiana.edu/~soenews/news/news983377388.html>
- Groce, E. C., Henson, R. K., & Woods B., (1999). *The Examination of Preservice Teachers' Journals for Reflective Thought Patterns Concerning Professionalism*. (ERIC Document Reproduction Service ED 436481).
- Gwenith, T. L. (1983). *The Portfolio Process in Professional Development*. (ERIC Document Reproduction Service No. ED 27073).
- Hall, G. (1974). *The Concerns-Based Adoption Model: A Developmental Conceptualization of the Adoption Process within Educational Institutions*. (ERIC Document Reproduction Service No. ED111791).
- Hall, G. (1978). *Concerns-Based Inservice Teacher Training: An Overview of Concepts, Research and Practice*. (ERIC Document Reproduction Service No. ED186375).
- Hall, G. (1979). The Concerns Based Approach to Facilitating Change. *Educational Horizons*, 57(4), 202-08.
- Hall, G. (1980). *Evaluation of the Delivery of Services: A Concerns-Based Perspective for the Design of Evaluations*. (ERIC Document Reproduction Service No. ED223728).
- Hall, G. & Hord, S. (1987). *Change in Schools: Facilitating the Process*. SUNY Series in Educational Leadership. (ERIC Document Reproduction Service No. ED332261).
- Hall, G. & Loucks, S. (1978). Teacher Concerns as a Basis for Facilitating and Personalizing Staff Development. *Teachers College Record*, 80(1), 36-53.

- Hall, G. & Rutherford, W. L. (1976). Concerns of Teachers about Implementing Team Teaching. *Educational Leadership*, 34(3), 227-233.
- Hall, G. E., Wallace, R. C., & Dossett, W. A. (1973). *A Developmental Conceptualization of the Adoption Process within Educational Institutions*. Austin: Research and Development Center for Teacher Education, the University of Texas. (ERIC Document Reproduction Service No. ED095126).
- Hawisher, G. E. & Self, C. L., (1997). Wedding the Technologies of Writing Portfolios and Computers: The Challenges of Electronic Classrooms. In K. Yancey & I. Weiser (Eds.), *Situating Portfolios Four Perspectives* (pp. 305-321). Logan: Utah State University Press.
- Hargreaves, A. (1994). *Changing Teachers, Changing Times: Teachers' Work and Culture in the Postmodern Age*. New York: Teachers College Press.
- Hefzallah, I. M. (1999). The New Educational Technologies and Learning: Empowering Teachers to Teach and Students to Learn in the Information Age. *Evaluating the Arts in Education*. (ERIC Document Reproduction Service No. ED429598).
- Henderson, J. G. (1996). *Reflective Teaching The Study of Your Reflective Practices*. Englewood Cliffs, NJ: Merrill/Prentice Hall.
- Hill, J. & Land, S. (1998). *Open-ended Learning Environments: A Theoretical Framework and Model for Design*. Proceedings of Selected Research and Development Presentations at the National Convention of the Association for Educational Communications and Technology (AECT). St. Louis, MO. (ERIC Document Reproduction Service No. ED423839).
- Hord, S., Rutherford, W. L., Huling-Austin, L. & Hall, G. (1987). *Taking Charge of Change*. Alexandria, VA: Association for Supervision and Curriculum.
- Huebner, T. (1996). *Engendering Reflective Practice in Teacher Candidates with the Assistance of Teaching Portfolios* (Doctoral Dissertation, Stanford University, 1996). UMI Dissertation Services.
- Johnson, D. L. & Lui, L. (2000). First Steps Towards a Statistically Generated Information Technology Integration Model. In D. L. Johnson, C. D. Maddux & L. Liu (Eds.), *Integration of Technology into the Classroom: Case Studies* (pp. 3-12). Hillsdale, NJ: Lawrence Erlbaum Publishers.
- Johnson, N. & Rose, L.M. (1997). *Portfolios, Clarifying, Constructing and Enhancing*. Lancaster: Technomic Publishing Company, Inc.
- Jonassen, D. (1996). *Computers in the Classroom: Mindtools for Critical Thinking*, Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

