Electronic Portfolio Adoption

Developing a Framework by Exploring Faculty Perspectives Through the Lens of Diffusion of Innovation Theory

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Abstract

The use of electronic portfolios (ePortfolios) to support learning, assessment, and professional development across higher education has increased in recent years. However, higher education faculty who are instrumental to successful adoption and implementation are not often invited as active participants in the innovation process. In addition, while student perspectives of ePortfolio adoption are well represented in the literature, faculty perspectives are not. The goal of this research study was to investigate faculty and administrators perspectives regarding the university-wide implementation of an ePortfolio initiative in order to develop a framework for implementation that integrates the voice of faculty as well as diffusion of innovation (DOI) theory. The study employed a design and development research methodology, comprised of three phases (analysis, development and evaluation, and revision) and focused on a large United States research university in its tenth year of electronic portfolio implementation. An analysis of survey and interview data in light of DOI theory as well as expert review resulted in a six-component modular framework that can be used by any faculty group to guide electronic portfolio adoption and implementation. One implication is that higher education now has a process technology to support successful integration of an instructional technology, electronic portfolios, in university teaching and learning.

Keywords: electronic portfolios, diffusion of innovation, development research

Dedication

To my parents, Samuel J. Blevins and Jane L. Blevins.

I have become the person that I am today due to your guidance, love, patience, and support. I am more grateful for everything you have given me than my own words can ever express.

To my husband, Arnold R. Bohanan, Jr.

Your unending support and love are inspiring. Thank you for helping me achieve this life-long dream. You give me the courage to never give up.

To my sister, Stephanie L. Blevins.

I am so lucky to have you as my sister, but even luckier to have you as my best friend.

I do not cease to give thanks for you, remembering you in my prayers. Ephesians 1:16

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CHAPTER 1

INTRODUCTION AND NEED FOR THE STUDY

Assessment is a trend that has become an important part of the educational landscape in the United States. While assessments were originally used in the classroom with the goal of assisting instructors in improving their classroom instruction (McLean & Lockwood, 1996), a push for education reform has begun to stress testing as a dominant component at the state, national, and global levels (Linn, 1993; United States Department of Education [USDE], 2006). As a result of this new demand, assessments have now evolved into tools used to make resourcing decisions and justify costs as well as ascribe accountability to both the institution and the instructor (Baker, 2001; Maki, 2009; USDE, 2006).

Traditional assessments, which are typically given through the use of paper and pencil or computers using a multiple-choice format, are currently the most commonly utilized testing tool (Chatterji, 2003; Maki, 2009). These types of assessment have the ability to measure a learner's knowledge or skills, but are often not robust enough to measure a combination of both (Airasian, 1996). Performance-based assessments, on the other hand, involve an observable activity and are thought to allow the learner to demonstrate both knowledge and skills in a more holistic form (Airasian, 1996; Banks, 2005; Smith & Ragan, 2005). This belief has lead to a rebirth of the performance assessment since the late 1980s (Baker, 2001; Khattri & Sweet, 1996).

One type of performance assessment that has increased in adoption at the university level is the portfolio-based assessment (Chatterji, 2003; Michelson & Mandell, 2004; Watson & Doolittle, 2011). Portfolio-based assessments are defined by Chatterji (2003) as a "purposeful collection of work or behavioral records that together provide a comprehensive picture of proficiencies in a broad area" (p. 93). These portfolio-based assessments are now taking on the

form of electronic portfolios (ePortfolios), defined as digital containers that are capable of displaying audio, graphical, and textual artifacts (Barrett, 2000; B. L. Cambridge, 2001; Watson & Doolittle, 2011). ePortfolios can be created to track learning, serve as a formative or summative assessment, present professional development, or a combination of these purposes (Barrett, 2000; B. L. Cambridge, 2001; Watson & Doolittle, 2011).

Need for the Study

Through a review of the literature, it was found that while the student perspective of ePortfolio development and adoption is represented (Ruiz, Quadri, & Karides, 2009; Wang & Turner, 2007), the faculty perspective of ePortfolio development and execution is lacking. Since faculty are on the front lines of ePortfolio implementation, it is important to explore their experiences and perspectives to further inform the process.

Diffusion of Innovation (DOI) theory seeks to understand the social process that members of a society go through in order to adopt or reject an innovation, including a new technology (Rogers, 2003; Surry & Farquhar, 1997; Watson, 2008). According to Rogers (2003), DOI theory encompasses five distinct phases that happen over a period of time: knowledge, persuasion, decision, implementation, and confirmation. Each phase considers the series of actions and decisions that effect whether or not an innovation is adopted.

Surry and Farquhar (1997) assert that the study of diffusion theory within the field of instructional technology is beneficial. Institutions of higher education are increasing their use of technology to support teaching and learning practices (Surry, 2002). However, there are many barriers to the integration of instructional technology within higher education, and the study of DOI in relation to instructional technology can assist in smoothing the integration process (Surry, 2002).

Rogers (2003) defines technology as a "design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome" (p. 13). In light of this definition, ePortfolios are an innovation in learning technology (D. Cambridge, 2012), aimed at facilitating desired student outcomes both formatively and summatively, serving as a more holistic performance assessment to demonstrate student learning, convey professional development, and fulfill academic requirements. The effective diffusion of ePortfolios at a university-wide level is of interest within the ePortfolio community on a national and international scale (C. E. Watson, personal communication, January 19, 2012), as evidenced, in part, by the recently formed Association for Authentic, Experiential and Evidence-Based Learning (AAEEBL) and the recently established International Journal of ePortfolio (IJeP). Yet, faculty and administrators who are currently part of ePortfolio adoption efforts are typically not involved in dissemination endeavors (C. E. Watson, personal communication, January 19, 2012). Such non-participation is contrary to what DOI theory conveys regarding the importance of adopters as change agents and opinion leaders who can serve a pivotal role in the adoption of an innovation (Rogers, 2003). Studying the experiences and perceptions of faculty and administrators in order to develop an adoption framework grounded in DOI theory can be beneficial to the national and international ePortfolio community as they pursue implementation efforts.

Purpose Statement of the Study

The purpose of this study was to develop a framework for supporting the adoption of ePortfolios by collecting data from faculty and administrators on the undocumented adoption process at a large research university. It is anticipated that university faculty, staff, and administrators will be able to use the framework to assist in the adoption of an ePortfolio for the

purposes of assessment, professional development, and/or demonstration of learning. The study employed a Type 2 developmental research design with the following stages: analysis, development and evaluation, and revision (Richey & Klein, 2007).

Research Questions

The research questions for this study were:

1. What strategies and resources are currently being used by a large research university to assist faculty with ePortfolio implementation and to what extent do such strategies and resources reflect diffusion of innovation theory?
2. How do faculty perceive the current ePortfolio adoption support process? What about the process is successful? What about the process is lacking and requires improvement? What about the process reflects diffusion of innovation theory?
3. What features of diffusion of innovation theory should be included in an ePortfolio adoption framework?

Benefits of the Study

The benefits of this study include informing the larger body of ePortfolio users and potential implementers regarding the needs of faculty when developing and implementing an ePortfolio requirement in their courses, programs, or institutions. It will also inform instructional designers and other professionals engaging in this work at their own organizations or universities.

Organization of the Proposed Study

Chapter One provides background information of this study and introduces the major issues that will be addressed by the study, stating the need for the study, the purpose statement, research questions, and anticipated benefits.

Chapter Two explores relevant literature to detail major issues informing the study and is divided into three sections. The first section focuses on the evolution of assessment within the educational landscape. The second section investigates ePortfolios and their uses in higher education. The final section of this chapter explores DOI theory.

Chapter Three provides a descriptive account of the methodology employed in order to conduct the study. Specifically, this chapter includes: the study design; site selection; research participants and procedures; survey and interview instrumentation; and data collection and analysis techniques.

Chapter Four analyzes the data collected through the use of a survey and interviews. From the analysis, issues that guided the framework development process are identified and discussed through the lens of DOI theory.

Chapter Five presents an in-depth account of the initial framework, where elements of diffusion of innovation theory are used in the context of ePortfolio implementation, as well as the recommended changes from expert reviews of the initial framework. The final framework incorporating suggested changes is also presented.

Chapter Six presents a summary of the study, including: a discussion of contributions of the study, limitations of the study, and directions for future investigations.

CHAPTER 2

REVIEW OF THE LITERATURE

The purpose of this study was to develop a framework for supporting the adoption of ePortfolios by collecting data from faculty and administrators on the undocumented adoption process at a large research university. The review of the literature related to this study included three general focus areas: the evolution of assessment within the educational landscape; ePortfolios and their uses in higher education; and DOI theory. Specifically, the goal for this literature review was to seek answers to the following questions:

- How has the practice of assessment in the educational landscape evolved over time, and do assessment practices support recommendations found within the literature?
- How can ePortfolios support assessment and related practices, in higher education and what are the challenges and opportunities?
- How can elements of DOI theory support faculty and administrators who are interested in adopting ePortfolios within their courses or programs?

Assessment

Assessment is defined as the collection, synthesis and interpretation of data in order to aid in the decision making process (Airasian, 2001). The practice of and motivation for assessing learners has evolved throughout the history of education. Originally, these tools were used in the classroom with the goal of assisting teachers with the improvement of their classroom instruction by measuring what learners were being taught (McLean & Lockwood, 1996). These original measurements were grounded in an empirical view of knowledge and the ability to find external factors for internal processes. The ultimate goal of these assessments was to predict the future of tested participants, which is still a goal for assessments (Baker, 2001).

The purpose of assessment has been changing over the last few decades. Assessments were used in the 1950s to select students who should continue in to higher education (Linn, 1998). In the 1960s, assessments were used for the purpose of program accountability (Linn 1998). During the 1970s and 1980s, a push for educational reform stressed assessment as a dominant component at the state level. These assessments were introduced with minimum competency requirements, which were then gradually increased to higher and higher levels of required competence (Linn, 1993). During the 1990s, the public and government began demanding that schools become accountable for learner performance (Linn, 1993; McLean & Lockwood, 1996). As a result of this demand, assessments have evolved into tools used for making instructional grading decisions through the collection, synthesis, and interpretation of information gathered from testing, and testing results (Airasian, 1996; Linn, 1993; Maki, 2009), as well as to judge the cost and accountability of both the institution and instructor (Baker, 2001; Cizek, 1996; Maki, 2009).

Assessments have now become central to the current debate regarding educational reform and will continue to gain importance (Baker, 2001). Assessments are seen as the primary documentation to prove a need for change in the educational system, as well as a barometer of educational quality (Linn, 1993). Raising assessment and learning standards is currently a national priority in the United States and a global priority throughout the world (Black & William, 1998). As assessments gain importance, it is crucial for these assessments to accurately gauge learning and to evolve with the educational landscape.

Current demands by stakeholders encourage not only a learners' ability to recall facts, rules, and information they have learned, but to inspire learners to think critically and be able to apply their knowledge and skills in other contexts (Maki, 2009; Wolf, Bixby, Glenn & Gardner,

1991). These new demands have exposed the shortfalls of traditional testing, leading to alternate forms of assessment (Maki, 2009; Wolf et al., 1991).

ePortfolios are flexible and can serve as an alternate form of assessment. Not only can ePortfolios fulfill the traditional needs of assessments, but ePortfolios can also fill in the gaps that traditional assessments can miss. These gaps include a holistic view of the categories of learning and categories of assessment, in addition to the inclusion of standardization.

Categories of learning. Learning can be broken down into three broad categories of capabilities that occur over the lifetime of a learner (Driscoll, 2005; Gagne, 1985). These areas are cognition, psychomotor skills, and attitudes (Driscoll, 2005; Gagne, Briggs, & Wager, 1992). Each area presents its own requirements for learning and assessment.

Cognitive area. The cognitive area of learning can be defined as a learner's intellectual skills (Gagne, 1984; Romiszowski, 2009). This area of learning consists of various levels of increasing complexity, including: memorizing information, interpreting and inferring information, applying new and previous knowledge, problem solving, reasoning, analyzing, and thinking critically and creatively (Airasian, 1996; Driscoll, 2005; Gagne, 1984; Romiszowski, 2009). The cognitive area is the most commonly assessed area of learning (Airasian, 1996).

In order to understand the relationships between each of these cognitive levels, cognitive behaviors can be further broken down and organized using models. One of the most commonly known cognitive models is Bloom's Taxonomy (Airasian, 1996; Bloom, Madaus, & Hastings, 1981). Bloom's Taxonomy is a system of classification organized into six levels of cognition, where each level represents a more complex cognitive behavior than the last (Airasian, 1996). Such taxonomies are used to remind instructors that cognition moves from lower-level to higher-level cognitive behaviors. A focus of instruction and assessment is to move learners toward

mastery of higher-level cognitive behaviors after mastery of the lower-level behaviors (Airasian, 1996).

Thus assessments, including portfolio-based assessments, should reach beyond lower-level cognitive behaviors, testing for higher-level cognitive behaviors. ePortfolios are well positioned for such assessment, given that they can contain assessments at all levels of cognition, from the lower-level multiple choice test to the higher-level performance-based artifact (e.g. an instructional unit demonstrating problem-solving competency).

Psychomotor area. Motor skills or psychomotor activities are defined as the exact, flowing, perfectly timed, and observable execution of performances involving muscle movement (Driscoll, 2005). Psychomotor activities are, overall, complex concepts (Rasmussen, 1983; Wellens, 1974). While viewing a skilled performance, an observer only sees the perfectly timed and flowing execution. However, when exploring the skill deeper, the observer will find that psychomotor skills are sequences of observable motor responses in combination with an internal knowledge of the skill, that are eventually routinized into complex performances (Driscoll, 2005; Gagne & Briggs, 1974; Romiszowski, 2009).

Even though the internal knowledge process executed to perform a skill cannot be readily viewed, the presence of this knowledge is implied based on the competency with which the skill is performed (Romiszowski, 2009). ePortfolios can be used to demonstrate proficiency in the internal and external processes executed to perform such skills (e.g. through embedding or linking video demonstrations that are supported by audio explanations).

Affective area. The affective area of learning includes the feelings, attitudes, interests, values, emotions, and preferences that a person holds (Airasian, 1996, 2001) and, as such, are developed overtime and difficult to assess. Thus, this learning domain is rarely assessed directly

and formally, typically becoming a domain that is assessed through observation (Airasian, 1996, 2001), the completion of checklists (Anderson, 2003), or student responses to Likert-scale surveys (Chatterji, 2003). However, these types of assessment techniques can be time consuming and obtrusive (Anderson, 1981).

In order to avoid these challenges, the completion of a performance assessment can indirectly but accurately demonstrate learning and growth in the affective area (Airasian, 1996, 2001). The use of an ePortfolio allows students to incorporate deep reflection within their demonstrations of learning, allowing instructors to better understand the student's feelings and attitudes about their own learning and growth.

In sum, assessments can cover the three different behavior areas of learning: cognitive, psychomotor, and affective (Airasian, 1996; Harrow, 1972). Each behavioral area includes different behavior qualities, which lead to different assessments. ePortfolios can be used to address all behavior areas, providing instructors a holistic opportunity to assess students.

Categorizing assessments. According to Banks (2005) assessments can be exampled along six different categories, as follows: method of development, level of formality, instructional purpose, type of grading standard, item format, and degree of authenticity. Each of these categories can then be further broken down into more specific types of assessment. For the scope of this paper, and due to their relevancy to cognitive and psychomotor testing, type of grading standard, type of item format, and degree of authenticity will be examined. (Banks, 2005)

Grading standard. Selecting an assessment based on type of grading standard is a decision between using criterion-referenced and norm-referenced assessments (Banks, 2005; McLean & Lockwood, 1996). Criterion-referenced assessments can be used to measure both the

content of the curriculum being assessed and how well a testing participant knows the content of that curriculum (Banks, 2005; McLean & Lockwood, 1996; Smith & Ragan, 2005). Norm-referenced assessments can be used to reveal how well testing participants perform in comparison to each other, and this can apply to a national standard (Banks, 2005; McLean & Lockwood, 1996; Smith & Ragan, 2005).

Before choosing between the use of a criterion-referenced or norm-referenced assessment, it is vital to decide how a testing participant's performance will be reported and how that performance will be used in the decision making process (McLean & Lockwood, 1996; Tanner, 2001). A criterion-referenced test is appropriate when decision makers plan to use scores to discover what testing participants know and have learned from instruction (McLean & Lockwood, 1996; Tanner, 2001). A norm-referenced test is appropriate when decision makers plan to use scores to compare testing participants' performances to another group (McLean & Lockwood, 1996; Tanner, 2001).

Type of item format. Selecting an assessment based on the type of item format can be further broken down into objective response assessments and constructed-response assessments (Banks, 2005; Chatterji, 2003). Objective response assessment items are very structured, providing learners with questions that either allow them to choose from a number of alternative answers or to fill in correct words (Banks, 2005; Chatterji, 2003). These types of items are easy to score and include formats such as multiple choice, fill in the blank, matching, and true/false selections (Banks, 2005; Chatterji, 2003; Khattri & Sweet, 1996). Multiple choice formatted questions remain the most widely used due to offering better quality control than all other item types (Banks, 2005; Chatterji, 2003; Khattri & Sweet, 1996). Constructed response assessment items are open-ended and require learners to respond in written or oral form (Banks, 2005;

Chatterji, 2003). These types of items are regarded as question formats that are able to gauge increasing higher-level cognitive skills by requiring learners to synthesize and defend their answer (Banks, 2005). However, these items also pose grading problems due to grading inconsistency that can arise due to the nature of the question type and human judgment error (Banks, 2005).

Degree of authenticity. Selecting an assessment based on the degree of authenticity can be further broken down into traditional assessments or performance assessments (Banks, 2005). Traditional assessments, which are typically given through the use of paper and pencil or computers using a multiple choice format (Chatterji, 2003; Khattri & Sweet, 1996; Maki, 2009), have the ability to assess learners' knowledge or skills, or a combination of both (Airasian, 1996). Performance-based assessments, which are also known as authentic or alternative assessments, can be utilized to assess knowledge and skills at the same time (Airasian, 2001; Chatterji, 2003; Linn, 1993). These two forms of assessment are discussed in further detail below.

Traditional assessments can measure knowledge and the knowledge of a performance, but most traditional test items are not robust enough to measure an actual performance (Airasian, 1996). These types of assessments are believed to typically only focus on "drill and practice" skills, and do not assess higher-level cognitive skills (Linn, 1993). While test items can be built in order to find out a learner's thought process, it is often assumed that if a correct response is provided, the learner has followed the correct procedure to arrive at the answer (Airasian, 1996).

Performance-based assessments are those that involve an observable activity (Banks, 2005; Linn, 1993). These types of assessments are thought to allow a learner to demonstrate both knowledge and skills simultaneously and heavily rely on extended tasks (Airasian, 1996; Maki,

2009). Performance-based assessments can be divided into five common domains: communication skills, psychomotor skills, athletic activities, concept acquisition, and affective skills (Airasian, 1996). Each of these areas can be assessed with a different type of performance-based assessment: written, open-ended questions; behavior-based; product-based; interview-based; and portfolio-based (Chatterji, 2003; Khattri & Sweet, 1996).

Performance-based assessments require learners to carry out an activity or produce a product in order to simultaneously demonstrate their knowledge and skill (Airasian, 1996; Baker, Chung, & Delacruz, 2007; Maki, 2009). These types of assessments are appropriate when learners are asked to demonstrate they have the knowledge and skills necessary to solve a real-world problem. Performance-based assessments also assist with assessing several learner qualities that are in demand by stakeholders, including: procedural knowledge and skills; higher-order thinking skills; social habits; skills needed to be successful in cooperative teamwork efforts; and demonstration of decision-making behaviors (Chatterji, 2003; Maki, 2009). These types of assessments also fulfill all three required characteristics of responsible assessment practices including: relevance to content, inclusion of higher-order thinking skills, and encouragement of collaboration (Banks, 2005).

A rebirth of the performance-based assessment has been taking place since the late 1980s due to the belief that it is possible to produce and administer the perfect test (Baker, 2001; Khattri & Sweet, 1996). Airasian (1996) attributes the growing popularity of the use of performance assessments can be credited to three factors. First, these types of assessments are being proposed or mandated as part of formal statewide assessment plans. Second, there has been a recent emphasis on problem solving, higher-order thinking, and real-world reasoning in both academic and professional settings. Finally, performance-based assessments are seen as an

alternative way to allow learners who perform poorly on traditional assessments the opportunity to show their achievement. (Airasian, 1996)

In addition, Banks (2005) contends that performance-based assessments motivate learners to become more involved in their learning, making learning more meaningful, related, and fun (Khattri & Sweet, 1996). Performance-based assessments are also seen to be more closely linked to the curriculum frameworks that make up standards (Linn, 1993). Advocates of performance-based assessments feel that these items are designed to nurture learners through the pursuit of thought, persistence, construction of new meaning, and their deepening of subject-matter understanding (Baker & O'Neil, 1996; Chatterji, 2003; Khattri & Sweet, 1996).

In this section, the assessment categories of grading standard, item format, and authenticity were reviewed. The nature of portfolios, including ePortfolios, suggests that this form of assessment can support a criterion-referenced grading standard, varied item formats, and higher levels of authenticity than traditional forms of assessment.

Role of standards. Standards are currently an important part of today's educational landscape, and will continue to increase in importance within that landscape on local and global scales (Baker, 2001; Black & William, 1998; National Endowment for the Humanities [NEH], 1991). The intent of standards is to have them serve as educational benchmarks (Tanner, 2001). Standards can be created by many different educational influences, including: state or national bodies; school district officials; or classroom teachers (Azeem et al.,2009; Tanner, 2001). The use of standards for structuring assessment raises important issues to stakeholders regarding the validation of content as a worthwhile pursuit for learners, as well the determination of when learners have met that standard (Tanner, 2001).

According to Banks (2005) the No Child Left Behind Act (NCLB) mandates an increasing amount of yearly testing of learners in every state. NCLB reflects society's current belief that increased standardized testing will increase stakeholder accountability. Currently, standards are developed by each state, giving each state the ability to make choices about their own standards and assessments, which then face scrutiny by the federal Department of Education (DOE). (Banks, 2005)

Airasian (2001) states that the information that is gathered from assessments can be used in either a standardized or a non-standardized way. If information is used in a standardized way it is interpreted the same for all learners, regardless of when or where the assessment occurred. This is especially important if learners will be compared to other learners in various classrooms and locations. If information is used in a non-standardized way it is interpreted to provide feedback for one specific group of learners and is not generalized to other groups of learners. Non-standardized assessments are typically teacher-made and focused on the one-time assessment of a group of learners to provide information relating to the instruction of that teacher's classroom (Airasian, 2001).

In this section, the role of standards in relation to assessment practices was examined. Portfolios, including ePortfolios, are flexible forms of assessment. Through this flexibility they lend themselves toward supporting the inclusion of standards within their requirements in either a standardized or non-standardized manner.

Conclusion. Assessment recommendations differ greatly depending on what type of knowledge the learner is being asked to prove, demonstrate, and/or apply. According to Chatterji (2003, p. 83), "A particular type of assessment tool is not necessarily superior to another. We should design, validate, or select assessment devised to ensure that they have the qualities we

specify in given contexts of use." After an exhaustive review of the literature, this statement rings true, proving the importance of a proper analysis of each design environment.

Assessments are generally an imperfect measure of the knowledge and skills they were designed to evaluate (Livingston & Zieky, 1982). However, performance-based assessments such as ePortfolios can assist in evaluating each category of learning simultaneously (Watson, Zaldivar, & Summers, 2010). In addition, ePortfolios can also help ensure that standards are being met. As such, they have the potential of replacing or supplementing traditional assessment.

Portfolio-based assessment

As previously mentioned, portfolio-based assessment is a type of performance assessment. Portfolio-based assessments, or portfolios, are defined by Chatterji (2003) as a "purposeful collection of work or behavioral records that together provide a comprehensive picture of proficiencies in a broad area" (p. 93). As the educational landscape has evolved, many disciplines have used portfolios for many various reasons (Watson et al., 2010). This type of assessment has a rich history of use in a number of fields for decades, including English, art, architecture, and education (Devanney & Walsh, 2002; Light, Chen, & Ittelson, 2012).

For example, in the area of visual arts, portfolios began as a way for an artist to demonstrate their ability to create quality work. This practice began in the 12th and 13th centuries, when portfolios were required by medieval artists guilds. In order to move from the role of paid apprentice to master, the apprentice would submit a portfolio of work for assessment by a group of master artists. This portfolio was considered proof of their work and the standards they had achieved. (Adams, 2010)

Through technological innovations and new assessment trends, portfolios have reentered conversations in higher education as ePortfolios. ePortfolios are defined as digital containers that are capable of displaying audio, graphical, and textual artifacts (Barrett, 2000; B. L. Cambridge,

2001; Watson & Doolittle, 2011). The use of ePortfolios has increased at the university level (Chatterji, 2003; Michelson & Mandell, 2004; Watson & Doolittle, 2011) as a reaction to the continued push for standardized testing prevalent in today's educational policy (Airasian, 1996; Watson et al., 2010). ePortfolio use has also been correlated to an increase in problem-based learning adoption (Kelly & Cox, 2012). According to a recent study by the Campus Computing Project (CCP), approximately 50% of public and private universities and public and private four-year colleges now offer some form of ePortfolios to their students (Campus Computing Project, 2010).

