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Identification of Unique ePortfolio System Features: Benefits to Students, Faculty, and Educational Institutions

CAPSTONE REPORT

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Abstract

for

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Electronic portfolios (ePortfolios) have become an important tool for student-centered learning in higher education. Literature published between 2002 and 2004 is analyzed using content analysis to identify a set of unique system feature descriptions for campus technology directors. Features are framed as benefits to key constituencies, including students, faculty, and educational institutions (Jafari, 2004). This outcome is intended to prepare technology directors for future ePortfolio implementation within the larger campus information system.

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Chapter I

Introduction

Brief Purpose

The purpose of this study is to provide a resource for technology directors at higher educational institutions that identifies the unique features and benefits of an electronic portfolio (ePortfolio) system. The term ePortfolio refers to a student's electronic record of completed work (Batson, 2002), artifacts (ePortfolio Portal, 2004), accomplishments (National Learning Infrastructure Initiative, 2004), and reflections about learning (Barrett, 2004). An ePortfolio system or computer application provides access for ePortfolio creation, management, storage, and other important system features (Greenberg, 2004).

Directors of campus information technology departments bear the greatest responsibility in planning for and developing computer systems that support learning and operations (Hawkins, 2004). According to Jafari (2004), technology directors must understand the ePortfolio concept and how it impacts all of the stakeholders involved: students, instructors, and the educational institution. Jafari (2004) concludes: "designing and developing the ePortfolio software environment may at first blush appear to be rather simple tasks, but they are intrinsically difficult" (p. 40).

A review of selected literature (Leedy & Ormrod, 2001) published between 2002 and 2004 is conducted in order to identify the unique features of an ePortfolio system (Love, McKean, Gathercoal, 2004) and how these features benefit the campus stakeholders. A content analysis

(Leedy & Ormrod, 2001) is conducted to identify the unique features of an ePortfolio system in the context of what technology directors can do to influence a campus implementation initiative.

Building on the results of the content analysis, the primary outcome of this study, is a set of descriptions that introduces the unique features of the ePortfolio system concept, framed as benefits to various constituencies. Particular emphasis is placed on how specific ePortfolio system features benefit the key stakeholders: learners, instructors, and educational institutions (Jafari, 2004).

Full Purpose

The purpose of this study is to provide a resource for technology directors at colleges or universities that helps them understand the ePortfolio concept and the benefits they extend to those at institutions of higher learning. Gaining an understanding of the ePortfolio concept contributes to the establishment of a clear rationale to justify the development of an ePortfolio system (Jafari, 2004), a requisite step prior to an actual implementation. An ePortfolio system implementation is a non-trivial undertaking (Wheeler, 2003) that is best approached as a maturation and progression (Love, et al, 2004; Johnson & DiBiase, 2004).

The importance of this study is underscored by the fact that ePortfolios, “have become a growing trend among academic institutions, with a number of universities and colleges creating, implementing, and using them as tools” for information management (Walz, 2004, para. 3). It is critical that directors of campus technology departments understand what an ePortfolio is (NLII, 2004), the features that make it unique (ePortConsortium, 2003), and what role they play in an initiative (Hawking, 2004) to implement an ePortfolio system that best meets the needs of users

and stakeholders (Jafari, 2004). According to Wheeler (2003), the components of the larger campus information system that need to be configured for interoperability with an ePortfolio system include elements such as: “human resource, student information, course management, learning management, and other systems” (p. 4).

Greenberg (2004) explores the conceptual connection between the traditional portfolio of an artist and that of an ePortfolio, which over time, “becomes more than a collection of organized work—it is the critical vehicle for an artist’s education and creative development” (p. 28). Batson (2002) describes the coming together of education and technology that creates a similar vehicle—the ePortfolio—to drive a student’s learning and success.

By definition, an ePortfolio is an electronic collection of a student’s academic work consisting of various files or artifacts that demonstrate learning, accomplishments, or competency in a given subject (Wheeler, 2003), as well as commentaries or reflections about that learning (ePortfolio Portal, 2004). In relation to a student’s ePortfolio, an ePortfolio system is a networked application that makes ePortfolio creation and management possible by providing services such as access, storage, security, presentation or sharing, integration with other systems, etc. (Siemens, 2004; Walz, 2004).