- Jonassen, D., Peck, K., & Wilson, B. (1999). *Learning with Technology a Constructivist Perspective*. Upper Saddle River, New Jersey: Merrill an imprint of Prentice Hall, Inc.
- Kantowski, M. G. (1974). *Problem Solving* (Unpublished Doctoral Dissertation, University of Georgia.)
- Kantowski, M. G. (1979). *Problem Solving in Mathematics*. In Wilson J. (Ed.), *Soviet Studies in the Psychology of Learning and Teaching Mathematics*, Volume XII: Problems of Instruction. (ERIC Document Reproduction Service No. ED184840).
- Kozma, R. (2000). Reflections on the State of Educational Technology Research and Development. *Educational Technology Research and Development*, 48(1), 5-15.
- Krause, S. (1996). Portfolios in Teacher Education: Effects of Instruction on Preservice Teachers' Early Comprehension of the Portfolio Process. *Journal of Teacher Education*, 47(2), 130-138.
- Kulik, J. A. (1994). Meta-Analytic Studies on Computer-Based Instruction. In E.L. Baker & H.E. O'Neill (Eds.), *Technology Assessment in Education and Training* (pp. 221-244). Hillsdale, NJ: Lawrence Erlbaum Publishers.
- LeCompte, M. D. & Schensul, J. (1999). *Designing and Conducting Ethnographic Research*. London: Altamira Press
- LeMahieu, P., Gitomer, D., & Eresch, J. (1995). Portfolios in Large-Scale Assessment: Difficult but not Impossible. *Educational Measurement: Issues and Practice*, 19(1), 11-35.
- Lin, X. (1993). Assessment of Student Assessment. Retrieved August, 2001 from <http://www.ied.gov/pubs/SER/ASP/studel-2.html>.
- Lin, X., Hmelo, C., Kinzer, C. K., & Secules, T.J. (1999). Designing Technology to Support Reflection. *Educational Technology Research and Development*, 47(3), 43-62.
- Lincoln, Y. & Guba, E. (1985). *Naturalistic Inquiry*. Beverly Hills: Sage Publications.
- Lyons, N. (1998). Reflection in Teaching: Can it be Developmental? A Portfolio Perspective. *Teacher Education Quarterly*, 25(1), 115-128.
- Marra, R. M. & Carr-Chellman, A. A. (1999). Undergraduate Education Students' Perspectives on Classroom Technologies: A Qualitative Analysis. *Journal of Educational Computing Research*, 21(3), 283-303.

- Martin-Kniep, G. O. (1998). *Why am I doing this? Purposeful Teaching Through Portfolio Assessment*. Heinemann, Portsmouth, NH.
- Matovinovic, D. & Nocente, N. (2000). Computer Technology in an Authentic Science Project. I. In D.L. Johnson, C. D. Maddux & L. Liu (Eds.), *Integration of Technology into the Classroom: Case Studies*. Hillsdale (pp. 109-119). NJ: Lawrence Erlbaum Publishers.
- McClintock, R. (1992). *Power and Pedagogy: Transforming Education Through Information Technology*. New York: Institute for Learning Technologies, Teachers College Press.
- McKinney, M. (1998). Preservice Teachers' Electronic Portfolios: Integrating Technology, Self-Assessment, and Reflection. *Teacher Education Quarterly*, 25(1), 85-103.
- Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass.
- Mokhtari, K., Yellin, D., Bull, K., & Montgomery, D. (1996). Portfolio Assessment in Teacher Education: Impact on Preservice Teachers' Knowledge and Attitudes. *Journal of Teacher Education*, 47(4), 245-252.
- Moon, T. R. (1997). [Review of the Book *Implementing Performance Assessment: Promises, Problems, and Challenges*]. *Journal of Educational Measurement Review of Books*, 34(4), 373-76.
- Murphy, S. (1996). Teachers and Students: Reclaiming Assessment Via Portfolios. In K. Yancey & I. Weiser (Eds.), *Situating Portfolios Four Perspectives* (pp. 72-88). Logan: Utah State University Press.
- National Council for Accreditation of Teacher Education (NCATE), (2000). NCATE 2000 Standards. Retrieved December 20, 2001 from <http://www.ncate.org/standards/m-stds.htm>.
- Nickerson, R. (1989). New Directions in Educational Assessment. *Educational Researcher*, December, 18(9), 3-7.
- Papert, S. (1998). Child Power: Keys to the New Learning of the Digital Century. Retrieved August 15, 2001 from <http://www.papert.org/articles/Childpower.html>.
- Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods* (2nd Ed). Newbury Park: Sage Publications.
- Paul, R. & Elder, L. (1994). Critical Thinking: Using Intellectual Standards to Assess Student Reasoning. *Journal of Developmental Education*, 18(2), 32-33.