While portfolios have print and electronic format, a review of the literature shows that all portfolios have at least some commonalities. Portfolios include a construction process that is purposeful, driven by content, and incorporates self-reflection and self-assessment; hold students accountable for their own learning; showcase growth over time; encourage students to set goals for their future; and incorporate a collaborative process during their creation (Paulson, Paulson, & Meyer, 1991; Watson et al., 2010; Yancey, 2001).

In addition to the many roles that they play in learning, ePortfolios also assist adult learners in conveying their prior knowledge, which has often been learned through experiential means (Michelson & Mandell, 2004). While there are certainly other ways of assessing prior knowledge, ePortfolios allow for self-reflection and self-assessment more so that other assessment means (Michelson & Mandell, 2004; Yancey, 2009).

Reflection is an important piece of the ePortfolio creation process that cannot be ignored. This piece of the ePortfolio process leads to deep and long-lasting learning (Zubizarreta, 2004). Reflection includes three processes, identified as projection, retrospection, and revision (Yancey,

2001). Through reflection, students articulate what they have learned in their own terms, which fosters deep learning.

The past decade has seen the emergence of blogs and social networking sites, allowing people to represent themselves through the use of these online media (D. Cambridge, 2010). Individual expression is a common tie between ePortfolios, blogs, and social networking sites (D. Cambridge, 2010) and the use of ePortfolios taps into today's student's increased use of multimedia in their everyday lives (Kelly & Cox, 2012; Watson et al., 2010). While most students will be more than capable of creating informal online identities through well known social media outlets, most will probably have not considered creating a more formal identity (Kelly & Cox, 2012), through, for example, an ePortfolio.

Purposes of portfolios. ePortfolios can be designed for a multitude of purposes. The most common types of ePortfolios are built to reflect learning, serve as an assessment, or showcase professional development (Barrett, 2000; B. L. Cambridge, 2001; Watson & Doolittle, 2011). ePortfolios can also be built in order to encompass a combination of these purposes (Watson et al., 2010).

ePortfolios for learning. ePortfolios designed to showcase learning can take many different forms and incorporate a variety of different elements in order to demonstrate learning (Yancey, 2001). These types of portfolios push students to become responsible for the inclusion and synthesis of artifacts they feel exhibit their mastery of course or program objectives. Through the selection and synthesis process, student learning becomes visible to the reviewer (Watson et al., 2010).

ePortfolios for assessment. When used as a form of assessment, ePortfolios are considered a performance-based or authentic assessment, in which learners are expected to

demonstrate their knowledge and skills simultaneously, while also considering contexts outside of their formal education (Airasian, 1996; Baker et al., D. Cambridge, 2010). These assessments can be used within the context of a course or program, or can be aligned with standards set forth by a governing body (D. Cambridge, 2010). The adoption of ePortfolios for assessment employs a more learner-centered form of assessment, and will, in turn, promote learner-centered teaching strategies in the classroom (Kelly & Cox, 2012).

Watson, Zaldivar, and Summers (2010) claim that electronic portfolios assist with assessment of students on three distinct levels. First, the creation process for building ePortfolios provides a method for capturing student learning that is often unable to be captured using traditional assessment, allowing instructors to see the growth of students through a course or program. Second, if the instructor of a course or program builds their own ePortfolio alongside students, that instructor will be able to better reflect on the progress and experiences of their students. Lastly, programs and institutions also benefit from the use of ePortfolios, providing rich learning and program assessment data.

The use of an ePortfolio for assessment purposes is a visible way to capture student learning and growth. Instead of focusing on the outcome of the assessment, ePortfolios can also focus on the creation process, eliminating some of the criticism attached to traditional assessments (B. L. Cambridge, 2001). Two qualities that are essential and also typical of ePortfolios, reflection and authentic assessment, provide evaluators the information they need in order to assess students (Johnson, Mims-Cox, & Doyle-Nichols, 2006).

The systematic gathering of student learning data is aided by the development of ePortfolios, providing direct evidence through student reflections and presented artifacts (Watson et al., 2010). This gathered information can be used for assessment on many different levels,

including: the individual student; the classroom instructor; the student or instructor's program; or the institution (Watson et al., 2010).

ePortfolios for professional development. A portfolio that is created for the purpose of professional development is one in which the creator selects items that best showcase his/her skills or achievements (Challis, 1999; Watson et al., 2010). Creating a professional development portfolio takes discipline on the part of the creator, requiring self-assessment and reflection in order to connect lessons learned in school with the skills and criteria that make the creator qualified professionally (Kelly & Cox, 2012; Watson et al., 2010). These types of portfolios can be especially useful for students applying to graduate school or transitioning into a career (Watson et al., 2010).

Benefits of ePortfolios. The creation of ePortfolios can be beneficial to administrators, faculty, and students. Administrators benefit due to the ability for ePortfolios to support departmental review and institutional accreditation fulfillment (Reese & Levy, 2009). Faculty benefit from the created archive of student work, facilitation of student advising, and support of departmental review (Reese & Levy, 2009). Students benefit from the creation of ePortfolios in several ways. They can serve as: archives of their work, research, projects, and extracurricular activities; spaces for continually evolving personal reflections; tools to facilitate academic and career advising; and supplements for potential employers or higher education admissions (Reese & Levy, 2009).

Challenges of implementing ePortfolios. While ePortfolios can be beneficial, the adoption of this technology can be met with many challenges. Perceived costs of adoption can sometimes outweigh perceived benefits of adoption (Reese & Levy, 2009). Lack of a shared definition of ePortfolios, a common vision, or a coordinated implementation can challenge those

who wish to adopt ePortfolios (Reese & Levy, 2009; Watson et al., 2010). In addition, if there is insufficient integration of already accepted technology systems, systemic issues can arise (Reese & Levy, 2009). Most importantly, the attitudes of faculty and students toward ePortfolios can heavily influence the successful adoption or abandonment of this technology (Kelly & Cox, 2012; Watson et al., 2010). The use of DOI theory can assist in meeting these challenges when attempting to adopt ePortfolios.

Conclusion. An ePortfolio is a versatile tool that can be used in various academic and organizational settings. This technology can be designed for the purposes of learning, assessment, professional development, or a combination of any of these categories. While there are certainly challenges for adopting any type of new technology or innovation in a course, program, or organization, the benefits of ePortfolios can certainly make them worth the effort. DOI theory explores the opportunities and challenges presented by implementing an innovation such as ePortfolios. This theory will be discussed in the next section.

Diffusion of Innovation Theory

Diffusion of innovation (DOI) theory seeks to understand the social process that members of a society go through in order to adopt or reject an innovation or technology (Rogers, 2003; Surry & Farquhar, 1997). The literature regarding DOI theory is extensive, however Surry and Farquhar (1997), in reviewing the DOI literature, derived two categories into which it can be divided. These categories are general diffusion theories and instructional technology diffusion theories.

General diffusion theories. General diffusion theories can be applied to most any organizational setting. These theories include, but are not limited to: the theory of innovation

attributes; the theory of rate of adoption; and diffusion of innovation theory (Surry & Farquhar, 1997).

Theory of innovation attributes. The theory of innovation attributes is an idea credited to Everett Rogers and has been incorporated in many other diffusion theories (Surry, 2002). Rogers (2003) identified the attributes of an innovation as trialability, compatibility, complexity, relative advantage, and observability. These attributes are believed to be key factors in whether or not potential adopters accept or reject an innovation based on their perception of that innovation along each attribute (Surry, 2002).

S-Curve theory. The s-curve theory, also known as the theory of rate of adoption, can be used to visually demonstrate the life cycle of an innovation. When a new product is introduced, there is an intense amount of research and development that takes place around the innovation, leading to quality improvements and cost reduction, which then leads to a growth in the adoption of the innovation. Once the improvements and cost reduction opportunities are exhausted, the market becomes saturated and there are very few new adoptions of the innovation (Rogers, 2003).

DOI according to Rogers. Rogers (2003) defines the diffusion of an innovation as a special type of communication, in which potential adopters decide whether to accept or reject a technology. This process involves four key elements and has five distinct phases. In addition, opinion leaders and change agents are pivotal to the successful adoption of an innovation.

Key elements of DOI. Four key elements are always present when discussing DOI. These elements are identified by Rogers (2003) as the innovation, communication channels, time, and the social system. Each of these elements are "identifiable in every diffusion research study and

in every diffusion campaign or research program" (Rogers, 2003, p. 11). These elements are crucial to the successful adoption of a new technology.

Innovation is defined as the perception of an individual or group that an idea, practice, or object is new. It should be noted that whether this innovation is actually new or not is irrelevant. "If an idea seems new… it is an innovation" (Rogers, 2003, p. 12). According to Rogers, most newly analyzed innovations are those that involve technology, and the terms innovation and technology are typically used interchangeably. Technologies are typically composed of hardware and software. Innovations often include the following characteristics: relative advantage, compatibility, complexity, trialability, and observability. Technologies that are perceived as having greater amounts of relative advantage, compatibility, trialability, and observability and lesser degrees of complexity will be adopted more quickly that those that do not. Reinvention of the innovation, which is defined as the change or modifications of an innovation by users during the adoption process, can also occur.

Communication is identified as the process by which participants create and share information regarding the innovation. This communication process typically takes place across various communication channels, including, mass media channels, interpersonal channels, and interactive communication channels. Mass media channels have proven to be the most effective form of communicating an innovation to the largest possible audience, while interactive communication channels, such as the Internet, are becoming more popular since diffusion is a social process (Rogers, 2003).

Time is involved throughout the entire diffusion of an innovation. The element of time is involved in the following ways: an individual passing from initial knowledge of an innovation to the eventual adoption or rejection of that innovation; the innovativeness of the technology

adopter, regarding where an individual falls within the spectrum of adopter categories compared to others members of the system; and the rate of adoption of the innovation into the system, which is typically measured by the number of adopters. Most innovations will be adopted on an S-curve timeline, as previously discussed (Rogers, 2003).

A social system is defined as a set of interrelated units that are involved in the adoption process, which can be individuals, groups, or entire organizations. This social system gives a social structure, or end point, to the adoption of a technology. Opinion leaders and change agents are integral in the decision-making process, and will be discussed later in this section. Three types of decisions can be made by the social system, including: optional innovation-decisions, collective innovation-decisions, and authority innovation-decisions. Given these three types, authority and collective innovation-decisions are the most common and the fastest rate of adoption stems from authority innovation-decisions (Rogers, 2003).

Each of these individual elements (the innovation, communication channels, time, and social system) combined contribute to the successful adoption or rejection of an innovation. In addition to these elements of DOI theory, there are also five phases to the DOI process.

Phases of DOI. Rogers (2003) contends that the innovation-decision process encompasses five distinct phases, which happen over a period of time. These five phases are identified as knowledge, persuasion, decision, implementation, and confirmation. Each distinct phase considers the series of actions and decisions that members of society go through that effect whether or not a technology is adopted.

Knowledge occurs when a potential adopter becomes aware of an innovation and then learns how it works. There are three distinct types of knowledge that must be fulfilled during the knowledge phase of DOI in order for potential adopters to fully understand an innovation.

Awareness-knowledge addresses the knowledge of what an innovation encompasses. How-to knowledge addresses the importance for a potential adopter to understand how to utilize an innovation. Finally, principles-knowledge encompasses the underlying information a potential adopter needs in order to understand how the innovation works. While an innovation can be successfully implemented when only awareness-knowledge and how-to knowledge are addressed, the failure to explore principles-knowledge with potential adopters can lead to the misuse or abandonment of that innovation (Rogers, 2003).

Persuasion occurs when a potential adopter forms an attitude in regards to the innovation. The attitude formed can be either favorable or unfavorable and will influence their beliefs and actions regarding the innovation. During this stage of DOI, a potential adopter will become more invested in an innovation, in terms of emotional and intellectual investment. Potential adopters typically seek advice from their peers regarding the innovation during this stage (Rogers, 2003).

Decision occurs when the potential adopter takes steps toward choosing to adopt or reject an innovation. Adoption is identified as a potential adopter's decision to use an innovation. Rejection is identified as the decision by a potential adopter to not adopt an innovation, and it should be noted that this could occur at any time throughout the five phases of innovation. The decision phase can be aided by offering potential adopters a trial-use of the innovation in order to help them determine the usefulness of that innovation in relation to their own needs (Rogers, 2003).

Once a decision has been made to adopt an innovation, the implementation phase follows. Implementation is defined as the process in which the potential adopter makes use of the new innovation. This phase, unlike the other phases thus far, involves observable actions by a potential adopter to incorporate the innovation into their personal or professional life. The

potential adopter will maintain some level of uncertainty regarding the innovation and continue to seek out knowledge about the innovation (Rogers, 2003).

The final stage, confirmation occurs when the adopter seeks reinforcement from the just completed innovation-decision process. The decision to adopt an innovation can be reversed if the adopter is exposed to conflicting information about their decision. The reduction of conflicting information is important during this phase in order to continue the use of the innovation (Rogers, 2003).

The importance of opinion leaders and change agents. Change agents and opinion leaders are pivotal to the success or failure of a technology adoption through their ability to influence participants. A change agent is defined as an individual who influences a participant's innovation-decision process in the direction deemed necessary by the change agency. Opinion leaders are members of a social system and have the ability to use their impact within that social system in order to influence whether or not a technology is adopted. Change agents often use opinion leaders for the purposes of influencing the rest of an organization to adopt an innovation (Rogers, 2003).

Instructional technology diffusion theories. Surry and Farquahar (1997) claim that the study of diffusion theory within the field of instructional technology is beneficial for three reasons. First, it is important for instructional technologists to have an understanding of why or why not an innovation is or is not adopted (Surry & Farquhar, 1997). Second, since instructional technology is a field based in innovation, the understanding of DOI theory will help instructional technologists work more effectively with clients (Schiffman, 1991; Surry & Farquhar, 1997). Lastly, the study of DOI theory "could lead to the development of a systematic, prescriptive model of adoption and diffusion" (Surry & Farquhar, 1997, p. 2).

Instructional technology diffusion theories are applied specifically to technology in instructional settings and include: the User Oriented Instructional Development (UOID) model; the Concerns Based Adoption Model (CBAM); the innovation implementation work of Donald P. Ely; the Critical Factors in Adoption Checklist; and the concept of adoption analysis (Surry & Farquhar, 1997).

User Oriented Instructional Development (UOID) model. Ernest Burkman was one of the first diffusion theorists to focus on instructional technology (Surry & Farquhar, 1997). His model regarding UOID focuses on the importance of understanding the perceptions of potential implementers of a technology (Burkman, 1987). This model is based on a five-step process: identify the potential adopter; measure relevant potential adopter perceptions; design and develop a user-friendly product; inform the potential adopter; and provide post-adoption support (Burkman, 1987).

Concerns Based Adoption Model (CBAM). Shirley Hall and Gene Hord developed the CBAM, which considers the roles that people play within an organization in order to facilitate a change. This model's most commonly discussed elements are "stages of concern" and "levels of use" (Surry & Farquhar, 1997). The seven stages of concern are identified as awareness, information, personal, management, consequence, collaboration, and refocusing (Hall & Hord, 1984). The levels of use are divided into nonuse, orientation, preparation, mechanical use, routine, refinement, integration, and renewal (Hall & Hord, 1984). Both the stages of concern and levels of use reinforce that change agents in an organizations will not only need to be able to understand the concerns of the members of an organization when implementing a technology change, but these change agents will also have to be able to offer support to the organization's members throughout each level (Hall & Hord, 1984).

Conditions for implementing instructional technology innovations. Donald P. Ely examined eight conditions for implementing technology innovations (Surry & Farquhar, 1997). Ely (1976, 1999) focused on the implementation phase of DOI, which he viewed as the most important part of the process that is often overlooked. The conditions identified in order to successfully facilitate the implementation of an innovation are: dissatisfaction with the status quo; knowledge and skills; availability of resources; availability of time; rewards and/or incentives; participation; commitment; and leadership (Ely, 1976, 1999).

Critical Factors in Adoption Checklist. Developed by Stockdill and Morehouse, the Critical Factors in Adoption Checklist is a comprehensive overview of the factors that assist in the adoption of an innovation in an educational setting (Surry & Farquhar, 1997). The five categories that are identified within the checklist are educational need, user characteristics, technology considerations, organizational capacity, and content characteristics (Stockdill & Morehouse, 1992).

Adoption analysis. Farquhar and Surry (1994) incorporate many of the theories related to the diffusion of an educational technology and identify four categories that affect adoption. These four categories are as follows: user characteristics, which considers the personal traits of those within an organization; perceived attributes, which includes Everett's Rogers' five attributes of an innovation; physical environment, which looks at the technology infrastructure already available within an organization; and support environment, which examines the available resources that will be required to support and maintain the innovation (Farquhar & Surry, 1994).

DOI and ePortfolios. Growing institutional assessment needs are often a pivotal reason for the adoption of ePortfolios (Bass & Eynon, 2009; Schneider, 2009). Like any other innovation, ePortfolios are subject to the same conditions and stages in the diffusion process.

Applying what is known about technology adoption to the introduction of ePortfolios into a system can support successful use.

Instructional technologists can provide guidance to administrators and technology directors regarding the best strategies to aid in a smooth adoption process. For example, Watson, Zaldivar, and Summers (2010) outline several key strategies that were called on during their university's ePortfolio adoption process. To ensure that the ePortfolio adoption initiative was strategically aligned to department, college, and/or institutional goals and missions, partnerships with key stakeholders who had similar missions on campus were developed and nurtured. Lengthy pilots were completed in order to fully understand the capabilities and limitations of the system being used to implement ePortfolios. Faculty development was also implemented in order to establish relationships with faculty, and then continue those relationships. The CBAM was used in order to assist with developing and continuing relationships with the faculty. Donald P. Ely's eight conditions of implementation were also called upon to help facilitate change efforts and diminish resistance to ePortfolio implementation. Although elements of DOI theory were considered in the implementation of ePortfolios, it is unclear to what degree the most useful elements were successfully woven systematically throughout the initiative. This study helped to answer that question and provide a more comprehensive framework for adoption.

Conclusion. In this section, important elements of DOI theory were presented. Clearly, there are many diffusion of innovation theories and models that seek to understand the complicated process that potential adopters go through in order to accept or reject an innovation. The use of DOI theory is key to the successful implementation of a technology, and ePortfolios are no exception. In particular, Rogers' five phases of the innovation-decision process (knowledge, persuasion, decision, implementation, and confirmation) and Ely's eight conditions

for implementing technology innovations (dissatisfaction with the status quo; knowledge and skills; availability of resources; availability of time; rewards and/or incentives; participation; commitment; and leadership) appear most relevant to examining the ePortfolio adoption process of faculty and administrators, and subsequently developing a framework for implementation.

Summary of Literature Review

In this chapter, three bodies of literature were examined: assessment, ePortfolios, and DOI theory. Each of these three areas of literature inform this study by guiding the data collection and framework development processes.

The review of assessment literature discussed categories of learning, categories of assessment, and the role of standards. As the practice of assessment has evolved overtime, recommendations on the type of assessment to be used to understand student learning differ depending on the type of knowledge being assessed. Before selecting an assessment, it is important to analyze the learning environment in order to ensure that the assessment in question will fulfill learning expectations.

In addition, assessments are, in general, an imperfect measure of the knowledge and skills they are being used to evaluate (Livingston & Zieky, 1982). Current national requirements to assess learners according to their fulfillment of standards has lead to an overuse of traditional assessments, which are easy to score but generally cannot measure complex categories of learning simultaneously. However, a performance assessment such as an ePortfolio can be used to assess each category of learning in any combination, giving a more holistic view of learning. ePortfolios can also be used to ensure standards are being met, making them a robust type of assessment and a potential replacement or addition to traditional testing.

A review of literature regarding ePortfolios discussed the three purposes of ePortfolios, the benefits of ePortfolios, and the challenges of implementation. The ability of an ePortfolio to encompass the areas of learning, assessment, and professional development makes it a versatile tool. While there are challenges to the implementation of ePortfolios, the benefits of utilizing them can be numerous, if implemented systematically.

The review of DOI literature discussed general DOI theories, instructional technology DOI theories, and DOI in relation to ePortfolios. While there are many theories and models written regarding the diffusion of an innovation, they all seek to inform the social process that happens when potential adopters decide to accept or reject an innovation. Regardless of the theory or model utilized, four elements are always present when adopting an innovation, which are identified as: the innovation, communication channels, time, and the social system. The adoption of ePortfolios can be supported by an implementation framework that considers elements of DOI and, in particular, Rogers' five phases of the innovation-decision process and Ely's eight conditions for technology implementation.

CHAPTER 3

RESEARCH METHODOLOGY

The purpose of this study was to develop a framework for supporting the adoption of ePortfolios by collecting data from faculty and administrators on the undocumented adoption process at a large research university. It is anticipated that university faculty, staff, and administrators can use the framework to assist in the adoption of ePortfolios for the purposes of assessment, professional development, and/or demonstration of learning. The study employed a Type 2 developmental research design with the following stages: analysis, development and evaluation, and revision (Richey & Klein, 2007).

Introduction to Study Design

This study employed a design and development research approach. Richey and Klein (2007) define design and development research as "the systematic study of design, development and evaluation processes with the aim of establishing an empirical basis for the creation of instructional and noninstructional products and tools and new or enhanced models that govern their development" (p. 1). Specifically, this study used what was previously known as Type 2 developmental research and recently renamed to model research, in which the research "pertains to the [study] of the development, validation, and use of design and development models" (Richey & Klein, 2007, p. 10). Three phases were used to develop a framework for assisting in ePortfolio implementation: analysis, development and evaluation, and revision (Richey & Klein, 2007). An overview on how these phases were applied in this study is provided in Table 1.

Table 1

Overview of Study Phases

Type 2 Phases	Framework Development and Validation
Analysis	Analyze survey data, interview data, and DOI literature. Apply DOI Literature.
Development and Evaluation	Develop framework based on analysis. Develop rubric for DOI expert reviewers.
Revision	Administer expert reviews. Incorporate feedback from expert reviewers in revised framework.

Site Selection and Researcher Role

This study was conducted at a large United States research university. This university began an ePortfolio effort in 2001 with the intent of including important DOI elements (e.g. stakeholder involvement) in the initiative. Yet, no formal study of the initiative had been conducted.

The researcher was a graduate assistant for the university's ePortfolio office from August 2011 to March 2013. During the two years served in this position, the researcher aided in the design and facilitation of ePortfolio workshops, as well as the creation of training and instructional aids, for faculty, staff, and students. The researcher benefited from being in this position in relation to the research project by being familiar with the faculty members and administrators who were asked to participate in the interview and survey phases. However, the researcher was also challenged to separate from the initiative in order to conduct the study.

The Director and Assistant Director of the university's ePortfolio office were enthusiastic about the study, gave their approval, and assisted in identifying programs and courses at the

university that are currently or have previously participated in this ePortfolio initiative so that the researcher could contact them requesting their voluntary participation.

Research Participants

The target population for this research study consisted of faculty and administrators who are currently or have previously participated in the ePortfolio initiative at the university. Thus, the participants of this study were purposefully selected (Creswell, 2009; Maxwell, 2005). A total of 144 faculty and administrators who have implemented ePortfolios in their courses or programs at the university were contacted for participation in the study through coordination with the university ePortfolio office. The study is focused on examining the faculty and administrator perspectives in order to assist in the development of a framework for supporting the adoption of ePortfolios by collecting data on the undocumented adoption process at a large research university.

The decision to focus solely on faculty and administrators in the adoption process was made for two reasons. First, a review of the literature revealed that while the student's view of the adoption process is well represented (Ruiz et al., 2009; Want & Turner, 2007), the faculty and administrator perspective is lacking. Second, faculty and administrators who are currently working to implement ePortfolios in their courses and programs are not typically involved in the dissemination process (C. E. Watson, personal communication, January 19, 2012). Yet, DOI theory emphasizes that key stakeholders are important to the innovation adoption process (Rogers, 2003).

Instrumentation

Survey instrumentation. The survey instrument used in this study was a modified RIPPLES survey (see Appendix A). The RIPPLES survey is based in DOI theory and is

specifically designed to explore aspects of instructional technology integration in higher education. The RIPPLES instrument was developed by Dr. Daniel Surry, Professor in Instructional Design and Development in the College of Education at the University of South Alabama, and Dr. David C. Ensminger, Clinical Assistant Professor in the School of Education program at Loyola University Chicago. Permission to use this survey for this study was obtained from Dr. Surry (see Appendix B).