Using literature review (Leedy & Ormrod, 2001) as a framework, the method for carrying out this study is outlined as follows. A literature search is performed to identify a core body of ePortfolio material that discusses the ePortfolio concept and system considerations recommended for implementation. From that material, and by employing a content analysis research strategy (Leedy & Ormrod, 2001), ePortfolio system features and benefits are marked and categorized.

These features identify the unique elements of an ePortfolio system in relation to how each stakeholder (student, faculty, and institution) benefits.

The principal outcome of this study is a description of the unique system features representative of ePortfolio systems, presented as benefits for each of three constituencies: students, faculty, and the institution. Identifying and examining these features is important because of the novelty of the ePortfolio concept and the differences between an ePortfolio system and other information systems typically found within higher education. The intent of this material is to provide technology directors with resources that aid in understanding and planning an ePortfolio system implementation built to recognize and meet the needs of the key stakeholder constituencies.

Significance

Batson (2002) boldly predicts that, “Electronic portfolios have a greater potential to alter higher education at its very core than any other technology application we’ve known thus far” (para. 4). As a result of this study, technology directors gain an understanding of how the ePortfolio concept, with its unique features (Jafari, 2004), contributes to the educational objectives of an institution of higher education (Wheeler, 2003).

The results of this study are important because technology directors at higher educational institutions are expected to solve information management problems and to articulate solutions to administrators (Savarese, 2004). The ePortfolio concept has tremendous potential (Walz, 2004), although sophisticated software is just beginning to be developed (ePortConsortium, 2003) to support all of the desired features and functionality. Johnson and DiBiase (2004) believe that

technology directors can begin at any stage of deployment “to foster an e-portfolio culture” (p. 25) by using advances in technology to address learning problems and solutions for institutions of higher learning.

Hawkins (2004) asserts that the role of the campus CIO or technology director is not about computers and the information management infrastructure, but about how to use technology to reach higher educational objectives. Hawkins continues by comparing the influence a university or college technology director to that of a musical conductor:

Whereas higher education has historically been organized in vertical administrative structures or silos, technology—as a cross-cutting function—creates horizontal interdependencies that require administrators to manage these campus-wide functions...

The [technology director] must be able to get all units to harmonize, and the ultimate score must be defined by the entire executive team. All members must understand and assume their collective responsibility for the success or failure of the institution’s technology program. (p. 96)

If ePortfolios are to be successful in transforming higher education, it will be due in large part to the efforts of technology directors who understand the growing ePortfolio trend (Walz, 2004). This understanding must include the ability to anticipate its potential impact on the higher educational system by carefully considering how an ePortfolio system implementation influences the learning activities of the students, the curriculum of the faculty, and the mission of the institution.

Limitations to the Research

The subject of ePortfolio use and the desire to develop campus systems to support their incorporation into learning activities is a movement that only began a few years ago (Jafari, 2004). A focus session in October 2002 by the National Learning Infrastructure Initiative (Batson, 2002) brought together educational leaders, software vendors, and publishers for the first time to discuss the needs of ePortfolio development. Since 2002, much has been published about ePortfolios and work has begun on developing sophisticated systems and services that add greater value to the ePortfolio model. In addressing the subject of ePortfolio systems and uses, this study focuses on resources published from the year 2002 to present.

For this study, ePortfolio references are selected from academic research and project proposals, educational technology-focused publications, material from professional conferences, Websites of individual subject matter experts, and non-profit organization Websites that promote e-learning and technology development efforts. In particular, the EDUCAUSE association, “whose mission is to advance higher education by promoting the intelligent use of information technology” (What is EDUCAUSE, 2005, para. 1), provides a number of valuable resources and articles about the current state of the ePortfolio trends within higher education.

Databases used for locating resources include: Academic Search Premier or EBSCO Host Research Database, ERIC, Lexis-Nexis Academic, ECO, and ArticleFirst. Both Google and Teoma search engines are used to locate resources published to the Internet. Other resources are also located in the reference or additional recommended reading sections accompanying many of the resources. Because ePortfolio research and development is a recent phenomenon, there is not

a large body of material available on the subject outside of magazine articles and association literature, the bulk of which is offered online in electronic form.