- Paul, R. & Elder, L. (1996). Critical Thinking: Rethinking Content as a Mode of Thinking. *Journal of Developmental Education*, 19(3), 32-33.
- Paul, R. & Elder, L. (1997). Critical Thinking: Implications for Instruction of the Stage Theory. *Journal of Developmental Education*, 19(3), 32-33.
- Paulson, F. L. & Paulson, P. R. (1990). *How do Portfolios Measure Up?* Paper presented at the conference Aggregating Portfolio Data sponsored by the Northwest Evaluation Association, Union, WA. (ERIC Document Reproduction Service ED324329).
- Paulson, F. L. & Paulson, P. R. (1994). *Assessing Portfolios Using the Constructivist Paradigm*. Paper presented at the Annual Meeting of the American Educational Research Association New Orleans, LA. (ERIC Document Reproduction Service ED376209).
- Paulson, F. L., Paulson, P. R., & Meyer, C. A. (1991). What Makes a Portfolio a Portfolio? *Educational Leadership*, 48(5), 60-63.
- Pea, R. (1985). Beyond Amplification: Using the Computer to Reorganize Mental Functioning. *Educational Psychologist*, 20, 176-182.
- Piaget, J. (1974). *To Understand is to Invent: The Future of Education*. New York: Grossman.
- Piper, C. (2000). *Electronic Portfolios in Teacher Education Reading Methods Courses*. Paper presented at the Annual meeting of the American Educational Research Association. (ERIC Document Reproduction Service ED 442755).
- Phillion, T. (1997). Portfolios and the Flow. In K. Yancey & I. Weiser (Eds.), *Situating Portfolios Four Perspectives*, (pp. 176-181). Logan: Utah State University Press.
- Piper, C. & Eskridge, S. (2000). *Infusing Technology into the Preservice Teacher Education Program through Electronic Portfolios*. Paper presented at the Annual meeting of the Society for Information Technology and Teacher Education. Retrieved August 15, 2001 from <http://www.chapman.edu/seofaculty/piper/infustech.htm>.
- Pultorack, E. G. (1993). Facilitating Reflective Thought in Novice Teachers. *Journal of Teacher Education*, 44(4), 288-295.
- Reisetter, M. F. & Fager, J. J. (1995). *Assessing the Effectiveness of the Beginning Teacher from a Constructivist Perspective*. Paper presented at the Annual meeting of the American Educational Research Association. (ERIC Document Reproduction Service ED387498).

- Rogers, E.M. (1995). *Diffusion of Innovations* (Rev. Ed.). New York, NY: Free Press.
- Ross, D. (1989). First Steps in Developing a Reflective Approach. *Journal of Teacher Education*, 40(2), 22-30.
- Sandholtz, J. H., Ringstaff, C., & Dwyer, D. C. (1997). *Teaching with Technology Creating Student Centered Classrooms*. New York: Teachers College, Columbia University.
- Santora, E. M. *Portfolios for Reflection in Teacher Education Programs*. Unpublished Manuscript, The Pennsylvania State University at University Park, PA.
- Schön, D. (1983). *The Reflective Practitioner: How Professionals Think in Action*. New York: Basic Books.
- Schön, D. (1988). Coaching and Reflective Teaching. In P.P. Grimett & G.L. Erickson (Eds.), *Reflection in Teacher Education* (pp. 19-29). New York: Columbia University, Teachers College Press.
- Schrum, L. (1995). Educators and the Internet: A Case Study of Professional Development. *Computers in Education*. 24(3), 221-228.
- Sheingold, K., & Hadley, M. (1990). *Accomplished Teachers: Integrating Computers into Classroom Practice*. (ERIC Document Reproduction Service ED322900).
- Sherman, R. R. & Webb, R. B. (1997). *Qualitative Research in Education: Focus and Methods*. New York, The Falmer Press.
- Shulman, L. S. (1987). Knowledge and Teaching: Foundations of the New Reform. *Harvard Educational Review*, 57(1), 1-22.
- Shulman, L. S. (1988). The Dangers of Dichotomous Thinking in Education. In P.P. Grimett & G. I. Erickson (Eds.), *Reflection in Teacher Education* (pp. 31-46). New York: Columbia University, Teachers College Press.
- Shulman, L. S. & Sparks, D. (1992). Merging Content Knowledge and Pedagogy: an Interview with Lee Shulman. *Journal of Staff Development*, 13(1), 14-16.
- Sizer, T. R. (1984). *Horace's Compromise: The Dilemma of the American High School*. Boston: Houghton Mifflin.
- Snyder, J., Lippincott, A., & Bower, D. (1998). The Inherent Tensions in the Multiple Uses of Portfolio in Teacher Education. *Teacher Education Quarterly*, 25(1), 45-60.