The RIPPLES model is based in the combination results of a literature review of DOI theory, a survey of college dean's opinions regarding the factors effecting technology integration, and the author's personal experiences with innovation adoption (Surry, 2002, 2005). Seven elements make up the RIPPLES acronym as follows: resources, which refers to the fiscal resources available in order to acquire, utilize, maintain, and upgrade technology; infrastructure, which refers to the hardware, software, facilities, and network capabilities within the organization considering adopting a new technology; people, which refers to those who will be involved in the adoption process, and how their hopes, needs, and experiences will influence the adoption process; policies, which refers to the need for organizational policies and protocol that do not inhibit the adoption of a new innovation; learning, which refers to the instructional outcomes that accompany training related to the new innovation; evaluation, which refers to the need for continual assessment and reassessment of the innovation; and support, which refers to the need for support to be available to those who are using the innovation (Surry, 2002, 2005). Each of these elements is believed to be critical to the adoption of an innovation. A portion of the survey asks several questions categorized by each of the seven RIPPLES elements.

Each of the seven RIPPLES survey components described above were analyzed to determine their correspondence to Ely's eight conditions for implementing technology

innovations (Surry, 2002, 2005). The correspondence of these components was found as follows: resources and infrastructure were found to correspond with Ely's condition of availability of resources; people was found to correspond with Ely's condition of participation; policies was found to correspond with Ely's condition of leadership; learning was found to correspond with Ely's condition of sufficient knowledge and skills; evaluation was found to correspond with rewards or incentives; and support was found to correspond with Ely's condition of commitment. Two of Ely's conditions of change were not found to be reflected in the original RIPPLES survey. These conditions were dissatisfaction with the status quo and availability of time. A summary of this analysis is provided in Table 2.

Table 2

Comparison of RIPPLES Survey Elements to Ely's Eight Conditions

RIPPLES Survey Component and Definition	Corresponding Condition of Change
Resources – financial resources	Availability of resources
Infrastructure – technological backbone of the university	Availability of resources
People – social and human elements	Participation
Policies – written and unwritten rules, practices, traditions, and regulations	Leadership
Learning – instructional outcomes of training	Sufficient knowledge and skills
Evaluation – assessment of student goals, technology, technology plans, innovative practices, costs/benefits	Rewards or incentives
Support – training, technical support, pedagogical support, administrative leadership	Commitment

In order to align the RIPPLES survey with Ely's eight conditions of change, the researcher modified the resources category of the RIPPLES survey to include time as a resource. The survey also lacked questions related to the user's dissatisfaction with the status quo. Since the target population had already adopted ePortfolios, this condition of dissatisfaction with a prior state was addressed through additional questions regarding rationale for adoption.

In order to effectively modify the survey, the researcher consulted with her advisor as well as statisticians with the Laboratory for Interdisciplinary Statistical Analysis (LISA) at

Virginia Tech (VT). The following changes were suggested by the LISA team and made to the original RIPPLES survey: made numbers and options for each survey item consistent throughout the survey; moved demographic questions to the end of the survey since the answers to those questions were less important; added an opinion area to each section of the survey; moved the questions in each section around so that the question asking the importance of the item was listed first; recommended that the don't know/unsure option from the original RIPPLES survey remain; and, added a question at the end of the survey that asked participants to rank each RIPPLES item in order of its importance.

The last portion of the survey asked if the participant was willing to participate in a follow-up interview with the researcher. The survey was distributed electronically to all 144 potential participants through email with three follow-up reminders over a period of four weeks.

Interview instrumentation. The interview protocol for this study was designed by the researcher (see Appendix C). The protocol consisted of 10 questions that asked the participant to speak in greater depth about their experiences implementing ePortfolios at the university. An interview sample of 12 participants was selected from survey respondents to represent a diverse cross-section of the university. Selection criteria for this interview included: discipline, gender, years at the university, years teaching, role (faculty or administrator), and time using the university's ePortfolios (including those who had rejected the innovation).

Data Collection and Procedures

Phase I: Permissions and survey administration. Before beginning data collection, the researcher obtained approval from the university Institutional Review Board (IRB) (see Appendix D). Once approval was obtained, contact information for survey participants was obtained through the university's ePortfolio office and a participation solicitation email was sent. This email introduced the researcher, the purpose of the study, and the nature of the study; asked

for voluntary participation; and provided a web link to proceed to the informed consent information and survey (see Appendix E). This email also informed potential participants that if they wished to be considered for a follow-up interview, they would be given an opportunity at the end of the survey to provide their contact information.

The survey instrument was administrated through VT's instance of Qualtrics, an online survey tool, which can be found at http://virginiatech.qualtrics.com. VT's Qualtrics tool is a system for data collection that is housed securely through VT's servers.

Once participants clicked the link provided, they were directed to read a letter of consent. The letter of consent provided participants with information regarding the project, the survey, and the interview process, including: the title of the project; the names of the researchers; the purpose and procedures of the research study; the risks, benefits, and confidential nature of the study; the subjects' responsibilities and rights; and the contact information for the researchers and the IRB (see Appendix F). Clicking on the 'Provide Consent' button at the bottom of the form recorded consent to participate and the browser automatically redirected participants to the online survey.

After one week, a reminder email was sent out to potential participants reiterating the information in the first email solicitation (see Appendix G). After two weeks, a second reminder email was sent out again asking for participation (see Appendix H). A final reminder was sent out three days before the close of the survey (see Appendix I). At the end of four weeks, the researcher closed the survey from further participation. Then, the interview and data analysis phases of the study began.

Phase II: Interview. Following the close of the online survey, the researcher examined the survey data in order to identify which participants have volunteered to partake in follow-up

interviews. A total of 23 participants volunteered for interviews. Participants were selected in order to ensure there was a balanced representation across the university. Participants who had volunteered for interviews were divided into those who were currently using ePortfolios and those who had abandoned the tool. Participants were then further divided into administrators and faculty members. From these divisions, 12 participants were then selected from different academic programs and departments. Participant demographic details are discussed in Chapter Four.

Once selection occurred, the researcher contacted each participant individually through email in order to setup the interview time and location (see Appendix J). The researcher conducted interviews with each individual participant in a private location at their preference. Participants who volunteered but were not selected for Phase II received an email after all interviews had been conducted thanking them for volunteering and notifying them that they were not selected for an interview at this time (see Appendix K).

Before each interview began, the participant was informed that the interview would be recorded in order to ensure the accuracy of information captured from the interview during transcription (Rossman & Rallis, 2003). Each interview lasted no more than 30 minutes.

Data Analysis Techniques

During Phase I of this study, faculty and administrators at the university who had used or were currently using ePortfolios within their courses or programs were asked to report about their experiences with the ePortfolio adoption process at the university. This information was collected through an online survey that was modeled after the original RIPPLES survey, which was modified to address Ely's eight conditions of change.

A descriptive analysis of the data was conducted first in order to determine the means, percentages, and standard deviations for each survey item. Second, participants' answers to the open-ended questions were examined for emerging themes (Creswell, 2009). Based upon the study's purpose, these themes influenced the interview protocol in order to provide opportunities for more directed data collection.

During Phase II of this study, a qualitative interview protocol consisting of 10 questions and developed by the researcher was administered to participants who chose to volunteer for this phase of the study. The researcher transcribed the data collected as soon as possible after the conclusion of each interview. Interview transcripts were coded for themes (Creswell, 2009). Interview findings were then triangulated with participant survey findings (Creswell, 2009) in order to strengthen the analytic process. Table 3 provides a summary aligning research questions to data sources and data analysis strategies.

Table 3

Data Sources and Plan for Analysis Matrix

Research Questions	Primary Data Sources(s) Used to Answer this Question	How these Data were Analyzed to Answer this Question
1. What strategies and resources are currently being used by a large research university to assist faculty with ePortfolio implementation and to what extent do such strategies and resources reflect diffusion of innovation theory?	RIPPLES Survey Instrument (Questions 9, 10, 11, 13, 14, 15, 16, 18, 19, 20, 21, 23, 24, 25, 26, 27, 29, 30, 31, 32, 34, 35, 36, 37, 39, 40, 41, 42, 43, 44, 46) DOI Literature	Descriptive analysis of survey statistics (Creswell, 2009) Theme coding (Maxwell, 2005; Rossman & Rallis, 2003)
2. How do faculty members perceive the current ePortfolio adoption support process? What about the process is successful? What about the process is lacking and requires improvement? What about the process reflects diffusion of innovation theory?	RIPPLES Survey Instrument (Questions 6, 7, 8, 47, 48) Interview (Questions 7b, 7c, 8a, 10) DOI Literature	Descriptive analysis of survey statistics (Creswell, 2009) Transcription, theme coding (Maxwell, 2005; Rossman & Rallis, 2003)
3. What features of diffusion of innovation theory should be included in an ePortfolio adoption framework?	RIPPLES Survey Instrument (Questions 3, 8, 49, 50, 51) Interview (Questions 9a, 9b) DOI Literature	Descriptive analysis of survey statistics (Creswell, 2009) Transcription, theme coding (Maxwell, 2005; Rossman & Rallis, 2003)

Framework Development and Evaluation

Using the findings from the survey, interviews, and DOI literature, the researcher developed a framework for supporting the adoption of ePortfolios by university faculty, staff, and administrators. Conceptually, the framework is meant to operationalize those aspects of DOI

theory that appear to be most supportive of successful ePortfolio adoption. Beginning in March, five experts in DOI theory were asked to provide feedback regarding the extent to which the framework effectively and appropriately integrates important DOI elements. The DOI experts were contacted by email to solicit their participation (see Appendix L). While it was challenging to secure experts, eventually, three experts agreed.

After agreeing, the DOI expert reviewer was then sent an email explaining the expectations of the review process and the expert review packet (See Appendix M). The expert reviewer was also provided with the original framework and a rubric to guide his/her evaluation process (see Appendix N). After a follow-up email (see Appendix O) and a final follow-up email (see Appendix P), three reviewers completed the review process within the time available, 38 days. This feedback was analyzed and incorporated into a revised ePortfolio adoption framework.

Chapter Four details the findings from this study. Chapter Five provides the original ePortfolio framework, the expert reviews, and the revised framework.

CHAPTER 4

FINDINGS

Study Overview

The purpose of this study was to develop a framework for supporting the adoption of ePortfolios by collecting data from faculty and administrators on the undocumented adoption process at a large research university. In order to accomplish this purpose, the study employed a Type 2 developmental research design with the following stages: analysis, development and evaluation, and revision (Richey & Klein, 2007). During the analysis phase, survey and interview data were analyzed in light of the research questions and DOI literature. During the development and evaluation phase, a framework was developed based on the data analysis, along with a rubric for use in the DOI expert reviews. During the revision phase, feedback from the expert reviewers was incorporated into a revised framework.

Survey Findings

As described in Chapter Three, the modified RIPPLES survey consisted of 55 questions, and was divided into four sections as follows: participant demographics; background; ePortfolios at the university; and, opinion. The section of the survey regarding ePortfolios at the university was divided into seven subsections according to the RIPPLES model: resources; infrastructure; people; policies; learning; evaluation; and, support. Each close-ended question in the subsections had a possible value between one and six (1 = don't know/unsure; 2 = strongly disagree; 3 = disagree; 4 = neutral; 5 = agree; 6 = strongly agree). The data for those who answered don't know/unsure are reported in the tables to follow, but these data were not included in the final calculations of mean and standard deviation values (see Appendix Q) or within the reporting of each RIPPLES element.

Participant demographics section. Fifty-two out of 144 individuals responded to the survey (36%) and all of them indicated that they were currently or had previously used Sakai, the university's ePortfolio system. Sixty-two percent (32) of the participants who submitted the survey were female and 38% (20) were male. In response to age, 4% (2) indicated they were age 20-29; 10% (5), age 30-39; 27% (14); age 40-49; 38% (20); age 60-69; and 4% (2); age 70 or above. Thus, 14% of respondents could be considered early career, while 69% could be characterized as mid to late career.

Regarding professional position, 14% (7) responded professor; 29% (15) responded associate professor; 8% (4) responded adjunct instructional faculty; and 24% (12) responded administrator. Twenty-two percent (11) responded to the Other category as follows: administrative/professional faculty (2), advanced instructor (2), instructor (2), (1) assistant professor, (1) clinical assistant professor, (1) adjunct instructional faculty, (1) graduate assistant, and (1) assessment coordinator. Thus, in total, 67% (34) of survey respondents were faculty and 29% (15) were in administrative roles. Although only participants who were faculty or administrators were to be included in this study, it was decided to include the graduate assistant participant's data since that individual indicated serving a pivotal role in the implementation of ePortfolios in the program.

Background section. When asked the number of years teaching at the college or university level, 52 of the 52 participants (100%) responded. Of those responses, 35% (18) answered zero to 10 years; 40% (21) answered 11 to 25 years; and 25% (13) answered 25 years or more.

When asked how long participants had been using or previously used ePortfolios, 48 of 52 participants (92%) responded. Of those responses, 23% (11) answered less than one year;

35% (17) answered one to three years; and 42% (20) answered four or more years. In response to the question that asked if they had stopped ePortfolios, when did they stop and why, 22 of 52 participants (42%) responded. Responses were grouped into the following six categories, ordered here from high to low: change in employment position (8); usability and reliability of technology (8); faculty or student resistance (3); too much time or effort required (3); change in course structure (3); and, still in development (1).

Regarding the purpose(s) for using ePortfolios, 50 of 52 participants (96%) responded. Of those responses, 46% (23) answered to track learning; 60% (30) answered to assess learning; 40% (20) answered to support professional development; and 36% (18) answered Other. From the Other category, the following response themes emerged: course or program requirement (3); scholarship and employment (4); support student learning (5); showcase student work (3); accreditation (1); and document learning (1).

When prompted to identify what they liked most about using ePortfolios, 50 of 52 participants (98%) responded. Ordered high to low, these categories included: housing and showcasing of artifacts (27); self-reflection and learning process engagement (15); meets accreditation and assessment requirements (7); reveals whole picture of student (6); flexibility (4); and, availability and security (1). Clearly, survey respondents value ePortfolios as a means to store and access student work.

When asked to pinpoint what they liked least about using ePortfolios, 51 of 52 participants (98%) responded. Responses were grouped in categories, high to low, as: lack of user-friendly interface and non-intuitiveness of platform (25); time spent planning and grading (11); student and faculty difficulty and resistance (9); inflexibility of tool (8); defining and

understanding ePortfolios (2); and, inaccessibility after graduation (2). Given these responses, it appears as if survey respondents are most troubled by the current ePortfolio platform, Sakai.

Regarding what participants perceived as the most important factor(s) influencing faculty adoption and use of ePortfolios, 49 of 52 participants (94%) responded. Responses were categorized as follows: usability and flexibility of system (20); faculty buy in and clear purpose (19); support and training (7); reward for use and time (6); and, learning curve (5).

ePortfolios at the university. This part of the survey was divided into seven subsections aligned with the RIPPLES model (resources, infrastructure, people policies, learning, evaluation, and support). Each subsection had four Likert-scale questions followed by one open-ended question that gave participants the option to expand on their response(s) to any of the other questions in that subsection.

Resources. The resources subsection defined resources as time and money for ePortfolio adoption. This subsection was comprised of four Likert-scale questions and one open-ended question. Table 4 displays the list of statements presented to participants related to resources and the corresponding response percentages.

Table 4

Resource Questions and Responses

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know/ Unsure
The resources available for adopting electronic portfolios were at an appropriate level.	6%	29%	21%	17%	13%	13%
Resources related to electronic portfolios are allocated in an appropriate way.	2%	24%	20%	8%	12%	35%
The way in which resources are allocated act as an enabler to the use of electronic portfolios.	6%	31%	13%	6%	23%	21%
Resources are important to the successful use of a technology innovation, such as electronic portfolios.	57%	33%	8%	0%	0%	2%

Question one asked if the resources available for adopting ePortfolios were at an appropriate level. A total of 52 of 52 participants (100%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 40% (18) answered strongly agree or agree; 24% (11) answered neutral; and 36% (16) responded disagree or strongly disagree. Question two asked if resources related to ePortfolios are allocated in an appropriate way. A total of 51 of 52 participants (98%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 39% (13) participants answered strongly agree or agree; 30% (10) answered neutral; and 30% (10) responded disagree or strongly disagree.

Question three asked if the way in which resources are allocated act as an enabler to the use of ePortfolios. A total of 52 of 52 participants (100%) responded. Of those respondents

(excluding those who responded Neutral or Don't Know/Unsure), 46% (19) participants answered strongly agree or agree; 17% (7) answered neutral; and 36% (15) responded disagree or strongly disagree. Question four asked if resources are important to the successful use of a technology innovation, such as ePortfolios. A total of 51 of 52 participants (98%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 92% (46) participants answered strongly agree or agree; 8% (4) answered neutral; and 0% (0) responded disagree or strongly disagree.

Question five was an open-ended question and gave participants the opportunity to express anything else they felt was significant regarding resources and their importance to ePortfolio adoption and use. A total of 28 of 52 participants (53%) responded. Time was the resource mentioned most frequently, with 16 participants reporting that the time to prepare for the implementation of ePortfolios is scarce. As one participant remarked, "Faculty need time to develop strong learning outcomes, sometimes across several courses. They also need time to develop activities and plans, so that the ePortfolio isn't just another assignment in the course."

Clearly, when it comes to time and money, most respondents felt as if these resources were important to ePortfolio implementation and use, with time being identified as more important than money. However, respondents were fairly divided in their assessment of the organization having adequate availability of these resources, as well as its allocation of these resources for the ePortfolio initiative. This suggests an opportunity for improvement when it comes to resources.

Infrastructure. The infrastructure subsection defined infrastructure as the overall technological backbone of an organization, including communication systems, networks, hardware, software, and administrative and production facilities. This subsection was comprised

of four Likert-scale questions and one open-ended question. Table 5 displays the list of statements presented to participants related to infrastructure and the corresponding response percentages.

Table 5

Infrastructure Questions and Responses

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know/ Unsure
The infrastructure of the organization is of high quality.	19%	46%	12%	12%	8%	4%
The infrastructure of the organization, specifically related to electronic portfolios and their adoption and use, is of high quality.	10%	39%	10%	18%	14%	10%
The infrastructure of the organization acts as an enabler to the use of electronic portfolios.	4%	51%	4%	12%	18%	12%
Infrastructure is important to the successful use of a technology innovation, such as electronic portfolios.	60%	33%	4%	0%	2%	2%

Question one asked if the infrastructure of the organization is of high quality. A total of 52 of 52 participants (100%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 68% (34) of participants answered strongly agree or agree; 12% (6) answered neutral; and 20% (10) responded disagree or strongly disagree. Question two asked if the infrastructure of the organization, specifically related to ePortfolios and their adoption and use, is of high quality. A total of 51 of 52 participants (98%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 68% (34) of participants

answered strongly agree or agree; 12% (6) answered neutral; and 20% (10) responded disagree or strongly disagree.

Question three asked if the infrastructure of the organization acts as an enabler to the use of ePortfolios. A total of 51 of 52 participants (98%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 62% (28) of participants answered strongly agree or agree; 4% (2) answered neutral; and 23% (15) responded disagree or strongly disagree. Question four asked if infrastructure is important to the successful use of a technology innovation, such as ePortfolios. A total of 52 of 52 participants (100%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 94% (43) of participants answered strongly agree or agree; 4% (2) answered neutral; and 2% (1) responded disagree or strongly disagree.

Question five was open-ended and gave participants the opportunity to express anything else they felt was significant regarding infrastructure and its importance to ePortfolio adoption and use. A total of 22 out of 52 participants (42%) responded. The Sakai system used for housing ePortfolios was mentioned most frequently, with seven respondents mentioning the cumbersome nature of the in-house ePortfolio system. Respondents have seen glitches within the system while using it, making enthusiasm for the system wane. One participant remarked, "The [Sakai] system is cumbersome. Faculty complain, students complain, etc."

Noticeably, the survey responses show that infrastructure is viewed as imperative to the successful implementation of ePortfolios. In addition, overall, the infrastructure available at the university is viewed as high quality. However, there is some indication that the system used to house ePortfolios at the university, Sakai, is viewed less favorably and may be serving as a

disenabler to some. This inadequacy suggested an area of further exploration through the follow-up interviews, which will be discussed later in the chapter.

People. The people subsection defined people as the social and human elements of a department or program, including goals, skills, talents, backgrounds, beliefs, opinions, and feelings. This subsection was comprised of four Likert-scale questions and one open-ended question. Table 6 displays the list of statements presented to participants related to people and the corresponding response percentages.

Table 6

People Questions and Responses

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know/ Unsure
The leaders of my department or program consider my opinions, ideas, beliefs, and experiences when making decisions.	27%	35%	10%	12%	10%	6%
The amount of shared decision-making in my department or program, specifically related to the area of electronic portfolios, is high.	8%	28%	18%	10%	26%	10%
The culture of my department or program, specifically shared decision-making and communication, acts as an enabler to the use of electronic portfolios.	6%	24%	26%	14%	22%	8%
The importance of shared decision-making and communication among department/program members to the successful adoption and use of electronic portfolios is high.	20%	29%	14%	12%	20%	6%

Question one asked if the leaders of the participant's department or program consider their opinions, ideas, beliefs, and experiences when making decisions. A total of 51 of 52 participants (98%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 67% (32) of participants answered strongly agree or agree; 10% (5) answered neutral; and 14% (11) responded disagree or strongly disagree. Question two asked if

the amount of shared decision-making in their department or program, specifically related to the area of ePortfolios, is high. A total of 50 of 52 participants (90%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 40% (18) of participants answered strongly agree or agree; 20% (9) answered neutral; and 40% (18) responded disagree or strongly disagree.

Question three asked if the culture of the participant's department or program, specifically shared decision-making and communication, acts as an enabler to the use of ePortfolios. A total of 50 of 52 participants (96%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 33% (15) of participants answered strongly agree or agree; 28% (13) answered neutral; and 39% (18) responded disagree or strongly disagree. Question four asked if the importance of shared decision-making and communication among department/program members to the successful adoption and use of ePortfolios is high. A total of 51 of 52 participants (98%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 52% (25) of participants answered strongly agree or agree; 15% (7) answered neutral; and 33% (16) responded disagree or strongly disagree.

Question five was open-ended and gave participants the opportunity to express anything else they felt was significant regarding people and their importance to ePortfolio adoption and use. A total of 22 out of 52 participants (42%) responded. Faculty (5), departments (5), and leadership (5) were mentioned most. In regards to faculty, one participant remarked,

> Like anything in education, it's all about the people…teaching faculty need to understand [ePortfolio] use so as to provide verbal/emotional/cognitive support to the students and administrators need to pave the way for faculty and students to get to work.

Another participant commented, "faculty need to feel ownership and engagement in the use of ePortfolios in order for them to be successful." At the department level, one participant stated "…communication among departments could certainly be improved and it would be necessary for everyone to be on board and on the same page if we were to implement ePortfolio in all departments in the college."

Another participant observed, "[In my department] there is not a unified culture to facilitate ePortfolio development…[there] are individual faculty working together and we are a very small slice of the department." In terms of leadership, one respondent mentioned, "My department thinks it is good that we have this activity in our classes if we wish to use it but we have no specific department or decision support." Another participant wrote, "…it was a challenge to convince leadership that a time commitment to develop the content was necessary." In addition, another participant mentioned, "I've done this under two department heads. Neither cared whether I did ePortfolios or not…"

The survey responses demonstrate that the element of people is an area of division. Respondents were split on most survey questions regarding whether or not they felt involved in the decision-making process, and whether or not the culture of their department or program embraced the adoption and use of ePortfolios through a shared decision-making approach. In addition, they were also split when asked whether people were an enabler of implementation, suggesting that, although a shared decision-making culture is not predominant, it is judged as less imperative to ePortfolio adoption and use.

Policies. The policies subsection defined policies as the written and unwritten rules, practices, traditions, and regulations that govern the participant's program or department day-to-day operations. This section was comprised of five Likert-scale questions and one open-ended

question. Table 7 displays the list of statements presented to participants related to policies and the corresponding response percentages.

Table 7

Policies Questions and Responses

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know/ Unsure
The policies of my department or program support the necessary and important work that must get done.	17%	46%	12%	10%	12%	4%
Compared to other departments or programs, the policies of my program are fluid and easy to modify when necessary.	6%	29%	22%	16%	16%	12%
Overall the quality of the policies of my department or program, specifically related to the area of electronic portfolio adoption and use is high.	8%	20%	25%	2%	27%	18%
The policies of my department or program act as an enabler to the adoption and use of electronic portfolios.	10%	25%	27%	6%	20%	12%
The importance of appropriate policies to the successful use of a technology innovation, such as electronic portfolios, is high.	15%	38%	21%	6%	10%	10%

Question one asked if the policies of the participant's department or program support the necessary and important work that must get done. A total of 52 of 52 participants (100%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 66% (38) of participants answered strongly agree or agree; 12% (6) answered

neutral; and 22% (11) responded disagree or strongly disagree. Question two asked if compared to other departments or programs, the policies of the participant's program are fluid and easy to modify when necessary. A total of 51 of 52 participants (98%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 40% (18) of participants answered strongly agree or agree; 24% (11) answered neutral; and 36% (16) responded disagree or strongly disagree.