This study uses literature review and content analysis as methodology and strategy for selecting, categorizing, and interpreting the chosen data. Leedy and Ormrod (2001) define the function of literature review as, “to ‘look again’ (re + view) at what others have done in areas that are similar, though not necessarily identical to one’s own area of investigation” (p. 70). A content analysis can be described as an organization, review, classification, and synthesis of raw data that becomes the foundation of a study (Leedy & Ormrod, 2001). In this study, selected literature is analyzed to identify the unique features of an ePortfolio system and how each benefits key stakeholders or constituencies. Features are identified by analyzing the selected data and recognizing specific conceptual similarities used throughout the texts.

While this study addresses the system features and benefits of an ePortfolio system, it does not seek to provide technical software development guidance. Technology directors could certainly make use of the stakeholder benefits described within this report to define a list of technical functionality for application development/procurement purposes or to identify interoperability issues for system integration with other campus information systems, but this is beyond the scope of the study.

This study does not include information about individual ePortfolios that reside outside of a higher educational institution’s information management system or that only serve the purposes of a single user. According to Love, et al (2004), a personal Web page could conceivably act as simple ePortfolio application, similar to a scrapbook used for the personal collection or evidence

of learning (Johnson & DiBiase, 2004); however, the goal of this study is to examine the use of ePortfolios as a campus system component intended to enhance the learning and teaching experience.

Definitions

Artifact. ePortfolio Portal (2004) defines an artifact as, “An item purposefully placed in a portfolio” (para. 1). Artifacts can be files of various formats (Walz, 2004) or content that, “provide a record of accomplishments” (NLII, 2004, para. 1).

Campus information system. A series of connected computer applications that provide administrative and support services such as records management, course and learning management, and other institutional data communication (Wheeler, 2003).

Educational institution. An organization that supports students and instructors engaged in learning and teaching within a controlled environment. Plymouth State University (2005) defines it as, “any public or private school, college or university, or other secondary or post secondary educational establishment” (para. 1).

ePortfolio. An electronic record of a student’s completed work, made up of artifacts or files “designed for a specific objective” (NLII, 2004, para. 1). An ePortfolio “allows students to demonstrate individual and collaborative growth, achievement, and learning over time” (Walz, 2004, para. 7). There is also a growing list of different kinds of ePortfolios, depending on the functional purpose each serves. Greenberg (2004) defines three of these as showcase, structured, and learning ePortfolios. Jafari (2004) identifies eight different types of ePortfolios. This study

focuses on the learning ePortfolio that is student centric and that supports lifelong learning objectives.

The term ePortfolio, sometimes called a webfolio (Love, et al, 2004), also has a variety of spellings, including: e-portfolio, e-Portfolio, eportfolio, ePortfolio, portfolio, efolio, and sometimes in plural form when referring to the general concept. This study uses “ePortfolio” as the proper spelling, as it appears to be the most common form in the literature.

ePortfolio feature. The ISP Glossary (2005) defines a feature as, “A notable property of a device or software application” (Feature, para. 1). In an ePortfolio system, such a property is a software representation of a specific user requirement for functionality.

ePortfolio system. A computer application that supports ePortfolio use by providing users with services such as system access, storage, security, and integration with other computing systems (ePortfolio Portal, 2004).

Lifelong learning. “Learning in which a person engages throughout his or her life. It includes but is not limited to learning that occurs in schools and formal educational programs” (Minnesota Virtual University, 2005). According to Gorard, Selwyn, and Madden (2003), the concept of lifelong learning is “revolutionizing post-compulsory education and extending learning opportunities to ‘anyone’ on an ‘anytime, anywhere’ basis” (p. 281). The term is sometimes referred to as ‘adult education’ (Brown, J.O., 2002) or as a ‘K-gray’ educational perspective (Wheeler, 2003).

Reflection. The act of recalling a learning experience, typically in written form (Barrett, 2004).

The ePortfolio Portal (2004) defines it as, “A calm, lengthy, intent consideration; a remark expressing careful consideration” (para. 1).

Technology Director. The person responsible for technology related decisions and initiatives for an educational institution (Hawkins, 2004). A technology director is also sometimes referred to as a chief information officer (CIO), chief technology officer (CTO), vice president/chancellor (Hawkins, 2004), or academic technology official (Young, 2002).

Problem Area

Education and learning have been significantly impacted by the technological developments of the last decade, particularly with the spread of the World Wide Web (Brown, J.S., 2002). As instructors and students discover new ways of teaching and learning with novel technologies, higher education is transformed, “by placing the student at the center of their learning, allowing them to draw connections across subject matters and across realms of student life” (Walz, 2004, para. 33).