- Sparks-Langer, G. M., Simmons, J. M., Pasch, M., Colton, A., & Starko, A. (1990). Reflective Pedagogical Thinking: How can we Promote it and Measure it? *Journal of Teacher Education*, 41(4), 23-32.
- Spiro, R., Feltovich, P., Jacobson, M., & Coulson, R. (1991). Cognitive Flexibility, Constructivism, and Hypertext: Random Access Instruction for Advanced Knowledge in Ill-Structured Domains. *Educational Technology*, 31(9), 24-32.
- Stake, R. (1975). To Evaluate an Arts Program. In R. Stake (Ed.), *Evaluating the Arts in Education* (pp. 13-31). Columbus OH: Merrill, 13-32.
- Stowell, L.P., Rios, F. A., McDaniel, J. E., & Kelly, M. G. (1993). Casting Wide the Net: Portfolio Assessment in Teacher Education. *Middle School Journal*, 25(2), 61-67.
- Strudler, N., Quinn, McKinney, & Jones. (1995). Integrating Technology into Teacher Education Courses: Longitudinal Perspectives on Overcoming Impediments. *Journal of Computing in Teacher Education*, 11(3), 15-20.
- Tierney, R. J. (1991). *Portfolio Assessment in the Reading-Writing Classroom*. (ERIC Document Reproduction Service ED331055).
- Torrance, H. & Pryor, J. (1998). *Investigating Formative Assessment: Teaching and Learning and Assessment in the Classroom*. Philadelphia, PA: Open University Press.
- Van Manen, M. (1977). Linking Ways of Knowing with Ways of Being Practical. *Curriculum Inquiry*, 7(6), 205-228.
- Van Sickle, R. L. & Hoge, J. D. (1991). Higher Cognitive Thinking Skills in Social Studies: Concepts and Critiques. *Theory and Research in Education*, 19(2), 152-172.
- Vygotsky, L. (1978). *Mind in Society: The Development of Higher Psychological processes*. Cambridge MA: Harvard University Press.
- Whetstone, L., & Carr-Chellman, A. (2001). Preparing Preservice Teachers to Use Technology: Survey Results. *TechTrends*, 45(4), 11-17, 45.
- Wickliff, G. A. (1997). A Hypertext Authoring Course: Portfolio Assessment, and Diversity. In K. Yancey & I. Weiser (Eds.), *Situating Portfolios Four Perspectives* (pp. 322-337). Logan: Utah State University Press.
- Wiggins, G. (1988). Rational Numbers. Toward Grading and Scoring that Help Rather Than Harm Learning. *American Educator*, 12(4), 20-25, 45-48.
- Winsor, P. & Ellefson, B. (1995). Professional Portfolios in Teacher Education: an Exploration of their Value and Potential. *The Teacher Educator*, 31(1), 68-91.

- Wolf, K. (1991). *Teaching Portfolios: Synthesis of Research and Annotated Bibliography*. (ERIC Document Reproduction Service ED343890).
- Wolcott, W. (1993). Addressing Theoretical and Practical Issues of Using Portfolio Assessment on a Large Scale in High School Settings. In T. Vernetson (Ed.), *Selected Papers from the Spring 1993 Breivogel Conference at the University of Florida on Alternative/Portfolio Assessment* (pp. 123-129). Sanibel: FERC, Inc.
- Wright, W. A., Knight, P. T., & Pomerleau, N. (1999). Portfolio People: Teaching and Learning Dossiers and Innovation in Higher Education. *Innovative Higher Education*, 24(2), 89-103.
- Yagelski, R. P. (1997). Portfolios as a Way to Encourage Reflective Practice Among Preservice English Teachers. In K. Yancey & I. Weiser (Eds.), *Situating Portfolios Four Perspectives* (pp. 225-243). Logan: Utah State University Press.
- Yancy K.B. & Weiser, I. (1997). Situating Portfolios: an Introduction. In K. Yancey & I. Weiser (Eds.), *Situating Portfolios Four Perspectives* (pp. 225-243) 1-17. Logan: Utah State University Press.
- Yin, R. (1994). *Case Study Research: Design and Methods*. Thousand Oaks: Sage Publications.
- Yost, D.S., Sentner, S.M., & Forlenza-Bailey, A. (2000). An Examination of the Construct of Critical Reflection: Implications for Teacher Education Programming in the 21st Century. *Journal of Teacher Education*, 51(1), 39-49.
- Zaltman, G. & Duncan, R. (1977). *Strategies for Planned Change*, New York: Wiley.
- Zembal-Saul, C. & Severs, M. (1999). *Web-Based Portfolios: A Vehicle for Examining Preservice Elementary teachers' Emerging Ideas about Teaching Science*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Boston, MA, March, 1999.

BIOGRAPHICAL SKETCH

Gail Ring was born in Delavan Wisconsin the youngest daughter of Louis and Ruth Decker. She has three brothers and one sister. Gail earned her bachelor's degree in English and her master's degree in Instructional Technology at the University of Florida. Gail has taught instructional technology courses at the University of Florida and Santa Fe Community College. She is currently the Director of Technology in the College of Education at the University of Florida. Gail received her Ph.D. from the School of Teaching and Learning at the University of Florida in December, 2002.