Question three asked if overall the quality of the policies of the participant's department or program, specifically related to the area of ePortfolio adoption and use, is high. A total of 51 of 52 participants (98%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 34% (14) of participants answered strongly agree or agree; 31% (13) answered neutral; and 35% (15) responded disagree or strongly disagree. Question four asked if the policies of the participant's department or program act as an enabler to the adoption and use of ePortfolios. A total of 51 of 52 participants (100%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 36% (15) of participants answered strongly agree or agree; 33% (14) answered neutral; and 31% (13) responded disagree or strongly disagree.

Question five asked if the importance of appropriate policies to the successful use of a technology innovation, such as ePortfolios, is high. A total of 52 of 52 participants (100%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 60% (28) of participants answered strongly agree or agree; 23% (11) answered neutral; and 17% (8) responded disagree or strongly disagree.

Question six was open-ended and gave participants the opportunity to express anything else they felt was significant regarding policies and their importance to ePortfolio adoption and

use. A total of 14 of 52 participants responded (27%). A total of four respondents mentioned that policies regarding the implementation and use of ePortfolios do not exist, or they are not aware of such policies. However, respondents also felt that such policies would be helpful to the successful adoption of ePortfolios. As one respondent remarked, "Having a policy requiring and detailing the use of ePortfolio would be useful and necessary for college-wide implementation."

Survey responses suggest that policies are important and that, respondents are more satisfied with the general policies of their local organization than with specific policies related to ePortfolios. The fairly even spread of responses with regards to ePortfolio policies, along with respondent comments, indicate that useful policies in conjunction with ePortfolios do not exist and/or are not communicated, and would be appreciated by the faculty to guide their implementation efforts.

Learning. The learning subsection defined learning as the instructional outcomes of training experiences offered by the university's ePortfolio office. This subsection was comprised of four Likert-scale questions and one open-ended question. Table 8 displays the list of statements presented to participants related to learning and the corresponding response percentages.

Table 8

Learning Questions and Responses

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know/ Unsure
I feel that the leaders of the university's ePortfolio office consider the educational needs of electronic portfolio adopters when making decisions.	25%	29%	8%	12%	4%	23%
I feel that the university's ePortfolio office's commitment to provide learning experiences for adopters/users of electronic portfolios is high.	33%	31%	6%	6%	6%	19%
The university's ePortfolio office's commitment to relevant learning outcomes for adopters acts as an enabler to the use of electronic portfolios.	31%	31%	14%	4%	4%	16%
Overall, the importance of institutional commitment to relevant learning outcomes for users to the successful adoption and use of a technology innovation such as electronic portfolios is high.	37%	40%	4%	2%	6%	12%

Question one asked whether or not the participant felt that the leaders of the university's ePortfolio office consider the educational needs of ePortfolio adopters when making decisions. A total of 52 of 52 participants (100%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 71% (28) of participants answered strongly agree or agree; 10% (4) answered neutral; and 20% (8) responded disagree or strongly disagree. Question two asked if the participant felt that the university's ePortfolio office's commitment to provide

learning experiences for adopters/users of ePortfolios is high. A total of 52 of 52 participants (100%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 78% (33) of participants answered strongly agree or agree; 7% (3) answered neutral; and 14% (6) responded disagree or strongly disagree.

Question three asked if the university's ePortfolio office's commitment to relevant learning outcomes for adopters acts as an enabler to the use of ePortfolios. A total of 51 of 52 participants (98%) responded. Of those responded (excluding those who responded Neutral or Don't Know/Unsure), 74% (32) of participants answered strongly agree or agree; 16% (7) answered neutral; and 10% (4) responded disagree or strongly disagree. Question four asked whether or not the participant felt that overall, the importance of institutional commitment to relevant learning outcomes for users to the successful adoption and use of a technology innovation such as ePortfolios, is high. A total of 52 of 52 participants (100%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 87% (40) of participants answered strongly agree or agree; 4% (2) answered neutral; and 8% (4) responded disagree or strongly disagree.

Question five gave participants the opportunity to express anything else they felt was significant regarding learning and its importance to ePortfolio adoption and use. A total of 19 out of 42 participants (37%) responded. A total of six responses mentioned the ePortfolio office, and their helpfulness in supporting faculty and student learning regarding ePortfolios. As one respondent remarked, "The ePortfolio office has been very helpful to our office in implementing the ePortfolio project. Very responsive." Another participant stated, "The university office responsible for administering ePortfolio support is excellent. They are always very helpful in this

area." However, one participant made a useful suggestion that faculty would benefit from the ePortfolio office personnel asking them [faculty] what they need to learn.

Unmistakably, responses to the survey questions demonstrate that the element of learning is important to faculty and administrators for the successful university-wide implementation of ePortfolios. More specifically, institutional commitment relevant to ePortfolio learning opportunities and outcomes, is very important. In addition, this appears to be an area where the university has done well in supporting the ePortfolio implementation process.

Evaluation. The evaluation subsection was defined as the evaluation of important factors (e.g., learner achievement, impact of technology innovation, cost/benefit analysis, etc.) related to ePortfolio adoption and use. This subsection was comprised of four Likert-scale questions and one open-ended question. Table 9 displays the list of statements presented to participants related to evaluation and the corresponding response percentages.

Table 9

Evaluation Questions and Responses

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know/ Unsure
The university's ePortfolio office conducts sufficient evaluations of important factors (e.g., learner achievement, impact of technology innovation, cost/benefit analysis, etc.) related to electronic portfolio adoption and use.	6%	14%	6%	2%	14%	58%
The quality and quantity of evaluations, specifically related to electronic portfolios at the university, is high.	8%	8%	6%	2%	10%	65%
I feel that the evaluation of electronic portfolios at the university acts as an enabler to the adoption and use of electronic portfolios.	4%	14%	18%	0%	12%	52%
Overall, the importance of evaluation to the successful adoption and use of a technology innovation, such as electronic portfolios, is high.	12%	30%	14%	0%	8%	36%

Question one asked if the participant felt that the university's ePortfolio office conducts sufficient evaluations of important factors (e.g., learner achievement, impact of technology innovation, cost/benefit analysis, etc.) related to ePortfolio adoption and use. A total of 50 of 52 participants (96%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 47% (10) of participants answered strongly agree or agree; 14% (3)

answered neutral; and 38% (8) responded disagree or strongly disagree. Question two asked if the quality and quantity of evaluations, specifically related to ePortfolios at the university, is high. A total of 49 of 52 participants (94%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 48% (8) of participants answered strongly agree or agree; 18% (3) answered neutral; and 15% (6) responded disagree or strongly disagree.

Question three asked whether the participant felt that the evaluation of ePortfolios at the university acts as an enabler to the adoption and use of ePortfolios. A total of 50 of 52 participants (96%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 37% (9) participants answered strongly agree or agree; 38% (9) answered neutral; and 25% (6) responded with disagree or strongly disagree. Question four asked if overall, the importance of evaluation to the successful adoption and use of a technology innovation, such as ePortfolios, is high. A total of 50 of 52 participants (96%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 66% (21) of participants answered strongly agree or agree; 22% (7) answered neutral; and 13% (4) responded disagree or strongly disagree.

Question five gave participants the opportunity to express anything else they felt was significant regarding evaluation and its importance to ePortfolio adoption and use. A total of 13 out of 52 participants (25%) responded. Three respondents mentioned that they had never seen an evaluation of the ePortfolio initiative. In addition, one respondent remarked that evaluations would be an enabler for ePortfolio adoption if evaluation results were communicated and acted upon. One respondent made the point that an evaluation might bring to light some longstanding concerns, "[Sakai]-based ePortfolios have been in disrepair for years, due to [Sakai], not the ePortfolio Initiative. An evaluation of ePortfolios … would have shown this three years ago and

[the university] could have moved on to a better tool earlier." Another individual commented that evaluation "…is important to verify that ePortfolio is linked to positive learning outcomes for our students."

Out of each of the RIPPLES elements covered in the survey, the element of evaluation had the highest response rate for the don't know/unsure category. Comments from respondents indicated that there may be some misunderstanding of the definition and purpose of evaluation, a lack of communication of evaluation efforts and results, as well as little evaluation compiled to-date. When it comes to evaluation, most respondents felt it is important to the successful adoption of an innovation. However, with regards to current evaluation activities by their specific university, the high degree of uncertainty, as well as respondent comments, suggest that the university needs to pursue more evaluation and/or communicate evaluation findings regarding ePortfolio implementation to the university community.

Support. The support subsection defined support as training, technical support, pedagogical support, and administrative leadership. This subsection was comprised of six Likert-scale questions and one open-ended question. Table 10 displays the list of statements presented to participants related to support and the corresponding response percentages.

Table 10

Support Questions and Responses

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know/ Unsure
The university's ePortfolio office provides the support necessary to implement electronic portfolios effectively.	31%	29%	12%	8%	4%	16%
The support that I received in formal and informal training related to implementing electronic portfolios was high quality.	32%	30%	16%	6%	4%	12%
The support that I received in applying electronic portfolios to the teaching and learning environment was high quality.	28%	32%	14%	8%	4%	14%
The support that I received in administrative leadership in helping to do an effective job implementing electronic portfolios was of high quality.	29%	8%	17%	19%	10%	17%
The overall support system of the university's ePortfolio office acts as an enabler to the use of electronic portfolios.	35%	35%	8%	4%	2%	16%
The importance of support to the successful adoption and use of a technology innovation is high.	35%	41%	8%	4%	2%	10%

Question one asked the participant if the university's ePortfolio office provides the support necessary to implement ePortfolios effectively. A total of 49 of 52 participants (94%) responded. Of those respondents (excluding those who responded Neutral or Don't

Know/Unsure), 71% (29) of participants answered strongly agree or agree; 15% (6) answered neutral; and 15% (6) responded disagree or strongly disagree. Question two asked if the support received in formal and informal training related to implementing ePortfolios was high quality. A total of 50 of 52 participants (96%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 69% (29) of participants answered strongly agree or agree; 19% (8) answered neutral; and 12% (5) responded disagree or strongly disagree.

Question three asked if the support that the participant received in applying ePortfolios to their teaching and learning environment was high quality. A total of 50 of 52 participants (96%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 69% (29) of participants answered strongly agree or agree; 17% (7) answered neutral; and 15% (6) responded disagree or strongly disagree. Question four asked if the support that the participant received in administrative leadership in helping to do an effective job implementing ePortfolios was of high quality. A total of 48 of 52 participants (92%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 45% (18) of participants answered strongly agree or agree; 20% (8) answered neutral; and 36% (14) responded disagree or strongly disagree.

Question five asked the participant if the overall support system of the university's ePortfolio office acts as an enabler for the use of ePortfolios. A total of 49 of 52 participants (94%) responded. Of those respondents (excluding those who responded Neutral or Don't Know/Unsure), 82% (34) of participants answered strongly agree or agree; 10% (4) answered neutral; and 6% (3) responded disagree or strongly disagree. Question six asked if the participant felt that the importance of support for the successful adoption and use of a technology innovation is high. A total of 51 of 52 participants (98%) responded. Of those respondents (excluding those

who responded Neutral or Don't Know/Unsure), 85% (39) of participants answered as strongly agree or agree; 9% (4) answered neutral; and 6% (3) identified disagree or strongly disagree.

Question seven gave participants the opportunity to express anything else they felt was significant regarding support and its importance to ePortfolio adoption and use. A total of 12 out of 42 participants (23%) responded. Seven respondents mentioned the venue for support they used was the university's ePortfolio office. Consistent with the Likert question responses, one respondent remarked, "I have had excellent support from the ePortfolio office…" In contrast, and also consistent with the Likert question responses, three respondents found department or university administrative support to be lacking. As one respondent commented, "The office dedicated to support cares and works with faculty, but I don't see the administrative support…from higher administration."

The responses to this set of survey questions demonstrate that the element of support is important to respondents for the implementation of ePortfolios. While most participants indicated they felt strong support in terms of the university's ePortfolio office, fewer felt sufficient support from the university's administration, suggesting an opportunity for improvement.

Opinion. After the RIPPLES sections of the survey, five supplemental questions were asked of the participants. These questions addressed enablers and barriers to ePortfolio implementation; how faculty would implement ePortfolios if given unlimited resources; the RIPPLES items and their importance in relation to each other; and a final open-ended question enabling participants the opportunity to express anything else regarding enablers and barriers to ePortfolio implementation.

The first question asked participants what they considered to be the two biggest barriers that prevent users from implementing and using ePortfolios. A total of 47 out of 52 participants (90%) responded. Ordered high to low, categories included: current system design (16); time (16); faculty understanding (9); support and training (6); technology resources (6); application beyond the classroom (5); and rewards (3). The second question asked participants what they considered to be the two biggest enablers that make it easier to implement and use ePortfolios. A total of 47 out of 52 participants (90%) responded. Ordered high to low, categories included: support (32); technology capabilities (10); rewards and/or incentives (7); understanding (6); interest (4); and application after graduation (2).

The third question asked participants if they were in charge of helping faculty adopt and use ePortfolios, and they had unlimited resources, how would they approach it. A total of 45 of 52 participants (86%) responded. Ordered high to low, categories included: rewards and/or incentives (15); user-friendly system (15); support and resources (14); and approach by department and/or program (4).

The fourth question gave the RIPPLES (resources, infrastructure, people policies, learning, evaluation, and support) survey components along with definitions, and asked participants to rank those seven elements regarding the adoption and implementation of ePortfolios by order of importance, with the first being the highest in rank. A total of 43 of 52 participants (82%) responded. The items that were ranked in the top three were resources (33), support (28), and people (24). The items that were ranked in the bottom three were evaluation (34), policies (34), and learning (25).

The fifth question asked participants if there was anything else they wanted to share regarding enablers or barriers to ePortfolio adoption. A total of 13 of 52 participants (25%)

responded. Ordered high to low, categories included: rewards and incentives (3); understanding of portfolios (3); and, difficulties with the ePortfolio system (2).

Overall, the responses in the opinion section suggest that technological system design, responses (especially time), and administrative support are the most important concerns of those engaged in ePortfolio adoption and use.

Observations across subsections. After analyzing each individual section of the RIPPLES survey, a more macro view was taken across the data. Interesting viewpoints emerged in terms of the evaluation and learning components of the RIPPLES survey.

When looking at the evaluation section of the survey individually, a question asked participants whether or not evaluation is important for the successful adoption and use of a technology innovation. When answering this question, 21 of 32 participants (66%) responded strongly agree or agree. However, when asked to rank the RIPPLES items in importance, evaluation was ranked sixth out of seven, seven being the lowest in importance.

When looking at the learning section of the survey individually, a question asked participants whether or not learning is important to the successful adoption and use of a technology innovation. In response to this question, 40 of 46 participants (87%) responded as strongly agree or agree. However, when asked to rank the RIPPLES items in terms of importance to ePortfolio implementation, learning was ranked seven out of seven, making it the least important.

These discrepancies imply that while participants view evaluation and learning as important, these elements do not rank as high when directly compared to the other five elements of the RIPPLES model, which include: resources, infrastructure, people policies, learning, evaluation, and support.

Interview Findings

In order to provide further insight into the data gathered from the survey, participants were asked if they would like to volunteer to take part in a confidential, 30-minute follow-up interview. Out of the 52 survey respondents, 23 faculty, administrators, and graduate students volunteered to participate in an interview. Of these 23 volunteers, 12 potential interview participants were contacted and all but one accepted, in which case the researcher contacted an additional participant. Study participant quotes represented by pseudonyms are used in this section are included to help represent a comprehensive reporting of study findings.

Participant demographics. The demographics of interview participants are displayed in Appendix R. All of the interviewees had experience with ePortfolios for their course, program and/or professional use, and used them for the purposes of learning, assessment, and/or professional development. Their length of time using ePortfolios ranged from one to 11 years. Of the 12 interviewees, eight were still using ePortfolios and four had abandoned them. The interview questions (see Appendix C) were derived in light of the results of the survey.

Emerging themes. Four core themes emerged from the data during analysis: (a) technology satisfaction, (b) resource allocation, (c) motivation, and (d) involvement. Each of these themes are substantiated by data from the survey and interviews.

Technology satisfaction. The theme of technology satisfaction encompasses two main issues: functionality of the technology used to create ePortfolios and flexibility of that technology to do what the user wants.

During interviews, the issues of tool functionality and flexibility were mentioned 24 times. This theme includes the need for the ePortfolio technology to be functional in basic operations and flexible to meet varied needs of faculty and learners. As evidenced Professor

Johnson, Administrator, remarked, "You cannot have a successful portfolio program if you have a product that is full of holes and bugs." Assistant Professor Hall pointed out, "One of the things that I am observing, and in talking to the students and getting feedback from them, is that there are limitations with the ePortfolio … The design limitations on the ePortfolio are horrendous." Professor Young emphasized a similar viewpoint, "The whole process is kind of awkward, how you load stuff [into the ePortfolio], it's not real time. You have to save, go to the preview, that's one of the things [students] also dislike."

Recall that survey findings revealed technology as a top priority to ePortfolio users and that, while the university's overall technological infrastructure was viewed favorable, the ePortfolio system was judged less positively. From the interview data, it is apparent that the need for an ePortfolio system that is both functional and flexible in design is important to those implementing ePortfolios.

Resource allocation. Resource allocation emerged as a second theme. This theme includes the need for a variety of resources and especially the need for time.

During interviews, the need for resources was mentioned 43 times, and these mentions varied including such things as documentation, training, and time. As Professor Smith, Graduate Teaching Assistant, remarked,

> [There needs to be] clear and easy to understand instructions for students, and resources for faculty [The ePortfolio office staff] can only do so much. If you really want to make this a university wide effort, you are going to have to teach a lot of faculty how to use it and a lot of students how to use it.

Additionally, Professor Clark, Administrator pointed out that when implementing ePortfolios,

> We ran into a whole lot of resources issues. No one had the time to work on it even though we had leadership buy-in. Resources were not provided to back it up even though I think [those implementing ePortfolios] were interested in it. They felt overwhelmed all the time.

The need for time, mentioned by interview participants 24 times, was the most prominent resource identified. As Professor Lewis, Associate Professor, remarked, "You have to have time to be able to think through the process. There has to be time dedicated to the instruction of the technology itself and the support of that technology." Professor Young stated,

> It's time consuming. As a faculty member, it's much easier to just go into a class and teach how you have always been taught or how you always teach. And when I did this to start with, and then every semester when I work on it, it takes a lot of time.

Interview responses suggest that time to implement is important to faculty and administrators when adopting ePortfolios. Survey findings supported time as a priority for successful adoption and implementation and revealed mixed judgments as to whether the organization allocated time effectively to ePortfolio implementation.

Motivation. Motivation was also found to be a theme of discourse through participant interviews. This theme includes the need for intrinsic and extrinsic motivators to implement ePortfolios.

During interviews, the need for intrinsic and extrinsic motivators was mentioned 21 times. As Professor Young remarked,

> I don't mean to sound like I'm complaining, but we don't get any extra compensation for [implementing ePortfolios]. As a faculty member, if you put a lot of technology into your class here, you get a pat on the head and its expected and yeah I guess it shows up in your

> performance report, but nobody's saying to me, oh here, let me give you an assistant. Here, let me give you fewer classes or something to make up for the time that you are spending on all this technology.

Associate Professor Lewis, also spoke about the need to address motivation,

> While there are a few awards right now and we got the department award and it makes our department feel good, and we got some money, but in general, even that doesn't filter all the way down to the lowest level.

As participants mentioned, using ePortfolios is a lot of work and takes a lot of valuable time. Motivators, especially extrinsic acknowledgements, are an important factor to faculty when implementing ePortfolios. While the RIPPLES model does not specifically address motivators, survey findings did indicate the need for time and money resources to implement them as a priority.

Involvement. The theme of involvement was the final theme to emerge through interviews with participants. This theme includes the need for stakeholders to have influence on the adoption process; the need for leadership to become and stay committed in the adoption process; and the need for leaders within the organization to encourage adopters to continue the implementation process.

During interviews, the need for involvement in the adoption process was mentioned 42 times. As Associate Professor Lewis, remarked,

> If the university believes that this is a valuable tool to enhance the teaching and learning process then the university needs to put their money where their mouth is. They put the resources behind it and make it a requirement so that faculty and students understand its value and understand that it has a place in this institution's pedagogy.

In addition, Associate Professor Lewis, pointed out that, "We all need to be aligned in the goals of the ePortfolio… there's a lot of moving parts, and a lot of people need to be on board for it to work." Professor Adams, Instructor, expanded upon this point, stating,

> Having the technology is not enough; you have to have the people behind it to implement it, to maintain it, and to improve it. It has to be an on going and continuous process and you can't let it sit.

As evidenced by participant responses, involvement is an important piece of the support process for faculty when implementing ePortfolios. Not only does this involvement need to happen when first introducing the concept of ePortfolios, but also throughout the process. Recall that survey findings revealed administrative support as a top priority for ePortfolio implementation, an area that, along with shared decision-making and helpful policies, received mixed reviews in terms of current performance.

Discussion of Research Questions

The previous sections provided a detailed discussion of study findings. Based on these findings, the following sections respond in a summary fashion to each of the three broader research questions.

Research question one. What strategies and resources are currently being used by a large research university to assist faculty with ePortfolio implementation and to what extent do such strategies and resources reflect diffusion of innovation theory?

The university where this study was conducted dedicated two main resources to assist faculty with ePortfolio implementation. These are identified as the university's ePortfolio office and an internal ePortfolio technology system, Sakai. Both of these resources support aspects of DOI theory.

ePortfolio Office. The university's ePortfolio office is available to faculty, staff, students and administrators; in essence, anyone who is interested in learning about or using ePortfolios. This campus-wide resource provides professional development opportunities, direct support in terms of pedagogy and technology assistance, and examples of ePortfolios that have been completed at the university. Further, study findings indicated that participants perceive this resource very positively.

The university's early and ongoing commitment to an ePortfolio office reflects DOI theory-in-practice on several fronts. The institutionalization of the office, its staff, and services support three of Ely's (1976) Conditions of Change (sufficient knowledge and skills, availability of resources, and commitment) and three of Roger's (2003) Stages of Adoption (knowledge, persuasion, and implementation). Through the office's professional development opportunities, university members have a chance to increase knowledge and skill-build. Through the office's consulting services, ePortfolio users have resources for ongoing and customized guidance to meet unique needs. Through the ongoing presence of the office, the university demonstrates commitment to the ePortfolio initiative and its continued implementation.

Internal ePortfolio technology system. The ePortfolio system that is currently used by the university is integrated within the university's preexisting course management system, Sakai. The incorporation of an ePortfolio system into existing technology can be viewed as ensuring compatibility for users and adopters (McKenzie, 2001). As discussed in Chapter Two, compatibility is identified as an attribute of an innovation that can influence the rate of adoption (Rogers, 2003).

In addition, the use of this internal ePortfolio system reflects DOI theory in two ways. This system relates directly to one of Rogers' (2003) Stages of Adoption (persuasion) and one of

Ely's (1976) Conditions for Change (availability of resources). By building the Sakai system the university made available a resource central to the ePortfolio initiative. However, the problems with Sakai have actually served to dissuade ePortfolio uses.

Both the ePortfolio office and the ePortfolio system that are currently offered by the university reflect elements of DOI theory. Study findings demonstrate that while the ePortfolio office is viewed as a positive force for adoption the ePortfolio system is viewed less favorably and may even serve, in its present form, as a barrier.

Research question two. How do faculty perceive the current ePortfolio adoption support process? What about the process is successful? What about the process is lacking and requires improvement? What about the process reflects diffusion of innovation theory?

The faculty who participated in the ePortfolio initiative at the university where this study was conducted identified several features of the current ePortfolio adoption support process that were beneficial and/or preventative to their implementation. These were identified as the university's ePortfolio office, the university's infrastructure, leadership, time, and rewards and/or incentives

ePortfolio office. As mentioned in the discussion of research question one, the university offers a dedicated support staff and office to ePortfolio users, a resource reflecting important DOI elements. Overall, this office is seen as an asset for users. However, while this avenue of support is available, sometimes this support isn't always convenient for users in terms of availability and location. As Professor Young remarks, "[The ePortfolio office] is a wonderful resource…but still, you are on the other end of campus, I've got to make an appointment."

While the ePortfolio office's services are a valued aspect of the adoption process, varying the availability and location of office services may offer an opportunity to improve this already useful resource.

Infrastructure. As mentioned during the discussion of the infrastructure portion of the survey, infrastructure is viewed by participants as essential to their successful implementation of ePortfolios and in general is believed to be high quality at the university. However, participants pointed to a specific piece of the university's infrastructure that could be improved upon. This was identified as the Sakai learning management system.

Generally, participants viewed Sakai unfavorably. Most interview participants were not in favor of continued use of the system. In addition to issues with tool functionality and flexibility discussed in the survey findings section, issues with system updates were also mentioned by participants. The Sakai system currently in use is open source, allowing the university to make changes and updates that users have requested. These changes and updates are not always seamless, occasionally introducing bugs into the system or changing the look and feel so much that users have to relearn how to use the system.

As previously mentioned, the integration of the ePortfolio system within an already existing learning management system can be seen as working toward compatibility for users, which can in turn, influence the rate of innovation adoption (Rogers, 2003). Unfortunately, users have experienced so much trouble with the system that it may be fostering such dissatisfaction with the status quo (Ely, 1976) as to be a contributing factor to the high rate of abandonment of ePortfolios at the university.