John Seely Brown (2002) theorizes that today’s students differ from previous generations’ by their ability to multi-process, or engage in several activities at the same time. According to Greenberg (2004), students are learning technical skills earlier, so that by the time they reach college or university they are:

...quite comfortable using the Internet and basic applications programs, communicating and interacting online, and increasingly, doing their own multimedia production. More significant, they are already using professional databases, archives, and tools that are

readily available on the Internet to explore and share personal interests while developing impressive expertise on their own. (p. 36)

Most college campuses are already well-equipped with computer networks and the technological infrastructure to provide core learning and administrative services to instructors and learners (Hudson & Walther, 2002). Not only are students able to access courses, lectures, books, and other learning resources online, but they are also able to access services such as registration and learning records, perform research with greater ease (Egendorf, 2004), and communicate and interact in new ways with instructors and fellow students (Alexiou-Ray, Wilson, Wright, & Peirano, 2003).

Batson (2002) believes that, “We’ve reached a critical mass, habits have changed, and as we reach electronic ‘saturation’ on campus, new norms of work are emerging. Arising out of this critical mass is a vision of how higher education can benefit, which is with the ePortfolio” (para. 6). The ePortfolio has, according to Walz (2004), “come to be seen as a major tool in the pedagogy of student-centered learning and student-directed development; and, as a way for students to piece the fragmented nature of their varied activities and courses into a trajectory of their educational and professional development” (para. 4).

In order for ePortfolios to have this transformative affect on higher education, Love, et al (2004) believe that a carefully planned ePortfolio implementation must be carried out first. To develop an implementation process, the technology director must work with campus administrators and faculty to establish institutional objectives and expectations related to ePortfolio functionality (Jafari, 2004). The campus stakeholders and users must understand the

purpose and potential of an ePortfolio system and then actually incorporate its use into the curriculum and learning activities.

Transforming higher education to a more learner-centric model is the ultimate goal of an ePortfolio implementation (Wheeler, 2003). Having a successful ePortfolio system is more than just a technological endeavor; it involves the students, faculty, and institution, as primary stakeholders and users (Siemens, 2004). What follows is a brief introduction to the needs and interests of each of these three stakeholders.

According to Walz (2004), students contribute to the success of the ePortfolio concept by being more closely involved with and in control of their educational objectives and pursuits. This includes learning new skills like information management, gaining access to educational resources like career centers, collaborating with instructors, students, and others through reflective feedback, and mapping out specific skill development areas as they progress through their learning careers.

Taking the perspective of faculty, Gathercoal, Love, Bryde, and McKean (2002) describe their role as follows:

A critical success factor for electronic portfolio implementation is a culture where faculty understand their central role in the portfolio process as resource providers, mentors, conveyors of standards, and definers of quality. The major obstacle to successful implementation of Web-based electronic portfolios is not student readiness, it is full faculty participation. (p. 30)

Johnson and DiBiase (2004) similarly relate in a study about Pennsylvania State University's ePortfolio initiative that most students will only maintain an individual ePortfolio, "when required by faculty members or as part of a class assignment or as a degree requirement" (p. 19).

An institution contributes to the success of an ePortfolio system by fostering its development and encouraging its use. Even the most basic ePortfolio implementation of providing students personal Web space for ePortfolio purposes is a good first step (Love, et al, 2004). Penn State learned that, "a sustained promotional and educational effort, backed up by a modest support infrastructure, can generate substantial interest and involvement in [ePortfolio] use, even when students must master basic Web publishing skills to participate" (Johnson & DiBiase, 2004, p. 25).

An ePortfolio implementation is not a simple endeavor and its impact is felt by all higher education stakeholders. In order for ePortfolios to meet the grand expectations of transforming learning, technology directors, whose responsibility it is to manage campus information system initiatives, must first clearly understand the ePortfolio concept and features and then carefully consider how these factor into the planning and implementation process.

Chapter II

Review of References

The key references used throughout this study are presented here as annotated descriptions of how each contributes to the content and method of this research. The first section lists those resources that provide content about ePortfolio system features and benefits. The second section describes the reference used to define the research method and strategy used to conduct this study. Each reference entry describes how a resource relates to the purpose of the study, where it is referenced in the study, and the criteria the researcher used to select it.

Content References

Batson, T. (2002, December). The Electronic Portfolio Boom: What's It All About. *Syllabus*.