Leadership. Leadership was also found to be important to the ePortfolio implementation process. Study findings reflect that the involvement of leadership in the ePortfolio initiative has

been inconsistent both initially and over the long-term. Two of Ely's (1976) Conditions for Change (leadership and commitment) explicitly state the need for consistent leadership involvement.

Time. Time was also found to be important to implementers when adopting ePortfolios. Time was found to be important in two ways. First, implementers spent time learning about the innovation, giving up a significant portion of their own time in order to successfully design and execute an ePortfolio option or requirement for learners. Second, time was also required to teach learners how to use ePortfolios. This time typically took place during course meetings in exchange for actual course instruction.

Availability of time, Ely's (1976) fourth Condition of Change, means that users need ample time to learn about and adapt an innovation to their context. Study findings showed that in general the availability of time is an issue for ePortfolio implementers, as they give up time in other areas (e.g. research and/or teaching) in order to learn about ePortfolios and execute effective implementation.

Rewards and/or incentives. Study findings revealed that ePortfolio implementers think that rewards and/or incentives are important to the implementation process. However, external rewards and/or incentives, Ely's (1976) fifth Condition for Change, were found to be lacking by study participants. While rewards do exist for ePortfolio implementation in one or two departments at the university, they are not widespread across campus.

Research question three. What features of diffusion of innovation theory should be included in an ePortfolio adoption framework?

Through findings from survey and interview data, six key components were identified as that are vital to the successful adoption of ePortfolios by faculty. These are awareness,

motivation, commitment, resources, leadership, and evaluation. These components, not only address what was found to be important to study faculty and administrators but also reflects elements identified as essential by Rogers and Ely. These components will be described in detail in Chapter Five. The ePortfolio implementation framework that was created to support faculty implementers will also be presented.

CHAPTER 5

EPORTFOLIO ADOPTION FRAMEWORK

Based on the findings from survey and interview data collected from faculty and administrators who have implemented or attempted to implement ePortfolios at a large United States research university, a framework for implementing ePortfolios was created. After expert review by three external DOI experts, suggestions were then analyzed and incorporated into a revised framework. This chapter describes the original framework, the expert review of the original framework, and the revised framework in detail. Any study participant quotes in this chapter are included to help tell the story of the framework built and are not intended to represent a comprehensive reporting of study findings, which was presented in Chapter Four.

Original Framework

The framework developed is meant to support those implementing, or attempting to implement, ePortfolios in a higher education context by guiding them through key attributes of systemic innovation in a practical and applied manner. First, six essential components were identified and defined through both the DOI literature, specifically Rogers (2003) and Ely (1976), and study findings. The framework was then assembled to include these components: awareness, motivation, commitment, resources, leadership, and evaluation in a modular format (see Figure 1).

*Figure 1.*Original Framework Components

Awareness is defined as the professional knowledge of the pedagogical benefits of ePortfolios. The Awareness component reflects Rogers' (2003) knowledge stage in his Stages of Adoption model and Ely's (1976) dissatisfaction with the status quo and sufficient knowledge and skills conditions in his Conditions for Change model. A comment from Professor Adams, Instructor, connects to the Awareness component:

> Prior to [ePortfolios], we were doing [artifact creation and collection] in different areas. We had a piece here, a piece here, and we were trying to teach the [students] a

methodology of developing themselves, but in addition to that, "how can I prepare myself for finding a job."

The motivation component is defined as the identification and/or presence of intrinsic and extrinsic incentives for using ePortfolios. The Motivation component reflects Rogers' (2003) persuasion stage in his Stages of Adoption and Ely's (1976) conditions for rewards or incentives and dissatisfaction with the status quo conditions in his Conditions for Change. A remark by Professor Johnson, is indicative of the motivation component:

> Because again, you've got a portfolio [this] thick for every student in the department and even though we've only got, you know we were graduating at that point 20 to 25 students a year, but 20 or 25 students a year was three quarters of a drawer and after 10 years we had … a lot of records and so … We were very eager to see the e-portfolio and we participated in that from the very beginning.

Commitment is defined as the decision, as a result of value recognition, to implement ePortfolios. The commitment component reflects Rogers' (2003) decision stage in his Stages of Adoption and Ely's (1976) participation and commitment conditions in his Conditions for Change. The need for commitment was also evident through study data, specifically in the themes identified as involvement and technology satisfaction. As Associate Professor Lewis, remarked, "We all need to be aligned in the goals of the ePortfolio… there's a lot of moving parts, and a lot of people need to be on board for it to work."

The Resources component is defined as identified resources to assist in ePortfolio implementation. This component reflects Rogers' (2003) implementation stage in his Stages of Adoption and Ely's (1976) sufficient knowledge and skills, availability of time, and availability of resources conditions in his Conditions for Change. The Resources component is also informed

by study findings, specifically in the theme of resources allocation. As Professor Clark, Administrator, commented,

> We ran into a whole lot of resource issues, no one had the time to work on it even though we had leadership buy-in. Resources were not provided to back it up even though I think they were interested in it. They felt overwhelmed all the time… Finally after post-award matrix was working and functional, they realized it was a great benefit for that side, so they started to find resources and experts to help develop it.

Leadership is defined as the necessary leadership support in place to sustain use of ePortfolios. This component reflects Ely's (1976) leadership condition in his Conditions for Change. The Leadership component was also evidenced through the involvement theme in study findings. As Professor Johnson, remarked,

> I think the answer to that is you need to make sure that the faculty are aware of the opportunity and how easy it to use right from the beginning. I do not see much information coming across my desk anymore that says, "Hey we have this cool tool, why don't you try it?"

Evaluation is defined as the data-based examination of ePortfolio use for improvements future iteration. This framework component reflects Roger's (2003) stages of implementation and confirmation and is also reflective of the need for systemic evaluation documented in study findings. As one survey respondent remarked,

> I think evaluation is very important. Evaluation results need to be communicated and added upon in order for them to be enablers. I think if evaluations are done in a solitary way and not acted upon, I am not sure how helpful they are.

After the six essential components were identified, and arranged, more work was done to expand the framework into a usable tool (see Appendix L). The intention was to enable anyone considering implementing ePortfolios, or already in the process of implementation, to use it to assess the workgroup's current status in the implementation process, as well as critical next steps. In addition to defining each component, guidance in the following areas was provided for each component: "Selected Strategies to Support Component"; "Key Player Involvement"; "Assessment of Current Implementation Status"; and, "Next Steps for Implementation Efforts." The "Selected Strategies to Support Component" column provided a noncomprehensive list of strategies to enact each component. The "Key Player Involvement" column provided key stakeholders that can influence the progress on that component. A rating scale was also provided for users in the "Assessment of Current Implementation Status" column to assess where this workgroup is in regards to each component and identify next steps to focus on in the implementation process. For example, a rating of one would identify a component as a major priority in planning efforts, whereas a three would indicate the component is of low priority. Through such a quick check, action planning provided in the "Next steps for Implementation Efforts" column could then be based on top priorities.

Review of the Framework

Once the original framework was created, an email (see Appendix L) requesting participation of three expert reviewers was sent. This email introduced the researcher; the purpose and nature of the study; a background of the study; anticipated timeline, and asked for voluntary participation.

Three expert reviewers agreed to participate in the evaluation of the framework. They were as follows: Dr. Roberto Joseph, Director of Educational Technology Programs and Associate Professor of Teaching, Literacy, and Leadership at Hofstra University; Dr. C. Edward

Watson, Director of the Center for Teaching and Learning at the University of Georgia; and, Dr. Stephanie L. Moore, Assistant Professor of Instructional Technology at the University of Virginia.

After an expert reviewer agreed to evaluate the framework, an expert reviewer packet (see Appendix M) was sent to the reviewer. This packet included an email that gave more detailed information about the study, a copy of Chapter Four, and the original framework. In addition, a link to the framework rubric (see Appendix N) was included in the email. The framework rubric was administrated through VT's instance of Qualtrics, an online survey tool, and contained 30 questions.

The expert reviewers who consented to the review process were asked to complete their independent reviews of the framework within two weeks. Two of the three expert reviewers were unable to complete the review within the two-week period, and more time was allotted for to each of them. After two follow-up emails, the reviewers completed the process within the minimum time available, 38 days.

The framework evaluation rubric consisted of 30 questions and was divided into seven sections as follows: Awareness, Motivation, Commitment, Resources, Leadership, Evaluation, and Overall Impressions. Each section contained three close-ended questions about that particular component and one open-ended question. Each close-ended question had a possible value between one and six (1=strongly agree, 2=agree, 3=disagree, 4=strongly agree). Expert reviewer feedback was analyzed and incorporated into a revised ePortfolio adoption framework (See Appendix S). The details of reviewer feedback (see Appendix T), including the strengths and opportunities for improvement of the original framework, are discussed below.

Expert reviewer feedback. During the review, each component of the framework was presented to the expert reviewers with close-ended questions related specifically to each given component. These closed-ended questions explored each component in relation to each framework column (Selected Strategies to Support Component, Key Player Involvement, Assessment of Current Implementation Status, Next Steps for Implementation Efforts).

Strengths of the framework. During their evaluation of the framework, the reviewers pointed out several strengths offered by the framework. Noteworthy strengths are discussed the below.

The first reviewer suggested that the framework would be a tool that could be used by institutions new to ePortfolios, stating, "For institutions new to ePortfolio, this framework will provide much needed guidance and systematic recommendations for moving an adoption campaign forward." The second reviewer also felt that the framework could be helpful for implementing ePortfolios, stating, "The framework provides a guidance process for implementing and sustaining ePortfolios in higher education." This reviewer also felt that the framework had "great potential and practical use in the field." The third reviewer found the framework to be aligned well with DOI theory, and also found it to be flexible and user-friendly. In addition, the rating system provided in the framework, which allows users to identify their current implementation status and identify appropriate next steps for implementation, was found to be beneficial for allowing users to track their implementation efforts over time.

Generally all three expert reviewers judged the framework positively with strong agreement that the framework aligned well with DOI theory and would likely be useful for the intended audience.

Opportunities for improvement to the framework. The expert reviewers, through open-ended questions at the end of each component area of the expert review rubric, identified several opportunities for improvement to the framework. These opportunities were analyzed across components, taken into consideration, and the decision to implement them or not is discussed below.

Introduction to the framework. Reviewer comments suggested that the intent and use of the framework required clarification. In order to clarify the intention of the framework information expanding on the general purpose of the framework was added to the descriptive pages of the framework. This new information stated explicitly that the framework was built so that it could be used in any higher education setting.

Reviewer comments suggested that the intent of the rating scale was not clear. Instead of providing for a formal assessment of the workgroup's implementation process, this rating scale was intended as a way to take an "informal pulse" of the workgroup's current status. Thus, more information regarding the rating scale was also added to the descriptive pages of the framework in order to clarify this purpose. In addition, the column titled "Assessment of Current Implementation Status" for each component was changed to "Rating of Current Implementation Status" to take the focus off of the word "assessment" which has a specific meaning in higher education.

Awareness. The reviewers agreed that the Awareness component included appropriate selected strategies, accurate key stakeholders, and next steps for implementation. For each question relating to this component, reviewers answered strongly agree or agree. Suggestions in the open-ended question for this component were also made, and the inclusion or exclusion of these suggestions are discussed below.

First, Reviewer One mentioned that the audience of the framework is unclear and that there are three areas in the framework document that seem to suggest that this model could be appropriate to a variety of audiences. The researcher, however, does not explicitly identify the intended audience of the framework on purpose. This was done in order to keep the framework flexible to support those implementing, or attempting to implement, ePortfolios in a higher education context, whether the audience is a group of faculty members, a department, or a university-wide implementation committee. So, now change was made to further specify the audience.

Second, suggestions were made for additions and revisions to "Key Player Involvement" in the Awareness component. Reviewer One suggested that a Provost could be influential to the implementation process. This suggestion was added to the framework. Reviewer Two suggested that the "faculty computing support department can be instrumental in showing faculty what is possible." This suggestion, while helpful, was believed to be less relevant to the Awareness component, since this component focuses on awareness of professional knowledge with regards to the pedagogical benefits of ePortfolios.

Reviewer Three suggested that listing a stakeholder as "other high-level respected opinion leaders" in the "Key Player Involvement" column was too generic because these leaders would be instrumental to the Awareness component. The researcher's intention was that all stakeholders listed were high-level respected opinion leaders. To clarify this intent, the column content was rewritten as: "Identified high-level opinion leaders including but not limited to:" and existing suggestions (Academic leaders on campus [e.g. provost, teaching and learning directors], Leading ePortfolio scholars and practitioners, Local faculty innovators). were moved to be included under this new label

Finally, Reviewer One also suggested that "Next Steps for Implementation Efforts" for the Awareness component would vary significantly based on the workgroup using the framework. This may be true however, no alterations to vary these steps were made in order to keep the framework flexible enough to meet the needs of any workgroup using it.

Motivation. The Motivation component also received strong marks from reviewers. All agreed that the Motivation component included appropriate selected strategies, accurate key stakeholders and next steps for implementation. For each question relating to this component, reviewers answered strongly agree or agree. Suggestions in the open-ended question for this component were also made, and the inclusion or exclusion of these suggestions are discussed below.

Reviewer One suggested that the communication channel language used in the Motivation component be used across the framework. Upon reflection, no change was made. The researcher judged this language to be most appropriate to the Awareness component only.

Reviewer Two suggested that a central motivation for ePortfolio implementation would be to satisfy accreditation requirements and that this motivation should be included in the framework. Accreditation fulfillment is included in the original framework under the "Selected Strategies to Support Component" column. Reviewer Two inquired about adding those resistant to technology and opinion leaders as key players under motivation. While those resistant to technology must be included in the adoption process, they are not key players in leading Motivational aspects of the process. Opinion leaders are more vital to other aspects of the process, such as Awareness. Thus no changes were made.

Finally, Reviewer Three suggested that involvement of the faculty itself could be considered an incentive. The researcher agrees and views the use of the framework itself as the

way to faculty involvement. This reviewer's final suggestion was the need to be more explicit on how to "assess current status" more clearly. As previously mentioned, the intention of this column was a rating system to provide users a quick check of their current implementation status, so this column's title for each component in the framework was renamed "Rating of Current Implementation Status" to take the focus off of formal assessment.

Commitment. Overall, reviewers also agreed that the framework component Commitment was useful and reflective of DOI theory. Each selected agree or strongly agree that this component included the appropriate selected strategies and key stakeholders. However, one reviewer selected disagree for the appropriateness of the next steps for implementation. Suggestions in the open-ended question for this component were also made, and the inclusion or exclusion of these suggestions are discussed below.

Reviewer One suggested that the recommendations in the "Next Steps for Implementation" for this component might not represent an accurate timeline given how quickly technology can change. Altering this to a one- to two-year timeline was suggested. While the researcher appreciates this point, it was decided that such an adjustment could be made by and individual group using the framework.

Reviewer Two suggested that the academic provost should be included in the "Key Player Involvement" column. While the researcher felt that "academic unit decision makers" included the provost, the researcher is aware that some institutions may use differing terms. In order to be more explicit, this element was altered to "provost and/or academic unit decision makers". This change was made throughout the entire framework wherever the original text appeared.

Resources. When evaluating the Resources component of the framework, all expert reviewers agreed or strongly agreed that the component included the appropriate selected strategies and key stakeholders. However, one reviewer responded with disagree regarding the appropriateness of the next steps for implementation. Reviewers also made suggestions in the open-ended question for this component, and the inclusion or exclusion of these suggestions are discussed below.

Reviewer One suggested that journals and articles related to ePortfolios be added to the "Selected Strategies to Support Component" column. The researcher believed that these selected strategies were already represented through professional memberships. Reviewer One also suggested that high-level administrators should be listed as key players. After careful consideration, the researcher decided to exclude this recommendation, as higher-level administrators, while probably still involved within the initiative, were not a key player for the Resources component.

Reviewer Three suggested that Rogers' (2003) element of time should be addressed within the resources component. While the resource of time was addressed in the motivation component as an incentive, the researcher understands that some incentives can also be viewed as resources. Thus, a reminder to ensure available resources, including incentives, was added to the "Next Steps for Implementation Efforts" column. This reviewer also recommended that an opportunity to explore the reasons as to why faculty are not using resources available to them, instead of assuming that awareness or access to the resources are the only issues. A bullet to address this area of concern was added to the "Next Steps for Implementation Efforts" column.

Leadership. The Leadership component was found acceptable by the expert reviewers in the areas of key stakeholders and next steps for implementation. However, two reviewers

answered disagree for the appropriateness of selected strategies and one reviewer answered disagree for the appropriateness of key players. Reviewers made suggestions in the open-ended question for this component to remedy the appropriateness this framework component, and the inclusion or exclusion of these suggestions are discussed below.

Reviewer One and Reviewer Three suggested that the "Key Player Involvement" column of this component should include various university leaders. As mentioned previously, "academic unit decision makers" was altered to "provost and/or academic unit decision makers" to address this concern.

Evaluation. The Evaluation component was found to be acceptable by the expert reviewers in the areas of key stakeholders and next steps for implementation. However, one reviewer responded with disagree for the appropriateness of selected strategies. Reviewers also made suggestions in the open-ended question for this component, and the inclusion or exclusion of these suggestions are discussed below.

Reviewer One and Reviewer Three suggested that the strategies to collect evaluation data should go beyond survey and interview data. To address this suggestion, the text "other data collection options" was added in the "Selected Strategies to Support Component" column of the framework.

Reviewer Three also suggested that faculty should be added to the "Key Player Involvement" column, and this change was made. Lastly, incorporating faculty involvement in the evaluation process was also suggested, and this improvement is reflected in the "Next Steps for Implementation Efforts" column.

Revised Framework

In addition to the changes made as a result of expert reviewer suggestions, the researcher felt that the "Key Player Involvement" column title could be improved. Therefore, this column was renamed "Key Stakeholder Involvement." Through the incorporation of feedback from expert review, a revised framework was created (see Appendix S).

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

This chapter provides a summary of the study while also providing the limitations of the study, the study's contributions to the field of instructional design and technology, as well as recommendations for future research, practice, and researchers.

Summary of the Study

The purpose of this study was to develop a framework for supporting the adoption of ePortfolios by collecting data from faculty and administrators on an undocumented adoption process at a large research university. In order to accomplish this purpose, the study employed a Type 2 developmental research design with three stages: analysis, development and evaluation, and revision (Richey & Klein, 2007). During the analysis phase, survey and interview data were analyzed in light of the research questions and DOI literature. During the development and evaluation phase, a framework was developed based on data analysis and key aspects of DOI theory. A rubric for use in the DOI expert reviews was also developed. During the revision phase, feedback from three expert reviewers was analyzed and incorporated into a revised framework. During the instructional design process, subject matter experts are often consulted in order to ensure that materials and/or content meet the needs and expectations of the intended audience (Dick, Carey, & Carey, 2005). The subject matter experts consulted during this study were DOI theory experts who have experience in higher education, some with ePortfolios. These experts were consulted to ensure the framework's alignment with DOI theory and the applicability with higher education faculty and staff.

It is anticipated that university faculty, staff, and administrators will be able to use the final framework to assist in the adoption of ePortfolios for the purposes of assessment, professional development, and/or demonstration of learning.

Study Limitations

The setting of the study, a large higher education institution with certain ePortfolio resources in place, could be viewed as a study limitation. While the researcher strove to ensure that the framework would be adaptable to any higher education setting, survey and interview findings may have been different if this study had been conducted in a different setting, for example, a smaller institution with different ePortfolio technologies at hand . In addition, the findings of this study may not be useful outside of a higher education context. Recommendations to address this issue are discussed later in this chapter.

In addition to the study setting, the study timeline may have also been a limitation. Having more time available to pursue expert reviewer agreement for evaluation of the framework, as well as a more flexible timeline for expert feedback collection and incorporation, may have also been beneficial to the study. This would have allowed for greater reflection on the framework from the expert reviewers as well as the researcher.

Contributions of the Study

As higher education institutions are increasing their use of instructional technologies to support teaching and learning, barriers to their adoption, integration and sustainment arise (Surry, 2002). Current ePortfolio implementation efforts differ in higher education and can take place in varying scalability, spanning use on a small scale in individual courses or programs to a large scale at an institutional level. Depending on a university's approach to implementation, this varying scalability can even be seen within the same institution.

As assessment has become central to educational reform (Baker, 2001), the new demands for testing to demonstrate a learner's ability to recall facts, think critically, and apply their knowledge to other contexts has exposed the pitfalls of traditional high-stakes testing (Maki, 2009; Wolf, et al., 1991). In order to address this need, the use of ePortfolios has increased within higher education contexts (Chatterji, 2003; Michelson & Mandell, 2004; Watson & Doolittle, 2011).

As the use of ePortfolios has increased, so has the need to effectively implement them. Similar to any other innovation, ePortfolios are subject to the challenges of institution-wide technology adoption. Applying DOI theory, in this case Rogers (2003) and Ely (1976, 1999), as well as faculty insights, to implementation can support successful use (Surry, 2002). The literature review, survey, and interview findings from this study were used to create a framework for ePortfolio adoption. This framework can be utilized to guide the initial or continued adoption process for ePortfolios in higher education courses, programs or institutions. The use of the framework clarifies the implementation process to users, informing them of the necessary steps and key stakeholders needed in order to successfully implement ePortfolios.

This study also adds to the body of knowledge on the methodology of development research, serving as a model of what this approach can look like in practice. While challenges were met in the deployment of this study related to the methodology, this methodology enabled a practical element to the study, assisting in the creation of a tangible and flexible framework to meet user and institutional needs.

The findings of this study have been and will continue to be disseminated to several different audiences. The original framework was presented at the ePortfolio Identity Conference (ePIC) in July of 2013 in London, United Kingdom, and several audience members expressed

interest in using the final framework. A presentation regarding the revised RIPPLES survey used in this study has been accepted for presentation at Association for Educational Communications and Technology (AECT) in Anaheim, California in November of 2013. This presentation will renew scholarly dialogue regarding enhanced applications of RIPPLES. Finally, the revised framework has been submitted for presentation and is awaiting a decision from the American Educational Research Association (AERA) for the next annual meeting in Philadelphia, Pennsylvania in 2014. If accepted, this presentation will enable further dissemination among scholars.

Recommendations for Further Research

In consideration of the study findings, recommendations for further research emerged. Each of these recommendations, which are discussed below, can assist in learning more about the application of DOI theory to the adoption and implementation of instructional technologies and specifically, to the implementation of ePortfolios.

The first recommendation for further research is to have the framework undergo additional expert review. This further review can strengthen the framework by including the perspectives and knowledge of additional experts, ensuring that the framework has the potential to meet or adapt to user and institutional needs

A second recommendation is pilot testing of the ePortfolio implementation framework. Pilot testing can aid in documenting the effectiveness of the framework within an appropriate context (Dick, Carey, & Carey, 2005). In order to ensure the framework is robust enough for use in different settings, pilot testing should take place in different academic environments, such as a smaller liberal arts university, a community college, or even a K-12 setting.

Results from both additional expert review and pilot testing can then be incorporated into an updated framework. Such additional research would strengthen the framework and add flexibility to its use in various contexts.

Recommendations for Further Practice

This study resulted in four recommendations for practice. The first recommendation is to minimize the barriers that faculty and administrators report as having negative effects technology implementation efforts. The two most detrimental barriers related to ePortfolio adoption at this university are the ePortfolio technology system and the unavailability of time. Faculty and administrators rated both these items as top barriers to the adoption and use of ePortfolios. Continuing to ignore the need to remedy these barriers could lead to further abandonment of the instructional technology (Ely, 1976).

The second recommendation for practice involves mitigating the expense of time and effort for those implementing ePortfolios. Several techniques could be used to do so. The first technique would be to incorporate rewards/incentives for faculty implementing ePortfolios. Extrinsic incentives, such as professional recognition, could be identified and offered in order to reward time and efforts of implementers (Ely, 1976). The second would be to create a course for students for the specific purpose of creating and developing their ePortfolio. This would allow students greater time to learn about the technology and adapt it to their needs (Ely, 1976). Third, the assignment of a graduate assistant or teaching assistant for the purpose of teaching and assisting students with their ePortfolio creation and use could free up time from faculty in order to allow them greater time working with students. Lastly, the use of a peer mentor group could also mitigate the time that would originally be spent by and instructor on assisting students with

ePortfolios while also giving students the opportunity to connect with students with more ePortfolio experience.

The third recommendation, which was brought to the attention of the researcher through expert review, would be to continue to develop the framework along additional aspects of DOI theory. This continued development could, for example, take into account adopter categories (innovators, early adopters, early majority, late majority, and laggards) (Rogers, 2003) and give further depth to the framework, supporting continued use of the framework beyond the initial implementation process to promote saturation of the innovation across community members.

A fourth recommendation, which was also brought to the attention of the researcher through expert review, would be to explore how performance improvement relates to the framework. Performance improvement is defined as measuring a process, by either an individual or an organization, and then modifying that process to increase productivity (Martin, 2008). Performance improvement models and practices provide new opportunities for exploring how the framework for ePortfolio implementation might be improved.

Recommendations for Future Researchers

RIPPLES survey. The use of the RIPPLES (resources, infrastructure, people, policies, learning, evaluation, and support) survey placed limitations on this study. As mentioned in Chapter three, several modifications were made to the survey for use in this study, including aligning the survey with Ely's eight conditions, normalizing the response scale, and adding an opinion area at the end of each RIPPLES section. However, further modifications could be made to the survey. The first modification would be to remove the neutral option from the question response scales, especially since participants also have a don't know/unsure option. Adjusting the length of the survey could also be beneficial, as it became very lengthy after the addition of

opinion questions. Finally, the removal or modification of the RIPPLES acronym from participant view could also be beneficial, as participants seemed to find the terms confusing.

Development research. The employment of the development research methodology posed several issues that delayed the completion of this study. Using this type of research methodology was challenging. Adequate resources on the method were minimal and model studies were inconsistent or often ambiguous. This limitation may be resolved over time as more researchers apply the methodology and resources grow in number and usefulness. While, a comprehensive article written by Richey and Klein (2014) describing 12 development research was just published, this information was not available to the researcher during the design and execution of the study. The revision stage of this study also proved difficult. Expert reviewers who met the selection criteria and could commit to an evaluation of the framework were hard to secure. Even once secured, it was challenging to remit the information in a timely fashion.

Summary of Chapter Six

Implementing a technology within a higher education context is a large, complex process. This process requires long-term and thoughtful coordination of infrastructure, resources, and people. This study offers insight into faculty and administrator perspectives regarding the process, as well as elements of DOI theory, to contribute a framework that can be leveraged to guide and enhance ePortfolio adoption and use.

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Appendix A

Modified RIPPLES Survey Instrument

INTRODUCTION

The objective of this survey* is to identify factors that impact faculty members' and administrators' adoption and use of electronic portfolios with the goal of improving electronic portfolio implementation practices. As a current or former electronic portfolio user, it is vital that we receive your input. All individual responses will remain confidential. Only aggregate results will be reported.

For the purposes of this survey:

An electronic portfolio is defined as a digital container capable of displaying a multitude of artifacts represented by different media that can be created to track learning, serve as an assessment, and/or demonstrate professional development efforts.

An enabler is defined as something that makes an innovation easier to implement.

A barrier is defined as something that makes an innovation harder to implement.

This survey will take only 15-20 minutes to complete. Thank you, in advance, for your participation!

*Survey adapted from: Surry, D. W. (2005). A model for integrating instructional technology into higher education. British Journal of Educational Technology, 36(2), 327-329.

PART ONE: Background

Please supply the following information regarding your experiences and background.

Q1 When did you start using electronic portfolios?

Q2 How long have you been using/did you use electronic portfolios?

Q3 If you have stopped using electronic portfolios, when did you stop and why? (If you are still using electronic portfolios, please answer with N/A.)

Q4 For what purpose(s) are you using/did you use electronic portfolios?

- Tracking Learning
- Assessing Learning
- Supporting Professional Development
- Other (Please Specify.) _____

Q5 What do you/did you like MOST about using electronic portfolios?

Q6 What do you/did you like LEAST about using electronic portfolios?

Q7 What do you perceive as the most important factor(s) influencing faculty adoption and use of electronic portfolios?

PART TWO: Electronic Portfolios at Your University

Please select the response option that best describes your opinion for each of the following statements in each section.

RESOURCES: The next set of statements relate to two resources (money and time) for adopting and using electronic portfolios.

Q8 The resources (money and time) available for adopting electronic portfolios as a technology at your university are at an appropriate level.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q9 The resources (money and time) of your university related to electronic portfolios are allocated in an appropriate way.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q10 The resources (money and time) of your university and the way those resources are allocated act as an enabler to the use of electronic portfolios. (An enabler makes an innovation easier to implement.)

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q11 Resources (money and time) are important to the successful use of a technology innovation, such as electronic portfolios.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q12 Is there anything else you would like to tell me regarding resources (money and time) and their importance to electronic portfolio adoption and use? (For example, if you responded "disagree" or "strongly disagree" to any of the statements in this set, you might use this space to explain your choice.)

INFRASTRUCTURE: The next set of statements relate to the overall technological backbone of an organization, including communication systems, networks, hardware, software, administrative and production facilities.

Q13 The infrastructure of your university is of high quality.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q14 The infrastructure of your university, specifically related to electronic portfolios and their adoption and use, is of high quality.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q15 The infrastructure of your university acts as an enabler to the use of electronic portfolios. (An enabler makes an innovation easier to implement.)

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q16 Infrastructure is important to the successful use of a technology innovation, such as electronic portfolios.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q17 Is there anything else you would like to tell me regarding infrastructure and its importance to electronic portfolio adoption and use? (For example, if you responded "disagree" or "strongly disagree" to any of the statements in this set, you might use this space to explain your choice.)

PEOPLE: The next set of statements relate to the social and human elements of your department or program, including the goals, skills, talents, backgrounds, beliefs, opinions, and feelings.

Q18 The leaders of my department or program consider my opinions, ideas, beliefs, and experiences when making decisions.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q19 The amount of shared decision-making in my department or program, specifically related to the area of electronic portfolios, is high.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q20 The culture of my department or program, specifically shared decision-making and communication, acts as an enabler to the use of electronic portfolios. (An enabler makes an innovation easier to implement.)

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q21 Overall, the importance of shared decision-making and communication among department/program members to the successful adoption and use of electronic portfolios is high.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q22 Is there anything else you would like to tell me regarding people and their importance to electronic portfolio adoption and use? (For example, if you responded "disagree" or "strongly disagree" to any of the statements in this set, you might use this space to explain your choice.)

POLICIES: The next set of statements relates to the written and unwritten rules, practices, traditions, and regulations that govern your department or program's day-to-day operations.

Q23 The policies of my department or program support the necessary and important work that must get done.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q24 Compared to other departments or programs, the policies of my department or program are fluid and easy to modify when necessary.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q25 Overall, the quality of the policies of my department or program, specifically related to the area of electronic portfolio adoption and use, is high.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q26 The policies of my department or program act as an enabler to the adoption and use of electronic portfolios. (An enabler makes an innovation easier to implement.)

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q27 Overall, the importance of appropriate policies to the successful use of a technology innovation, such as electronic portfolios, is high.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q28 Is there anything else you would like to tell me regarding policies and their importance to electronic portfolio adoption and use? (For example, if you responded "disagree" or "strongly disagree" to any of the statements in this set, you might use this space to explain your choice.)

LEARNING: The next set of statements relates to the instructional outcomes of training experiences offered by your university's ePortfolio office.

Q29 The leaders of my university's ePortfolio office consider the educational needs of electronic portfolio adopters (such as myself) when making decisions.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q30 The commitment of my university's ePortfolio office to provide learning experiences to adopters/users of electronic portfolios is high.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q31 My university's ePortfolio office's commitment to relevant learning outcomes for adopters (such as myself) acts as an enabler to the use of electronic portfolios. (An enabler makes an innovation easier to implement.)

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q32 Overall, the importance of institutional commitment to relevant learning outcomes for users to the successful adoption and use of a technology innovation such as electronic portfolios is high.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q33 Is there anything else you would like to tell me regarding adopter/user learning and its importance to electronic portfolio adoption and use? (For example, if you responded "disagree" or "strongly disagree" to any of the statements in this set, you might use this space to explain your choice.)

EVALUATION: The next set of statements relates to the evaluation of important factors (e.g. learner achievement, impact of technology innovation, cost/benefit analysis, etc.) associated with a new program.

Q34 My university's ePortfolio office conducts sufficient evaluations of important factors (e.g. learner achievement, impact of technology innovation, cost/benefit analysis, etc.) related to electronic portfolio adoption and use.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q35 The quality and quantity of evaluations, specifically related to electronic portfolios, at my university are high.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q36 The evaluation of electronic portfolios at my university acts as an enabler to the adoption and use of electronic portfolios. (An enabler makes an innovation easier to implement.)

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q37 Overall, the importance of evaluation to the successful adoption and use of a technology innovation, such as electronic portfolios, is high.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q38 Is there anything else you would like to tell me regarding evaluation and its importance to electronic portfolio adoption and use? (For example, if you responded "disagree" or "strongly disagree" to any of the statements in this set, you might use this space to explain your choice.)

SUPPORT: The next set of statements relates to support including: training, technical support, pedagogical support, and administrative leadership.

Q39 My university's ePortfolio office provides the support necessary for me to implement electronic portfolios effectively.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q40 The support I received in formal and informal training related to implementing electronic portfolios was high quality.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q41 The support I received in applying electronic portfolios to my teaching and learning environment was high quality.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q42 The support I received in administrative leadership in helping me do an effective job implementing electronic portfolios was high quality.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q43 The overall support system of my university's ePortfolio office acts as an enabler to the use of electronic portfolios. (An enabler makes an innovation easier to implement.)

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q44 Overall, the importance of support to the successful adoption and use of a technology innovation, such as electronic portfolios, is high.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don’t Know/Unsure

Q45 Is there anything else you would like to tell me regarding support and its importance to electronic portfolio adoption and use? (For example, if you responded "disagree" or "strongly disagree" to any of the statements in this set, you might use this space to explain your choice.)

OPINION: This next set of questions relate to your opinion about specific enablers and barriers to adopting and implementing electronic portfolios.

Q46 In your opinion, what are the two biggest barriers that prevent users such as yourself from adopting and using electronic portfolios? (A barrier makes an innovation harder to implement.)

Q47 In your opinion, what are the two biggest enablers that make it easier for users such as yourself to adopt and use electronic portfolios? (An enabler makes an innovation easier to implement.)

Q48 If you were in charge of helping faculty at your university with adopting and using electronic portfolios, and you had unlimited resources, how would you do it?

Q49 Please rank the following seven elements regarding the adoption and implementation of electronic portfolios by order of importance (FIRST place being of highest importance, etc.).

(Note: You will need to use your mouse to drag and drop the elements in order to change their order.)

Element	Ranking
Infrastructure (defined as the overall technological backbone of an organization, including communication systems, networks, hardware, software, administrative and production facilities)	
People (defined as the human elements of your department or program, including goals, skills, talents, backgrounds, beliefs, opinions, and feelings)	
Policies (defined as the written and unwritten rules, practices, traditions, and regulations that govern your department or program's day-to-day operations)	
Learning (defined as the instructional outcomes of training experiences offered by Virginia Tech's ePortfolio Initiatives office)	
Evaluation (defined as the evaluation of important factors, such as learner achievement, impact of technology innovation, cost/benefit analysis, associated with a new program)	
Support (includes training, technical support, pedagogical support, and administrative leadership)	

Q50 Is there anything else you'd like to tell me about enablers or barriers to the adoption and use of electronic portfolios?

PART THREE: Demographic Information

Please supply the following information regarding your demographics

Q51 Gender

- Male
- Female

Q52 Age

- 20-29
- 30-39
- 40-49
- 50-59
- 60-69
- 70 or above

Q53 Professional Rank

- Professor
- Associate Professor
- Lecturer
- Adjunct Instructional Faculty (Part-time, Non-Tenure Track
- Assistant Lecturer
- Assistant Lecturer
- Staff Associate
- Administrator
- Other

Q54 Highest Degree Held

- Doctorate
- Masters
- Bachelors
- Other

Appendix B

Permission to Use RIPPLES Survey

Samantha Blevins <sjblevin@vt.edu> Mon, Apr 2, 2012 at 5:24 PM
To: Daniel Surry <dsurry@usouthal.edu>

Dear Dr. Surry

Thank you again for your help over the past few weeks in regards to my search for resources citing your RIPPLES survey.

With your permission, I would like to use your RIPPLES survey during Phase I of my research into learning about the adoption of electronic portfolios in higher education in relation to Diffusion of Innovation theory.

Sincerely
Samantha Blevins
--
Samantha J. Blevins
Virginia Polytechnic Institute and State University
Ph.D Candidate, Instructional Design & Technology
Graduate Assistant, ePortfolio Initiatives, Learning Technologies
LinkedIn - http://www.linkedin.com/pub/samantha-blevins/18/a55/125

Daniel Surry <Dsurry@usouthal.edu> Mon, Apr 2, 2012 at 5:41 PM
To: sjblevin@vt.edu

Sure, you have my permission. Thanks for asking.

Good luck with your study and please let me know if there is anything I can do to help.

Dan

****
Dan Surry
Professor
University of South Alabama, College of Education
UCOM 3800, Mobile, AL 36688
(email) dsurry@usouthal.edu (phone) 251-380-2861 (fax) 251-380-2713
(www) idd.southalabama.edu (Twitter) dsurry
>>> Samantha Blevins <sjblevin@vt.edu> 04/02/12 4:24 PM >>>

Appendix C

Interview Protocol

The following interview questions are for a dissertation study that is exploring faculty and administrator experiences with the electronic portfolio adoption process. The results will be used to develop a framework for supporting the adoption of electronic portfolios. Your responses will be kept completely confidential and you will be offered the opportunity to review the transcription of this interview in order to make any corrections or changes you feel are necessary. This interview will be recorded to ensure accuracy during the transcription process and should take no longer than 30 minutes to complete. Thank you for your participation!

Interview Questions

1. What is the title of your current position?

2. What program are you a part of at the university?

3. How many years have you taught at the college/university level?

4. How long have you been using electronic portfolios?

5. At what level are you using electronic portfolios (i.e. course, program, personal, etc.)?

6. What purposes are you using electronic portfolios for (i.e. learning, assessment, professional development, etc.)?

    a. Please describe your current use of electronic portfolios.

7. Are you still using electronic portfolios and do you intend on using them in the future?

    a. If so, what are the major reasons for continuing their use?

    b. If not, what are the major reasons for discontinuing their use?

    c. Do you have any suggestions on how to make their use more effective?

8. Please describe the process that you or your program went through when making the decision to implement electronic portfolios.

    a. What would you do to improve the process when adopting ePortfolios? Why?

9. You may recall that on the online survey for this study, you were given a question in which you ranked the following items by their importance to you in terms of adopting ePortfolios: resources, infrastructure, people, policies, learning, evaluation, and support.

   a. You ranked _____, _____, and _____ as most important. Please speak to each of these and their importance to your adoption of ePortfolios.

   b. Is there anything else you would like to tell me about the other items that we haven't discussed?

10. Is there anything else you would like to tell me about electronic portfolios and your experiences implementing them?

Appendix D

Internal Review Board Approval Letter

VirginiaTech

Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, VA 24060
540/231-4606 Fax 540/231-0959
email irb@vt.edu
website http://www.irb.vt.edu

MEMORANDUM

DATE: October 17, 2012

TO: Jennifer Mary Brill, Samantha Jane Blevins

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires May 31, 2014)

PROTOCOL TITLE: Electronic Portfolio Adoption: Developing a Framework by Exploring Faculty Perspectives Through the Lens of Diffusion of Innovation Theory

IRB NUMBER: **12-766**

Effective October 17, 2012, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the New Application request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

http://www.irb.vt.edu/pages/responsibilities.htm

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As:	**Expedited, under 45 CFR 46.110 category(ies) 6,7**
Protocol Approval Date:	**October 17, 2012**
Protocol Expiration Date:	**October 16, 2013**
Continuing Review Due Date*:	**October 2, 2013**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Date*	OSP Number	Sponsor	Grant Comparison Conducted?

* Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.

Appendix E

Participation Solicitation Email

Dear Professor _____,

The use of electronic portfolios in courses and academic programs is increasing at Virginia Tech. While several studies have been completed regarding the students' perspective of electronic portfolios, little has been written about the experience of the faculty member and administrator in the adoption and use of electronic portfolios. My purpose in emailing you is to request your participation in a study on the use of electronic portfolios in higher education.

As a user or previous user of electronic portfolios, I would like to invite you to participate in a study that focuses on your experience with electronic portfolio implementation. Your participation in this study is voluntary and confidential. While no compensation is being offered, your input will help develop a framework for electronic portfolio adoption that might one day be used to implement electronic portfolios in higher education academic programs.

To participate, simply click the following Web address: http://tinyurl.com/ePdiffusion
The link will take you to an informed consent document that outlines the details of this study. After reading the document, if you agree to participate, you can click on the "Provide Consent" button at the bottom and you will automatically be taken to the survey. The estimated time to complete the survey is 15-20 minutes. The survey will be available until November 7, 2012 at 5:00 p.m.

At the end of the survey, you will be given the option to identify yourself in order to participate in the second phase of the study, which will consist of a 30-minute interview.

Thank you in advance for your participation.

Sincerely,
Samantha Blevins
--
Samantha J. Blevins
Virginia Polytechnic Institute and State University
Ph.D Candidate, Instructional Design & Technology
Graduate Assistant, ePortfolio Initiatives, Learning Technologies
sjblevin@vt.edu

Appendix F

Informed Consent Form

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Informed Consent for Participants in Research Projects Involving Human Subjects

Title of Project: Electronic Portfolio Adoption: Developing a Framework by Exploring Faculty Perspectives Through the Lens of Diffusion of Innovation Theory

Investigator: Samantha J. Blevins, School of Education, Virginia Tech

Research Advisor: Dr. Jennifer M. Brill, School of Education, Virginia Tech

I. Purpose of this Research/Project
The purpose of this research study is to gather information on faculty and administrator's perspectives of electronic portfolio adoption at Virginia Tech.

II. Procedures
In addition to this form, you will be asked to complete an online survey. At the end of this brief online survey, there is an option to provide your email address in order to allow the researcher to contact you for a personal interview.

III. Risks
There are no anticipated risks to you as a result of participating in this project.

IV. Benefits
Your participation in this study will contribute to research that may influence the design of a framework for electronic portfolio implementation. You may contact the researcher at any time for a summary of the research study results.

V. Extent of Anonymity and Confidentiality
Every effort will be made to ensure your identity in this study will be treated confidentially. Data collected will be kept confidential and only the researchers associated with the project will have access to the data. Information gathered from the project may result in reports, presentations, and articles in professional journals. However, all data will be pooled and published in aggregate form only. In no case will responses from individual participants be identified. Despite every effort to preserve it, there is always a chance that anonymity may be compromised.

VI. Compensation
No compensation is being offered to individuals who participate in this study.

VII. Freedom to Withdraw
You are free to withdraw from this study at any time without penalty. You may withdraw from the study by contacting the researchers (Samantha J. Blevins or Dr. Jennifer Brill) or by

contacting Dr. David Moore, IRB chair. Contact information for these individuals is available at the end of this document.

VIII. Participants Responsibilities

I voluntarily agree to participate in this study. I acknowledge I have the following responsibilities:

- Submit this "Informed Consent" form
- Fill out the survey that follows, and
- Submit it once complete

IX. Participant's Permission

I have read the Informed Consent agreement. I am 18 years of age or older and I have all my questions answered at this time. I hereby acknowledge the above and give my voluntary consent for participation in this project. If I participate, I may withdraw at any time without penalty by contacting one of the people listed below. I indicate my agreement to participate in this study by entering my email address below and clicking "submit".

To participate in this study, please type your Virginia Tech email address in the "email" box below and click the "Submit" button. Use the same email address through the study.

Should you have any questions about this research or its conduct, you may contact any of the following:

Investigator:	Samantha J. Blevins	Phone: 276-233-9590 [sjblevin@vt.edu]
Faculty Advisor:	Jennifer Brill	Phone: 540-231-5587 [jmbrill@vt.edu]
Department Reviewer:	Barbara B. Lockee	Phone: 540-231-5587 [lockeebb@vt.edu]
Chair, IRB:	David M. Moore	Phone: 540-231-4991 [moored@vt.edu]
	Office of Research Compliance, Research and Graduate Studies	

Appendix G

Participation Solicitation Email – 2nd Reminder

Dear Professor _____,

The use of electronic portfolios in courses and academic programs is increasing at Virginia Tech. While several studies have been completed regarding the students' perspective of electronic portfolios, little has been written about the experience of the faculty member and administrator in the adoption and use of electronic portfolios. My purpose in emailing you is to remind you of my request for your participation in a study on the use of electronic portfolios in higher education. If you have already taken the survey, I would like to thank you for taking the time to do so.

As a user or previous user of electronic portfolios, I would like to invite you to participate in a study that focuses on your experience with electronic portfolio implementation. Your participation in this study is voluntary and confidential. While no compensation is being offered, your input will help develop a framework for electronic portfolio adoption that might one day be used to implement electronic portfolios in higher education academic programs.

To participate, simply click the following Web address: http://tinyurl.com/ePdiffusion
The link will take you to an informed consent document that outlines the details of this study. After reading the document, if you agree to participate, you can click on the "Provide Consent" button at the bottom and you will automatically be taken to the survey. The estimated time to complete the survey is 15-20 minutes. The survey will be available until November 20, 2012 at 5:00 p.m.

At the end of the survey, you will be given the option to identify yourself in order to participate in the second phase of the study, which will consist of a 30-minute interview.

Sincerely,
Samantha Blevins
--
Samantha J. Blevins
Virginia Tech
Ph.D Candidate, Instructional Design & Technology
Graduate Assistant, ePortfolio Initiatives, Learning Technologies
sjblevin@vt.edu

Appendix H

Participation Solicitation Email – 3rd Reminder

Dear Professor _____,

Recently, I contacted you to request your participation in an important study on e-portfolio use at Virginia Tech (see below for original email). If you have completed the online survey, I want to thank you for your time and feedback!

If you have NOT completed the survey yet, we need your input! Please complete the survey by December 2, 2012 by clicking on the following link:

http://tinyurl.com/ePdiffusion

Thank you,
Samantha Blevins
--
Samantha J. Blevins
Virginia Tech
Ph.D Candidate, Instructional Design & Technology
Graduate Assistant, ePortfolio Initiatives, Learning Technologies
sjblevin@vt.edu

Appendix I

Participation Solicitation Email – Final Reminder

Dear Professor _____,

This is a friendly, and final, reminder of my request for your participation in my online survey. The survey can be accessed at http://tinyurl.com/ePdiffusion and will close on December 2, 2012 at midnight.

If you have completed the online survey, I want to thank you for your time and feedback!

Samantha
--
Samantha J. Blevins
Virginia Tech
Ph.D Candidate, Instructional Design & Technology
Graduate Assistant, ePortfolio Initiatives, Learning Technologies
sjblevin@vt.edu

Appendix J

Interview Solicitation Email

Dear Professor _____,

Recently you responded to a survey related to a study I am conducting on diffusion of innovation in regards to electronic portfolio adoption. You were also kind enough to agree to an interview by leaving your name and address at the end of the survey.

From those who responded to participate in an interview, you have been selected. If you still agree to be interviewed, please let me know a few convenient days and times for you within the next two weeks. I am willing to meet you in any setting that is convenient to you and would like to complete interviews by the close of business on February 1. In addition, I would also like to know the size of the course(s) or program(s) in which you are/were using electronic portfolios.

Thank you again for your support in my research efforts.

Sincerely

Samantha J. Blevins
Virginia Polytechnic Institute and State University
Ph.D Candidate, Instructional Design & Technology
Graduate Assistant, ePortfolio Initiatives, Learning Technologies
sjblevin@vt.edu

Appendix K

Notification of Non-selection Email

Dear Professor _____,

Recently you responded to a survey related to a study I am conducting on diffusion of innovation in regards to electronic portfolio adoption. You were also kind enough to agree to an interview by leaving your name and address at the end of the survey.

I am writing to let you know that you were not selected from those who volunteered. Thank you again for your support in my research efforts.

Sincerely

Samantha J. Blevins
Virginia Polytechnic Institute and State University
Ph.D Candidate, Instructional Design & Technology
Graduate Assistant, ePortfolio Initiatives, Learning Technologies
sjblevin@vt.edu

Appendix L

E-mail to Diffusion of Innovation Expert Reviewers Requesting Participation

Dear Dr. _____,

As an expert in systemic change, I would like to invite you to evaluate a framework I am developing as part of my dissertation work under the supervision of my advisor, Dr. Jennifer M. Brill (jmbrill@vt.edu), in the Instructional Design and Technology program at Virginia Tech. I estimate that your participation would take no more than 2-4 hours of your time over a two-week time period.

The title of my study is: Electronic Portfolio Adoption: Developing a Framework by Exploring Faculty Perspectives Through the Lens of Diffusion of Innovation Theory. A quick overview of the study is as follows:

- The purpose is to develop a framework for supporting the adoption of electronic portfolios by collecting data from faculty and administrators on the undocumented adoption process at a large research university.
- It is anticipated that university faculty, staff, and administrators will be able to use the framework to assist in the adoption and implementation of electronic portfolios (for a variety of teaching, learning, and professional development purposes).
- The study employs a Type 2 developmental research design with the following stages: analysis, development and evaluation, and revision (Richey & Klein, 2007).
- The evaluation portion of the study requires that the framework be formatively evaluated by an expert for recommendations for improvement.

Should you accept this invitation, I will provide you with electronic copy of the framework itself and a rubric to support the evaluation and feedback process within about 7-10 days.

Dr. Brill felt that your expertise would greatly help me to improve the framework. I hope that you are able to participate.