Retrieved on January 3, 2005 from <http://www.syllabus.com/article.asp?id=6984>

Batson, a technology director at the University of Rhode Island, wrote this article at the start of the ePortfolio movement when institutions and application vendors were just beginning, with concerted effort, to consider the possibilities for ePortfolio functionality currently being addressed by software development initiatives and incorporated into enterprise course management systems.

Batson discusses the benefits of the ePortfolio concept using his perspective as a technology director in charge of campus information services. He defines the primary beneficiaries of ePortfolios as students, faculty, and administrators, coinciding with other authors' benefactor classifications recognized in this study. This article supplies helpful introductory

material to the purpose sections and describes some of the key benefits of ePortfolio use presented in the analysis of data.

Because Batson's article appeared so early in the ePortfolio timeline, some of the ePortfolio system information is somewhat vague, more like a wish list than a representation of actual functionality. Several other resources used in this study reference the Batson article. The article was published in *Syllabus*, a monthly journal about higher education technology issues, popular among technology policy setters and campus administrators.

ePortConsortium, (2003, November 3). *Electronic Portfolio White Paper*. Retrieved on January 22, 2005 from http://www.eportconsortium.org/Uploads/whitepaperV1_0.pdf

This white paper describes common concerns among ePortfolio implementers and lists system features that developers should consider when building product features. It is a byproduct of a consortium formed of higher educational and commercial software vendors seeking to encourage the development of interoperability based ePortfolio software. The white paper also provides usage scenarios from the perspectives of students, instructors, and faculty, which help explain the ePortfolio concept in practical terms.

This paper contributes extensively to the outcome of this study with details about system features and descriptions of user benefits. The participants involved in the ePortConsortium play important roles in the learning technology industry and in higher educational circles. Some of the participants in this consortium are also authors of other articles used in this study.

Greenberg, G. (2004, July/August). The Digital Convergence: Extending the Portfolio Model.

EDUCAUSE Review, 39, pp.28-36. Retrieved January 3, 2005 from

<http://www.educause.edu/ir/library/pdf/erm0441.pdf>

Greenberg compares the traditional concept of an artist's portfolio to the emerging concept of the electronic portfolio and extends that model to better understand the learning possibilities of an ePortfolio system. Greenberg divides ePortfolios into the following three types based on when ePortfolio work is organized and when it is created: showcase, structured, and learning ePortfolios. The learning ePortfolio description is the type of ePortfolio most pertinent to the purposes of this study.

This article is used in the analysis of data chapter to explain the ePortfolio concept and typical system features. Greenberg supplies descriptions of actual system implementations within higher educational institutions, which provide valuable insight into the features of an ePortfolio system. Greenberg also provides an excellent summary for the impetus to consider the role an ePortfolio system should play on campuses. This article appears in one of EDUCAUSE's publications, a primary source for much of the ePortfolio material used in this study.

Hawkins, B.L. (2004, November/December). A Framework for the CIO Position. *EDUCAUSE*

Review, 39, pp. 94-103. Retrieved January 5, 2005 from

<http://www.educause.edu/ir/library/pdf/erm0465.pdf>

Hawkins examines the position of the campus technology director or chief information officer (CIO) at higher educational institutions. Suggesting that the technology leader position remains undefined or underappreciated at many institutions, Hawkins outlines a framework for

the role that a technology director should play in setting campus computing policy, leading initiatives, and interacting with other administrators and faculty.

This article is used as a reference in the purpose sections of this study to define the audience that the study addresses: the higher education technology director. Hawkins, an expert in his field, is president of the EDUCAUSE organization and this article appears in one of its publications.

Jafari, A. (2004, July/August). The “Sticky” ePortfolio System: Tackling Challenges and Identifying Attributes. *EDUCAUSE Review*, 39, pp. 38-49. Retrieved January 3, 2005 from <http://www.educause.edu/ir/library/pdf/erm0442.pdf>

This article defines a process for developing an ePortfolio software system and identifies attributes that contribute to the success or “sticky-ness” of an ePortfolio project, where stakeholders actually make use of the system. These attributes discuss system features related to a conceptual understanding of an ePortfolio system and offer suggestions on how to prepare for an implementation. This article is referenced frequently throughout the study because it describes the ePortfolio beneficiaries and identifies an ePortfolio’s unique system features.