If you have any questions, please do not hesitate to contact me.

Thank you for considering my request,

Samantha J. Blevins
Virginia Polytechnic Institute and State University
Ph.D Candidate, Instructional Design & Technology
Graduate Assistant, ePortfolio Initiatives, Learning Technologies
sjblevin@vt.edu

Appendix M

Expert Review Packet

Dear Dr. _____,

I would like to thank you for evaluating the framework I am developing as part of my dissertation work under the supervision of my advisor, Dr. Jennifer M. Brill (jmbrill@vt.edu), in the Instructional Design and Technology program at Virginia Tech.

The title of my study is: Electronic Portfolio Adoption: Developing a Framework by Exploring Faculty Perspectives Through the Lens of Diffusion of Innovation Theory. A quick overview of the study is as follows:

- The purpose is to develop a framework for supporting the adoption of electronic portfolios by collecting survey and interview data from faculty and administrators on the undocumented adoption process at a large research university.
- It is anticipated that university faculty, staff, and administrators will be able to use the framework to assist in the adoption and implementation of electronic portfolios (for a variety of teaching, learning, and professional development purposes).
- The study employs a Type 2 developmental research design with the following stages: analysis, development and evaluation, and revision (Richey & Klein, 2007).
- The evaluation portion of the study requires that the framework be formatively evaluated by an expert for recommendations for improvement.

The framework I have built is attached. As supplemental material, I have also attached a draft of Chapter 4 of my dissertation.

I have also created a rubric for your use in evaluating the framework. The rubric can be accessed and submitted through the following link:
https://virginiatech.qualtrics.com/SE/?SID=SV_b73X8H5IRxoOCmp

I estimate that your participation would take no more than 2-4 hours of your time. Please ensure your response is received by 5:00 p.m. on _____.

If you have any questions, please do not hesitate to contact me.

Thank you again,

Samantha J. Blevins
Virginia Polytechnic Institute and State University
Ph.D Candidate, Instructional Design & Technology
sjblevin@vt.edu

A Framework to Support Electronic Portfolio Implementation in Higher Education Contexts

Introduction to the Framework

Based on survey data and interviews conducted with faculty and administrators who have implemented electronic portfolios (ePortfolios) at a large research university in the United States and improved upon by suggestions from three expert reviewers, the following framework for implementing ePortfolios was created (see Figure 1). The framework is meant to support those implementing, or attempting to implement, ePortfolios in a higher education context by guiding them through key attributes of systemic innovation in a practical and applied manner.

Figure 1. Overview of the framework for implementing ePortfolios in a higher education context.

The framework is divided into six components that are vital to the successful implementation of ePortfolios by faculty over time. These components (Awareness, Motivation, Commitment, Resources, Leadership, and Evaluation) reflect important diffusion of innovation elements put forth by Everett M. Rogers and Donald P. Ely, prominent scholars in systemic change. Awareness is defined as professional knowledge of the pedagogical benefits of ePortfolios and corresponds with Roger's element of knowledge as well as Ely's condition of dissatisfaction with the status quo. Motivation is defined as the identification and/or presence of intrinsic and/or extrinsic incentives for using ePortfolios and corresponds with Roger's element of persuasion as well as Ely's conditions of dissatisfaction with the status quo and rewards or incentives. Commitment is defined as the decision, as a result of value recognition, to implement ePortfolios and corresponds with Roger's element of decision as well as Ely's conditions of participation and commitment. Resources is defined as identified resources to assist in ePortfolio implementation and corresponds with Roger's element of implementation as well as Ely's conditions of sufficient knowledge and skills, availability of time, and availability of resources. Leadership is defined as the necessary leadership supports in place to sustain use of ePortfolios and corresponds with Roger's element of implementation as well as Ely's conditions of leadership. Evaluation is defined as the data-based examination of ePortfolio use to inform improvements to future iterations and corresponds with Roger's element of confirmation.

The framework was built with the intention to enable anyone considering implementing portfolios or already in the process of implementation to use it to assess the organization's current status in the implementation process, as well as critical next steps. The framework is intended as modular, meaning that the components can be considered in any order as needed. In addition to defining each component, a noncomprehensive list of strategies to enact each

component, as well as key stakeholders that can influence the progress on that component are provided. A scale is also provided for users to assess where the organization is in regards to each component and identify next steps to focus on in the implementation process. For example, a rating of one would identify a component as a major priority in planning efforts, whereas a three would indicate the component is of low priority. Through such a quick check, action planning (see pages 10-11) can then be based in top priorities.

Electronic Portfolio Implementation Framework

Component	Selected Strategies to Support Component	Key Player Involvement	Assessment of Current Implementation Status	Next Steps for Implementation Efforts
 Professional knowledge of the pedagogical benefits of electronic portfolios	• Websites • Newsletters • Articles • Presentations • Professional development	• Academic leaders on campus (e.g. provost, teaching and learning directors) • Leading electronic portfolio scholars and practitioners • Local faculty innovators • Other high-level, respected opinion leaders	1. Faculty are unaware of the pedagogical value of electronic portfolios. 2. Faculty are somewhat aware of the pedagogical value of electronic portfolios. 3. Faculty are very aware of the pedagogical value of electronic portfolios.	Rating of 1 or 2 • Identify multiple avenues for electronic portfolio awareness building. • Plan a 3-6 month awareness building campaign. • Reassess awareness status after one to two academic years. Rating of 3 • Reassess awareness status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

Component	Selected Strategies to Support Component	Key Player Involvement	Assessment of Current Implementation Status	Next Steps for Implementation Efforts

Motivation
 	
Identification and/or presence of intrinsic and extrinsic incentives for electronic portfolio use
	• Learner incentives
	  ○ Hands-on, applied projects
	  ○ Alternative assessment opportunities
	  ○ Showcases and/or competitions
	  ○ Job seeking resource
	• Faculty incentives
	  ○ Departmental awards
	  ○ Accreditation fulfillment
	  ○ Teaching release time for development
	  ○ Grants and monetary incentives
	• Communication channels (awareness campaign, professional development sessions)
		• Academic unit decision makers
		• Electronic portfolio advocates
		• Faculty innovators
		• Student innovators
			1. Faculty are unaware of the intrinsic and extrinsic incentives for using electronic portfolios.
			
			2. Faculty are somewhat aware of the intrinsic and extrinsic incentives for using electronic portfolios.
			
			3. Faculty are very aware of the intrinsic and extrinsic incentives for using electronic portfolios.
				Rating of 1 or 2
				• Identify appropriate and realistic complement of learner and faculty incentives.
				• Use communication channels to convey incentives.
				• Showcase examples of student electronic portfolios that are relatable and convey incentives.
				• Reassess motivation status after one to two academic years.
				
				Rating of 3
				• Reassess motivation status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

Component	Selected Strategies to Support Component	Key Player Involvement	Assessment of Current Implementation Status	Next Steps for Implementation Efforts
 The decision, as a result of value recognition, to implement electronic portfolios	• Faculty acknowledgements and rewards for initial investments of time and effort • Exemplar electronic portfolios as models • Dedicated ePortfolio staff/office • Inclusion in strategic plan	• Academic unit decision makers • Electronic portfolio professional staff • Faculty leadership team	1. Faculty are not committed to the use of electronic portfolios. 2. Faculty are somewhat committed to the use of electronic portfolios. 3. Faculty are very committed to the use of electronic portfolios.	Rating of 1 or 2 • Identify a faculty leader by department or program, to establish and direct a regular schedule of work meetings regarding electronic portfolio implementation. • Reward faculty for initial time and effort. • After defining the direction of the initiative, involve technology service providers and ePortfolio staff in conversation with the faculty team to ensure potential: o technology solutions are feasible. o ePortfolio platforms are feasible and will support the features of desired models. • Reassess commitment status after one to two academic years. Rating of 3 • Reassess commitment status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

Component	Selected Strategies to Support Component	Key Player Involvement	Assessment of Current Implementation Status	Next Steps for Implementation Efforts
 Identified resources to assist in electronic portfolio implementation	• Targeted in-house professional development activities • Dedicated Technology support • Dedicated Pedagogy support • Professional ePortfolio organizations (AAEEBL, ePIC, EPAC) and associated resources	• In-house professional development service providers (ePortfolio, technologies, pedagogy) • Faculty innovators • Graduate assistants • External electronic portfolio professional organizations, conferences, and/or journals	1. Faculty are unaware of the resources available to assist in their implementation of electronic portfolios. 2. Faculty are somewhat aware of the resources available to assist in their implementation of electronic portfolios. 3. Faculty are very aware of the resources available to assist in their implementation of electronic portfolios.	Rating of 1 or 2 • Use communication channels (awareness campaign, professional development sessions) to convey available resources • Ensure that available resources are accessible to faculty in light of location and timing. • Reassess resources status after one to two academic years. Rating of 3 • Reassess resources status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

Component	Selected Strategies to Support Component	Key Player Involvement	Assessment of Current Implementation Status	Next Steps for Implementation Efforts
 The necessary leadership support in place to sustain use of electronic portfolios	• Ongoing professional development and recognition through communication channels (websites, newsletters, showcases, and presentations) • Inclusion in strategic plan	• Electronic portfolio professional staff • Contact staff for technology and pedagogy supports • Academic unit decision makers • Faculty champions	1. Faculty do not have the leadership support needed to sustain their use of electronic portfolios. 2. Faculty somewhat have the leadership support needed to sustain their use of electronic portfolios. 3. Faculty have the leadership support needed to sustain their use of electronic portfolios.	Rating of 1 or 2 • Align electronic portfolio initiative with strategic plan goals. • Recognize faculty and student electronic portfolio work. • Develop new initiatives for enhancing and highlighting ongoing ePortfolio work. • Reassess leadership status after one to two academic years. Rating of 3 • Reassess leadership status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

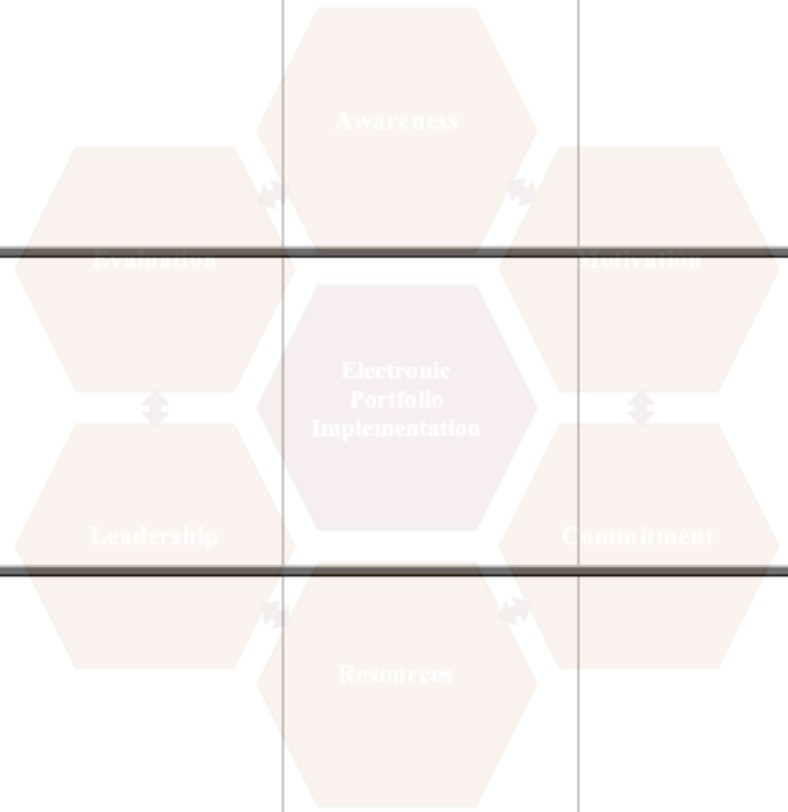
Component	Selected Strategies to Support Component	Key Player Involvement	Assessment of Current Implementation Status	Next Steps for Implementation Efforts
 The data-based examination of electronic portfolio use for improvements to future iterations	• Gather student, faculty, and/or potential employer feedback through survey or interview	• Electronic portfolio professional staff • In-house evaluation resources service provider	1. Faculty are unaware of the evaluation activities and outcomes related to the implementation of electronic portfolios. 2. Faculty are somewhat aware of the evaluation activities and outcomes related to the implementation of electronic portfolios. 3. Faculty are very aware of the evaluation activities and outcomes related to the implementation of electronic portfolios.	Rating of 1 or 2 • Electronic portfolio staff and evaluation staff plan for and implement an electronic portfolio evaluation • Use evaluation findings to improve the next phase of ePortfolio implementation • Reassess evaluation status after one to two academic years. Rating of 3 • Reassess evaluation status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

Electronic Portfolio Implementation Framework

Action Plan

Component	Current Implementation Rating	Next Steps	Key Players to Involve	Target Completion Date(s)	Additional Notes
Awareness	☐1 ☐2 ☐3				
Motivation	☐1 ☐2 ☐3				
Commitment	☐1 ☐2 ☐3				

Component	Current Implementation Rating	Next Steps	Key Players to Involve	Target Completion Date(s)	Additional Notes
Resources	☐1 ☐2 ☐3				
Leadership	☐1 ☐2 ☐3				
Evaluation	☐1 ☐2 ☐3				



Appendix N

Rubric for Evaluation of Electronic Portfolio Framework

Submitted to Expert Reviewers

Reviewer Name:

AWARENESS: Professional knowledge of the pedagogical benefits of electronic portfolios

Q1 The selected strategies given for Awareness are appropriate in number and kind.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q2 The key players involved in Awareness are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q3 The next steps for implementation efforts for Awareness are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q4 Please leave any comments you have for the Awareness component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)

MOTIVATION: Identification and/or presence of intrinsic and extrinsic incentives for electronic portfolio use.

Q5 The selected strategies given for Motivation are appropriate in number and kind.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q6 The key players involved in Motivation are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q7 The next steps for implementation efforts for Motivation are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q8 Please leave any comments you have for the Motivation component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)

COMMITMENT: The decision, as a result of value recognition, to implement electronic portfolios.

Q9 The examples given for commitment are appropriate in number and kind.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q10 The key players involved in Commitment are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q11 The next steps for implementation efforts for Commitment are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q12 Please leave any comments you have for the Commitment component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)

RESOURCES: Identified resources to assist in electronic portfolio implementation.

Q13 The examples given for Resources are appropriate in number and kind.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q14 The key players involved in Resources are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q15 The next steps for implementation efforts for Resources are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q16 Please leave any comments and/or feedback you have for the Resources component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)

LEADERSHIP: The necessary leadership support in place to sustain use of electronic portfolios.

Q17 The selected strategies given for Leadership are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q18 The key players involved in Leadership are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q19 The next steps for implementation efforts for Leadership are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q20 Please leave any comments you have for the Leadership component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)

EVALUATION: The data-based examination of improvements to future iterations.

Q21 The selected strategies given for Evaluation are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q22 The key players involved in Evaluation are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q23 The next steps for implementation efforts for Evaluation are appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q24 Please leave any comments you have for the Evaluation element in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)

Q25 The rating system (status of 1, 2, or 3) for assessing the organization's implementation efforts related to each framework component is appropriate.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

In addition to survey and interview data, DOI theory was used to inform the building of this framework. For example, it is thought that certain DOI theoretical elements connect as follows:

DOI Element	**Framework Component**
Knowledge of Innovation Dissatisfaction with the Status Quo	Awareness
Persuasion Dissatisfaction with the Status Quo Rewards and/or Incentives	Motivation
Decision Participation Commitment	Commitment
Implementation Sufficient Knowledge and Skills Availability of Time Availability of Resources	Resources
Implementation Leadership	Leadership
Confirmation	Evaluation

Please respond to the next two items particularly in light of your knowledge of DOI theory:

Q26 The framework aligns well with important DOI theory elements

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Don't Know/Unsure

Q27 To strengthen the framework's alignment with DOI theory, I recommend the following specific improvements:

Q28 What issues of concern do you foresee with the use of this electronic portfolio implementation framework by higher education faculty?

Q29 What benefits do you foresee with the use of this electronic portfolio implementation framework by higher education faculty?

Q30 Do you have any other comments

Appendix O

Expert Review Email – 2nd Reminder

Dear Dr. _____,

I would like to thank you for agreeing to evaluate the framework I am developing as part of my dissertation work under the supervision of my advisor, Dr. Jennifer M. Brill (jmbrill@vt.edu), in the Instructional Design and Technology program at Virginia Tech.

Last week I emailed you the framework, along with a supplemental draft of Chapter 4 of my dissertation. I have included both in this email as well.

The rubric you can use to evaluate the framework can be accessed and completed through the following link: https://virginiatech.qualtrics.com/SE/?SID=SV_b73X8H5IRxoOCmp

I estimate that your participation will take no more than 2-4 hours of your time. I hope to receive your completed evaluation by Wednesday, July 31 at 5:00 p.m.

If you have any questions or concerns, please do not hesitate to contact me.

Thank you again,

Samantha J. Blevins
Virginia Polytechnic Institute and State University
Ph.D Candidate, Instructional Design & Technology
sjblevin@vt.edu

Appendix P

Expert Review Email – Final Reminder

Dear Dr. _____,

Thank you again for agreeing to review my framework. Neither I nor my advisor, Jennifer M. Brill (jmbrill@vt.edu) have heard from you since _____ when you indicated that you would try to have the review back to me by the deadline of July 31.

Please let me know if there is anything I can do to assist you in your review. Also, could you please be so kind as to email me by Sunday, August 11 with an update on your review status?

Thank you again.

Sincerely,

Samantha J. Blevins
Virginia Polytechnic Institute and State University
Ph.D Candidate, Instructional Design & Technology
sjblevin@vt.edu

Appendix Q

Final Calculations of Mean and Standard Deviation Values by Survey Question

Survey Question	**Mean**	**Standard Deviation**
9. The resources (money and time) available for adopting electronic portfolios as a technology at your university are at an appropriate level.	3.04	1.21
10. The resources (money and time) of your university related to electronic portfolios are allocated in an appropriate way.	3.06	1.17
11. The resources (money and time) of your university and the way those resources are allocated act as anenabler to the use of electronic portfolios. (An enabler makes an innovation easier to implement.)	3.12	1.40
12. Resources (money and time) are important to the successful use of a technology innovation, such as electronic portfolios.	1.50	0.65
14. The infrastructure of your university is of high quality.	2.40	1.18
15. The infrastructure of your university, specifically related to electronic portfolios and their adoption and use, is of high quality.	2.85	1.30
16. The infrastructure of your university acts as an enabler to the use of electronic portfolios. (An enabler makes an innovation easier to implement.)	2.87	1.31
17. Infrastructure is important to the successful use of a technology innovation, such as electronic portfolios.	1.52	0.78
19. The leaders of my department or program consider my opinions, ideas, beliefs, and experiences when making decisions.	2.38	1.31
20. The amount of shared decision-making in my department or program, specifically related to the area of electronic portfolios, is high.	3.20	1.39
21. The culture of my department or program, specifically shared decision-making and communication, acts as an enabler to the use of electronic portfolios. (An enabler makes an innovation easier to implement.)	3.24	1.27
22. Overall, the importance of shared decision-making and communication among department/program members to the successful adoption and use of electronic portfolios is high.	2.81	1.45
24. The policies of my department or program support the necessary and important work that must get done.	2.50	1.25
25. Compared to other departments or programs, the policies of my department or program are fluid and easy to modify when necessary.	3.07	1.23
26. Overall, the quality of the policies of my department or program, specifically related to the area of electronic portfolio adoption and use, is high.	3.26	1.40
27. The policies of my department or program act as an enabler to the adoption and use of electronic portfolios. (An enabler makes an innovation easier to implement.)	3.07	1.33
28. Overall, the importance of appropriate policies to the successful use of a technology innovation, such as electronic portfolios, is high.	2.51	1.18

30. The leaders of my university's ePortfolio office consider the educational needs of electronic portfolio adopters (such as myself) when making decisions.	2.23	1.21
31. The commitment of my university's ePortfolio office to provide learning experiences to adopters/users of electronic portfolios is high.	2.02	1.20
32. My university's ePortfolio office's commitment to relevant learning outcomes for adopters (such as myself) acts as an enabler to the use of electronic portfolios. (An enabler makes an innovation easier to implement.)	2.02	1.08
33. Overall, the importance of institutional commitment to relevant learning outcomes for users to the successful adoption and use of a technology innovation such as electronic portfolios is high.	1.87	1.07
35. My university's ePortfolio office conducts sufficient evaluations of important factors (e.g. learner achievement, impact of technology innovation, cost/benefit analysis, etc.) related to electronic portfolio adoption and use.	3.10	1.55
36. The quality and quantity of evaluations, specifically related to electronic portfolios, at my university are high.	2.94	1.60
37. The evaluation of electronic portfolios at my university acts as an enabler to the adoption and use of electronic portfolios. (An enabler makes an innovation easier to implement.)	3.04	1.30
38. Overall, the importance of evaluation to the successful adoption and use of a technology innovation, such as electronic portfolios, is high.	2.41	1.19
40. My university's ePortfolio office provides the support necessary for me to implement electronic portfolios effectively.	2.12	1.17
41. The support I received in formal and informal training related to implementing electronic portfolios was high quality.	2.12	1.13
42. The support I received in applying electronic portfolios to my teaching and learning environment was high quality.	2.17	1.15
43. The support I received in administrative leadership in helping me do an effective job implementing electronic portfolios was high quality.	2.68	1.47
44. The overall support system of my university's ePortfolio office acts as an enabler to the use of electronic portfolios. (An enabler makes an innovation easier to implement.)	1.85	0.96
45. Overall, the importance of support to the successful adoption and use of a technology innovation, such as electronic portfolios, is high.	1.85	0.92

Appendix R

Interview Participant Demographics

Interviewee / Pseudonym	Gender	Faculty / Administrator	Discipline	Years Taught	Time using Electronic Portfolios	Level using Electronic Portfolios	Purposes for Electronic Portfolios	Current or Past User
Professor Adams	Male	Instructor	Human Development	10+	5 years	Course	Professional Development, Assessment	Past
Professor Allen	Female	Associate Professor	Apparel, Housing and Resource Management	29	6 years	Program	Learning, Assessment, Professional Development	Current
Professor Clark	Female	Administrator	Research Education	8	6 years	Program	Learning, Assessment, Professional Development	Current
Professor Davis	Female	Administrator	School of Education	6	3 years	Program	Assessment	Current
Professor Hall	Female	Assistant Professor	Forrest Restoration and Environmental Conservation	15	4 years	Course	Learning, Assessment, Professional Development	Current
Professor Johnson	Male	Administrator	Materials Science and Engineering	26	1 year	Program	Learning, Assessment, Professional Development	Current

Interviewee / Pseudonym	Gender	Faculty / Administrator	Discipline	Years Taught	Time using Electronic Portfolios	Level using Electronic Portfolios	Purposes for Electronic Portfolios	Current or Past User
Professor Jones	Female	Associate Professor	Human Development	17	5 years	Program	Assessment, Professional Development	Past
Professor Lewis	Male	Associate Professor	English	27	11 years	Course, Program, Personal	Assessment, Professional Development, Learning, Track Teaching	Current
Professor Smith	Female	Graduate Teaching Assistant	Human Development	4	2 years	Course	Learning, Assessment, Professional Development	Past
Professor Thomas	Male	Administrator	Science	24	4 years	Course	Subject Exploration and Capstone	Past
Professor Williams	Male	Professor	Fish and Wildlife Conservation	32	2 years	Courses	Professional Development, Assessment	Current
Professor Young	Female	Professor	Apparel, Housing and Resource Management	35+	6 years	Course	Professional Development	Current

Appendix S

A Framework to Support Electronic Portfolio Implementation

in Higher Education Contexts

Introduction to the Framework

Based on survey data and interviews conducted with faculty and administrators who have implemented electronic portfolios (ePortfolios) at a large research university in the United States and improved upon by suggestions from three expert reviewers, the following framework for implementing ePortfolios was created (see Figure 1). The framework is meant to support those implementing, or attempting to implement, ePortfolios in a higher education context by guiding them through key attributes of systemic innovation in a practical and applied manner.

Figure 1. Overview of the framework for implementing ePortfolios in a higher education context.

The framework is divided into six components that are vital to the successful implementation of ePortfolios by faculty over time. These components (Awareness, Motivation, Commitment, Resources, Leadership, and Evaluation) reflect important diffusion of innovation elements put forth by Everett M. Rogers and Donald P. Ely, prominent scholars in systemic change. Awareness is defined as professional knowledge of the pedagogical benefits of ePortfolios and corresponds with Roger's element of knowledge as well as Ely's condition of dissatisfaction with the status quo. Motivation is defined as the identification and/or presence of intrinsic and/or extrinsic incentives for using ePortfolios and corresponds with Roger's element of persuasion as well as Ely's conditions of dissatisfaction with the status quo and rewards or incentives. Commitment is defined as the decision, as a result of value recognition, to implement ePortfolios and corresponds with Roger's element of decision as well as Ely's conditions of participation and commitment. Resources is defined as identified resources to assist in ePortfolio implementation and corresponds with Roger's element of implementation as well as Ely's conditions of sufficient knowledge and skills, availability of time, and availability of resources. Leadership is defined as the necessary leadership supports in place to sustain use of ePortfolios and corresponds with Roger's element of implementation as well as Ely's conditions of leadership. Evaluation is defined as the data-based examination of ePortfolio use to inform improvements to future iterations and corresponds with Roger's element of confirmation.

The framework was built to the convey the idea that it was kept general with the intention to enable anyone in any context considering implementing portfolios or already in the process of implementation to use it to assess the workgroup's current status in the implementation process, as well as critical next steps. The framework is intended as modular, meaning that the components can be considered in any order as needed. In addition to defining each component, a

noncomprehensive list of strategies to enact each component, as well as key stakeholders that can influence the progress on that component are provided. In column four of each framework component, you may notice a scale for rating the current implementation status of the component. This scale is provided for users to assess where the workgroup is in regards to each component and identify next steps to focus on in the implementation process. The intent of the 3-point rating scale is for the workgroup (e.g. organization, department, or program level) to take a pulse of the group's current implementation status. For example, a rating of one would identify a component as a major priority in planning efforts, whereas a three would indicate the component is of low priority. Through such a quick check, action planning (see pages 10-11) can then be based in top priorities.

Electronic Portfolio Implementation Framework

Component	Selected Strategies to Support Component	Key Stakeholder Involvement	Rating of Current Implementation Status	Next Steps for Implementation Efforts
 Professional knowledge of the pedagogical benefits of electronic portfolios	• Websites • Newsletters • Articles • Presentations • Professional development	• Identified high-level opinion leaders including but not limited to: ○ Academic leaders on campus (e.g. provost, teaching and learning directors) ○ Leading electronic portfolio scholars and practitioners ○ Local faculty innovators	1. Faculty are unaware of the pedagogical value of electronic portfolios. 2. Faculty are somewhat aware of the pedagogical value of electronic portfolios. 3. Faculty are very aware of the pedagogical value of electronic portfolios.	Rating of 1 or 2 • Identify multiple avenues for electronic portfolio awareness building. • Plan a 3-6 month awareness building campaign. • Reassess awareness status after one to two academic years. Rating of 3 • Reassess awareness status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

Component	Selected Strategies to Support Component	Key Stakeholder Involvement	Rating of Current Implementation Status	Next Steps for Implementation Efforts


Identification and/or presence of intrinsic and extrinsic incentives for electronic portfolio use
	• Learner incentives
	  ○ Hands-on, applied projects
	  ○ Alternative assessment opportunities
	  ○ Showcases and/or competitions
	  ○ Job seeking resource
	• Faculty incentives
	  ○ Departmental awards
	  ○ Accreditation fulfillment
	  ○ Teaching release time for development
	  ○ Grants and monetary incentives
	• Communication channels (awareness campaign, professional development sessions)
		• Provost and/or academic unit decision makers
		• Electronic portfolio advocates
		• Faculty innovators
		• Student innovators
			1. Faculty are unaware of the intrinsic and extrinsic incentives for using electronic portfolios.
			2. Faculty are somewhat aware of the intrinsic and extrinsic incentives for using electronic portfolios.
			3. Faculty are very aware of the intrinsic and extrinsic incentives for using electronic portfolios.
				Rating of 1 or 2
				• Identify appropriate and realistic complement of learner and faculty incentives.
				• Use communication channels to convey incentives.
				• Showcase examples of student electronic portfolios that are relatable and convey incentives.
				• Reassess motivation status after one to two academic years.
				
				Rating of 3
				• Reassess motivation status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

Component	Selected Strategies to Support Component	Key Stakeholder Involvement	Rating of Current Implementation Status	Next Steps for Implementation Efforts
 The decision, as a result of value recognition, to implement electronic portfolios	• Faculty acknowledgements and rewards for initial investments of time and effort • Exemplar electronic portfolios as models • Dedicated ePortfolio staff/office • Inclusion in strategic plan	• Provost and/or academic unit decision makers • Electronic portfolio professional staff • Faculty leadership team	1. Faculty are not committed to the use of electronic portfolios. 2. Faculty are somewhat committed to the use of electronic portfolios. 3. Faculty are very committed to the use of electronic portfolios.	Rating of 1 or 2 • Identify a faculty leader by department or program, to establish and direct a regular schedule of work meetings regarding electronic portfolio implementation. • Reward faculty for initial time and effort. • After defining the direction of the initiative, involve technology service providers and ePortfolio staff in conversation with the faculty team to ensure potential: o technology solutions are feasible. o ePortfolio platforms are feasible and will support the features of desired models. • Reassess commitment status after one to two academic years. Rating of 3 • Reassess commitment status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

Component	Selected Strategies to Support Component	Key Stakeholder Involvement	Rating of Current Implementation Status	Next Steps for Implementation Efforts
 Identified resources to assist in electronic portfolio implementation	• Targeted in-house professional development activities • Dedicated Technology support • Dedicated Pedagogy support • Professional ePortfolio organizations (AAEEBL, ePIC, EPAC) and associated resources	• In-house professional development service providers (ePortfolio, technologies, pedagogy) • Faculty innovators • Graduate assistants • External electronic portfolio professional organizations, conferences, and/or journals	1. Faculty are unaware of the resources available to assist in their implementation of electronic portfolios. 2. Faculty are somewhat aware of the resources available to assist in their implementation of electronic portfolios. 3. Faculty are very aware of the resources available to assist in their implementation of electronic portfolios.	Rating of 1 or 2 • Use communication channels (awareness campaign, professional development sessions) to convey available resources. • Ensure that available resources (including incentives) are accessible to faculty in light of work habits and environments. • Check for other reasons for non-use of resources. • Reassess resources status after one to two academic years. Rating of 3 • Reassess resources status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

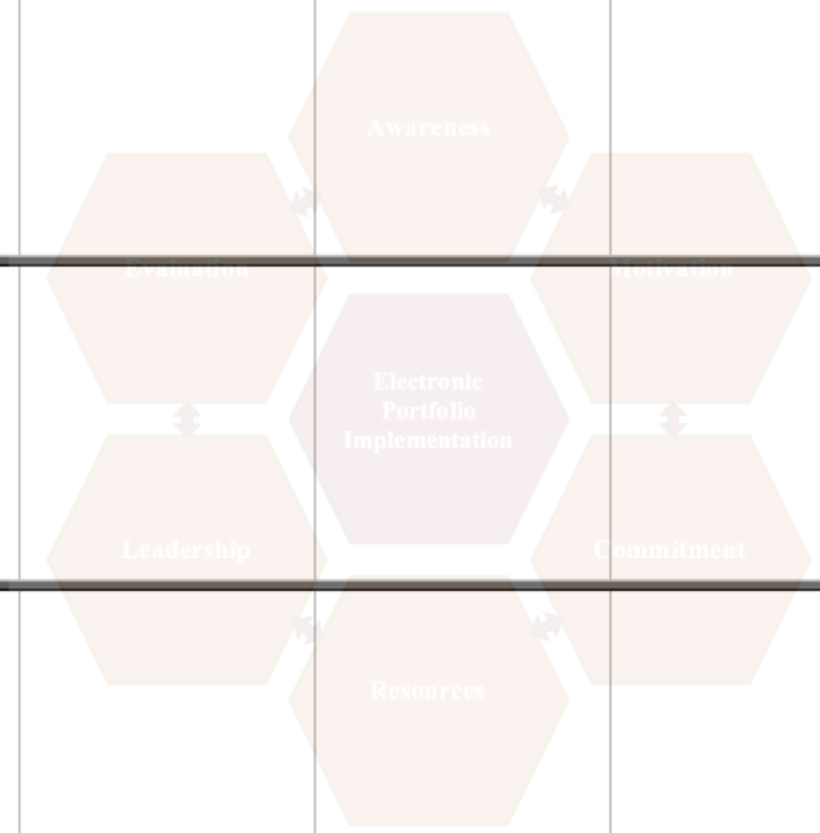
Component	Selected Strategies to Support Component	Key Stakeholder Involvement	Rating of Current Implementation Status	Next Steps for Implementation Efforts
 The necessary leadership support in place to sustain use of electronic portfolios	• Ongoing recognition by important leaders through preferred communication channels (websites, newsletters, showcases, and presentations) • Inclusion in strategic plan and other policy documents	• Electronic portfolio professional staff • Contact staff for technology and pedagogy supports • Provost and/or academic unit decision makers • Faculty champions	1. Faculty do not have the leadership support needed to sustain their use of electronic portfolios. 2. Faculty somewhat have the leadership support needed to sustain their use of electronic portfolios. 3. Faculty have the leadership support needed to sustain their use of electronic portfolios.	Rating of 1 or 2 • Align electronic portfolio initiative with strategic plan goals. • Recognize faculty and student electronic portfolio work. • Develop new initiatives for enhancing and highlighting ongoing ePortfolio work. • Reassess leadership status after one to two academic years. Rating of 3 • Reassess leadership status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

Component	Selected Strategies to Support Component	Key Stakeholder Involvement	Rating of Current Implementation Status	Next Steps for Implementation Efforts
 The data-based examination of electronic portfolio use for improvements to future iterations	• Gather student, faculty, and/or potential employer feedback through survey, interview, or other data collection options.	• Electronic portfolio professional staff • In-house evaluation resources service provider • Faculty	1. Faculty are unaware of the evaluation activities and outcomes related to the implementation of electronic portfolios. 2. Faculty are somewhat aware of the evaluation activities and outcomes related to the implementation of electronic portfolios. 3. Faculty are very aware of the evaluation activities and outcomes related to the implementation of electronic portfolios.	Rating of 1 or 2 • Electronic portfolio staff and evaluation staff plan for and implement an electronic portfolio evaluation • Use evaluation findings to improve the next phase of ePortfolio implementation • Reassess evaluation status after one to two academic years. Rating of 3 • Reassess evaluation status at next formal, systemic evaluation of electronic portfolio implementation. (A systemic evaluation is recommended every three to five years.)

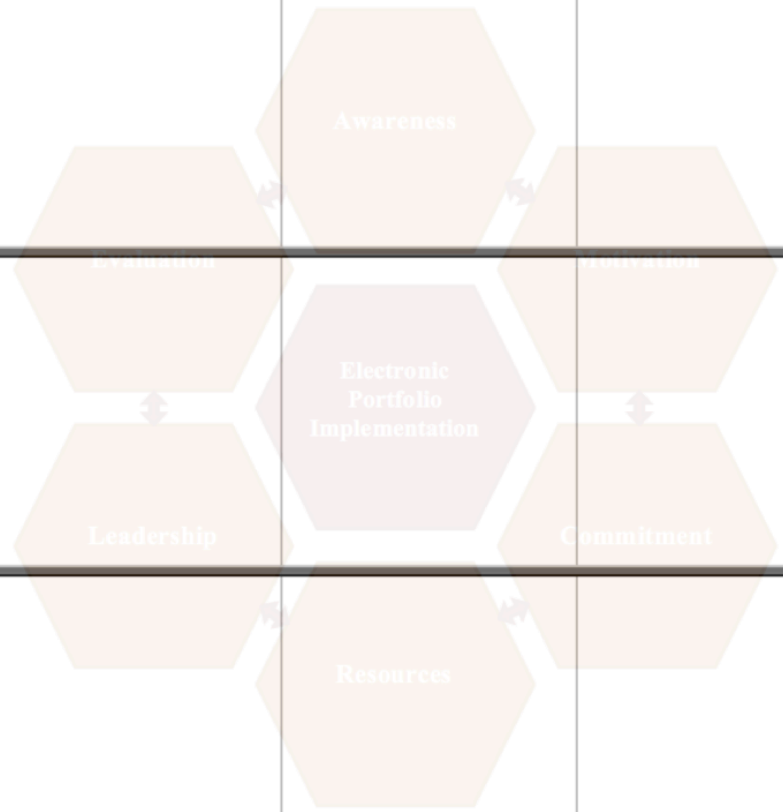
Electronic Portfolio Implementation Framework

Action Plan

Component	Current Implementation Rating	Next Steps	Key Players to Involve	Target Completion Date(s)	Additional Notes
Awareness	☐1 ☐2 ☐3				
Motivation	☐1 ☐2 ☐3				
Commitment	☐1 ☐2 ☐3				



Component	Current Implementation Rating	Next Steps	Key Players to Involve	Target Completion Date(s)	Additional Notes
Resources	☐1 ☐2 ☐3				
Leadership	☐1 ☐2 ☐3				
Evaluation	☐1 ☐2 ☐3				



Appendix T

Expert Reviewer Feedback

Expert Reviewer	The selected strategies given for Awareness are appropriate in number and kind.	The key players involved in Awareness are appropriate.	The next steps for implementation efforts for Awareness are appropriate.	Please leave any comments you have for the Awareness component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)
Reviewer One	Agree	Agree	Agree	I think what you've provided here is reasonable, but I'm not entirely sure I understand who would use this framework. There are three areas in the Framework document that seem to suggest different audiences for the tool. The last full sentence on page one is about those implementing ePortfolios. Is that faculty in the adoption process, managers fostering interest across campus, or high level administrators. Is it all of the above? Might there be different frameworks for each audience (or variations of)? I could see awareness as being easily impacted by a Provost where an individual faculty member may have little ability to impact awareness. It seems the specifics of the "Next steps" would be vary significantly based upon the role of the framework user within the organization, especially since the framework is to be used "to assess the organization's current status in the implementation process..." (p. 2).
Reviewer Two	Agree	Agree	Strongly Agree	Faculty computing support department can be instrumental in showing faculty what is possible.
Reviewer Three	Agree	Agree	Agree	Move "respected opinion leaders" to the top - they're not "others," they're probably the key individuals to get involved

Expert Reviewer	The selected strategies given for Motivation are appropriate in number and kind.	The key players involved in Motivation are appropriate.	The next steps for implementation efforts for Motivation are appropriate.	Please leave any comments you have for the Motivation component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)
Reviewer One	Agree	Agree	Agree	The choice of "motivation" as the term for this category may not be the best here. Motivation evokes a number of things that may not be intended. Rogers' use of the term "Persuasion" in the innovation-decision process model seems a better fit. They seem fairly analogous. It also seems that the Communication channel language could be used across many of the components, including Awareness and Motivation. Same concerns about various audiences using the framework exist here. I wonder about the term "key player involvement" -- by involvement, does that mean leadership of activities or does it also evoke the audience for the messages? If it's the latter, the audience never moves beyond faculty innovators across any of the framework components. How is broader adoption fostered?
Reviewer Two	Agree	Strongly Agree	Agree	At my university and I would imagine in many school's of education the main motivation for e-portfolio use is to satisfy accreditation requirement, and the second key motivation is for satisfying the new EDTPA requirements for teacher certification. Each student teacher must prepare a portfolio.

Expert Reviewer	The selected strategies given for Motivation are appropriate in number and kind.	The key players involved in Motivation are appropriate.	The next steps for implementation efforts for Motivation are appropriate.	Please leave any comments you have for the Motivation component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)
Reviewer Three	Strongly Agree	Agree	N/A	Incentives are a tricky thing. We were just asked to articulate faculty incentives for online learning by our peer institutions. One of the things we discussed is that, while I could provide them a list (and did), one of the biggest motivators was simply INVOLVEMENT - although we kinda knew what we would hear from faculty, instead of starting from there, we met with folks, listened, and responded (even though no real surprises emerged). So the ACT of engagement itself can be motivating - you could accomplish both Awareness and Motivation through active faculty and student involvement processes that allow you to demonstrate responsiveness. On Key Players - why only innovators? Why not those who are resistant as well? And opinion leaders? One thought that occurs to me here but applies to all - the third next step made me go back to the "Assessment Status" but it's not really clear how one would assess "very aware" faculty. And since most faculty won't take the time to articulate that or design a really good assessment, could you describe this "status" in a more observational / behavioral way that might articulate some observable indicators of that status? Are you suggesting everyone run surveys, or is there a way to make this more efficient (like taking temperature as an overall indicator of health)?

Expert Reviewer	The selected strategies given for Commitment are appropriate in number and kind.	The key players involved in Commitment are appropriate.	The next steps for implementation efforts for Commitment are appropriate.	Please leave any comments you have for the Commitment component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)
Reviewer One	Agree	Agree	Disagree	I'm not sure commitment is the appropriate term for this component. Commitment, for me, evokes a long-term decision. Here, it really speaks to a willingness to give it a shot. Regarding next steps, I was troubled by the timeline associated with the systemic evaluation of faculty commitment to ePortfolio (see Rating of 3). Given the rate of change in the technological world, a 1 to 2 year evaluation, even seems appropriate, especially since this component speaks to only to a decision to implement. Further, I can imagine a scenario where there are significant technological challenges during the first semester of adoption, and as a result, the level of commitment changes radically. An evaluation of this should be ongoing in some fashion.
Reviewer Two	Agree	Agree	Strongly Agree	I might also include academic provost as a key player.
Reviewer Three	Strongly Agree	Agree	Strongly Agree	Each of the elements you ask about are strong, but the three tiers of assessment seem too vague - again, what might be observable indicators of each level of performance?

Expert Reviewer	The selected strategies given for Resources are appropriate in number and kind.	The key players involved in Resources are appropriate.	The next steps for implementation efforts for Resources are appropriate.	Please leave any comments you have for the Resources component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)
Reviewer One	Agree	Agree	Agree	Consider adding journals, articles, etc. under strategies. Consider including high level administrators under key player involvement. Ely suggests that clear access to accountable leadership is also key. That would also feed into the assessment of current implementation status… Do faculty know who the leadership is and how to gain audience with them? Rating of 1 or 2 might then recommend the publication of a newsletter, having the university's newspaper write a story about ePortfolio resources, etc.
Reviewer Two	Strongly Agree	Strongly Agree	Strongly Agree	N/A

Expert Reviewer	The selected strategies given for Resources are appropriate in number and kind.	The key players involved in Resources are appropriate.	The next steps for implementation efforts for Resources are appropriate.	Please leave any comments you have for the Resources component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)
Reviewer Three	Agree	Agree	Disagree	How is time addressed by these Resource strategies? And faculty often want compensation (buy-out of summer time or TA support or something) - I didn't go back to look at whether your data supported that, but are these strategies aligned with your data from your faculty? Key Players - IT (not sure if this arose in your data, but hard to imagine they don't play a role) Status - same question as before - can you think of specific indicators, like faculty making use of specific resources? Next Steps - I think this in reality becomes MUCH more involved (so much of the performance improvement literature focuses on why people don't use resources available to them) - perhaps this is a good place for a "needs assessment" to determine why resources aren't being used instead of assuming it's only due to awareness or access? A well-sought answer could actually return you to motivation (which is why I think you really have a performance improvement process here, grounded in DOI, not just a DOI framework)

Expert Reviewer	The selected strategies given for Leadership are appropriate in number and kind.	The key players involved in Leadership are appropriate.	The next steps for implementation efforts for Leadership are appropriate.	Please leave any comments you have for the Leadership component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)
Reviewer One	Disagree	Disagree	Agree	It seems that the leadership expectations found in Rogers and Ely aren't really reflected here. For instance, the key player involvement doesn't include various university leadership players. Teaching Center leaders, Learning Technology Leaders, Associate Provosts associated with Academics, Provosts themselves. I agree that being written into the university's strategic plan is important, but how is that leadership. That's certainly a result of leadership, but none of the key players listed would've accomplished this goal. I think this component may be the one that requires the most revisions. I again think the 3 to 5 years for evaluation, even for Rating of 3, is too long.
Reviewer Two	Agree	Agree	Strongly Agree	N/A

Expert Reviewer	The selected strategies given for Leadership are appropriate in number and kind.	The key players involved in Leadership are appropriate.	The next steps for implementation efforts for Leadership are appropriate.	Please leave any comments you have for the Leadership component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)
Reviewer Three	Disagree	Agree	Strongly Agree	Strategies - how were these identified? (Again, I don't have your data in front of me) And are these strategies for getting leadership to support the ePortfolio and faculty use of it, or strategies for informing leadership, or? (Some clarity would be good) Leadership here plays a role in identifying and providing appropriate incentives, recognizing the work, and allocating the resources (to name a few). Are those the types of strategies you mean to have here? Key player - again, not sure of what your data tells you so let it be your guide, but I am wondering why someone like a Dean or Provost or central admin person (academic admin and IT admin) aren't on here Status - is that they don't have or don't perceive that they have the support? And how would you actually assess this?

Expert Reviewer	The selected strategies given for Evaluation are appropriate in number and kind.	The key players involved in Evaluation are appropriate.	The next steps for implementation efforts for Evaluation are appropriate.	Please leave any comments you have for the Evaluation component in the box below. (In particular, if you responded Disagree or Strongly Disagree to any previous item, please offer specific recommendations for improvement.)
Reviewer One	Agree	Agree	Agree	Consider expanding data collection options to evoke the full range of evaluations strategies... not just limited to survey or interview. Should evaluation faculty in Colleges of Education be included among key players? Some institutions have groups that focus on the Scholarship of Teaching and Learning. The key players listed here are somewhat limited to key players at [the university]. To be generalizable to other settings, it may be helpful to investigate how program and technology evaluation are done at various institutions. Again, evaluation timeline for Rating of 3 may be too long.
Reviewer Two	Strongly Agree	Strongly Agree	Strongly Agree	N/A
Reviewer Three	Disagree	Agree	Agree	Strategies - Maybe this is my bias, but I really think we have to get beyond surveys and interviews to gather good performance data. For example, what other kinds of data could someone easily / readily collect, like usage / user data in the system? Key Players - You don't involve faculty here, but you want to assess their awareness of the evaluation activities - I would involve them (or some subset) as Key Players. And program contacts can often provide all kinds of great ideas for what to assess, so their input would be good. Next Steps - just integrate faculty with the other key players

Expert Reviewer	The rating system (status of 1, 2, or 3) for assessing the organization's implementation efforts related to each framework component is appropriate.	The framework aligns well with important DOI theory elements	To strengthen the framework's alignment with DOI theory, I recommend the following specific improvements:	What issues of concern do you foresee with the use of this electronic portfolio implementation framework by higher education faculty?
Reviewer One	Disagree	Disagree	I recommend that you decouple the attempt to align each Roger stage and Ely condition to a specific component in your model. They often do not match exactly and those inaccuracies create the appearance of flaws in your model, which really isn't the case. The flaw is in the conceptual attempts at matching.	I see the one size fits all framework for teaching faculty and administrators being problematic for some as faculty, in particular, will not have the ability or resources to engage in some of the recommended action steps.
Reviewer Two	Strongly Agree	Strongly Agree	You might consider how you will deal with adopter categories (laggards, early adopters...etc.).	I'm not convinced that faculty will us the framework...it most likely will be used by higher education administrators.

Expert Reviewer	The rating system (status of 1, 2, or 3) for assessing the organization's implementation efforts related to each framework component is appropriate.	The framework aligns well with important DOI theory elements	To strengthen the framework's alignment with DOI theory, I recommend the following specific improvements:	What issues of concern do you foresee with the use of this electronic portfolio implementation framework by higher education faculty?
Reviewer Three	Agree	Strongly Agree	Your alignment with theory is good. What I think will turn up missing in actual practice is performance improvement theory.	It may wax too general for anyone to use as-is, so it will likely be adapted. It also doesn't address some things that may be impacting diffusion (such as characteristics of the innovation), but then you start to make it not-so-user-friendly. I also think what you've generated in the framework is an additional innovation for users to adopt (recognize it as such), and it may not get used because there is not enough guidance in particular around the Assessment of Status piece.

Expert Reviewer	What benefits do you foresee with the use of this electronic portfolio implementation framework by higher education faculty?	Do you have any other comments?	Additional Feedback
Reviewer One	For institutions new to ePortfolio, this framework will provide much needed guidance and systematic recommendations for moving an adoption campaign forward.	I do not like the rating system of 1, 2, or 3 because next steps for 1 and 2 are the same. You really have only two categories from an action plan perspective.	
Reviewer Two	The framework provides a guidance process for implementing and sustaining electronic portfolios in higher education.	Samantha, you have designed a solid framework that has great potential and practical use in the field. Good luck!	

Expert Reviewer	What benefits do you foresee with the use of this electronic portfolio implementation framework by higher education faculty?	Do you have any other comments?	Additional Feedback
Reviewer Three	It IS user-friendly right now and adaptable. I like the basic rating system, and this provides you an easy metric to track performance over time (just clarify what that performance really is under your "Status" statements)	The limitations I see to it I think really come down to the question we discussed of what you're trying to create in this framework. If you just want a general overview of things to consider, it works well. However, there are a lot of performance issues left unaddressed by it (e.g. being able to truly identify why resources aren't being used or articulating clearer indicators for the Status levels). What you've generated really sits at the intersection of DOI and performance improvement, so attention to some performance improvement aspects would bolster this more.	Reviewer asked if this was a framework or a performance support tool, it doesn't seem to be a conceptual framework. Suggested we bring in information about performance support. Reminds her of CBAM. Stage oriented, some of the components are modular and some are not (ex. Awareness). Needs to have a progression to the components. The name "Framework" is too generic, it is misleading.