Jafari also discusses some ways key stakeholders are impacted by an ePortfolio system implementation which helps explain some of the concepts included in the analysis of data chapter. Jafari’s “ePortfolio Success Algorithm” presents a unique formula to guide the ePortfolio planning process and highlights certain features worthy of consideration for system implementation. This article was selected because the author is mentioned frequently in other resources as an expert in the field and because it also appears in an EDUCAUSE publication.

Johnson, G. & DiBiase, D. (2004). Keeping the Horse Before the Cart: Penn State's E-Portfolio Initiative. *EDUCAUSE Quarterly*, 27, pp. 18-26. Retrieved on January 12, 2005 from <http://www.educause.edu/ir/library/pdf/eqm0443.pdf>

This article describes Pennsylvania State University's ePortfolio initiative within the context of the survey results of the students and faculty using it. While the survey method and statistics do not contribute to this study, the article does provide excellent details about Penn State's ePortfolio system, which represents an important example of a minimal, non-enterprise, Web-based program for supporting ePortfolio use with the ultimate goal to, "foster consensus among faculty members and students about the nature and potential benefits of portfolio practice" (Johnson & DiBiase, 2004, p. 18).

Based on Penn State's ePortfolio initiative, in service since May 2002, the content of this article contributes to the understanding of how to approach a rather simple ePortfolio system implementation with practical guidance on issues that impact a technology director's decisions. It also presents some system features that help define a level of implementation success that other institutions with similar objectives could potentially duplicate.

The authors of this article, Johnson and DiBiase, are Penn State's ePortfolio initiative project manager and the director of the e-learning institute, respectively. The planning guidance their expertise provides in the article is also supportive of another major resource used in this study by Love, et al (2004).

Love, D., McKean, G., Gathercoal P. (2004). Portfolios to Webfolios and Beyond: Levels of Maturation. *EDUCAUSE Quarterly*, 27, pp. 24-37. Retrieved on December 28, 2004 from <http://www.educause.edu/ir/library/pdf/eqm0423.pdf>

Love, et al describe five levels of ePortfolio maturation and the criteria that defines various functionality or specific requirements at each level. The fifth level marks the highest level of maturation and represents the ideal ePortfolio system for all users. This resource contributes valuable data in the analysis or data chapter of this study by explaining various system features and the benefits they provide to users within the framework of progressing levels of maturation. This article also offers implementation experiences from two universities that successfully demonstrate the maturation levels.

The terminology of this article differs from that used in most of the other resources in this study. The authors define an ePortfolio as something that resides on a CD-ROM or other electronic medium but that is not available over the Web. The term they use, called a “webfolio” (an electronic portfolio available on the Web), is what this study refers to as an “ePortfolio” (see Definition: ePortfolio). When referring to the content of this article, this study uses “ePortfolio” as the universal term and parenthetically replaces webfolio to avoid any reader confusion.

This article was selected because the authors have written other articles on the subject (see Gathercoal, et al, 2002) and are recognized subject matter experts in ePortfolio understanding and trends. The paper presents a case example of actual ePortfolio use gained from two university settings.

Siemens, G. (2004, December 16). *ePortfolios*. Retrieved on December 28, 2004 from

<http://www.elearnspace.org/Articles/eportfolios.htm>

Siemens describes the current state of the ePortfolio world from the viewpoint of its general impact on higher education. The article explores some of the basic ePortfolio concepts, defines common features of an ePortfolio system, and identifies who benefits from an ePortfolio system and how. Data from this resource is used throughout the study to introduce the idea of an ePortfolio system, to define the features of an ePortfolio system, and to understand the potential benefits. Siemens also includes a robust reference section leading to the discovery of other key resources.

This article was selected because it takes an evolutionary look at the past few years of ePortfolio developmental practice, discusses projects currently underway, and predicts some trends of the future. It is very recently published, appearing only a few weeks prior to the start of this study.

Walz, P. (2004, February 19). *EPortfolios: What's behind the hype?* Retrieved on December 28,

2004 from <http://istpub.berkeley.edu:4201/bcc/Spring2004/eportfolio.html>

This article offers a summary of the ePortfolio concept and movement based on a larger study conducted by the University of California Berkeley. Walz describes how students benefit from ePortfolio use by framing the discussion around five functions: storage, information management, connections, communication, and development.

The descriptions of these five functions are used to understand the unique system features of an ePortfolio system and to provide insight into some of the issues technology directors

consider when planning an implementation. This article explains in simple terms the foundational principles behind the ePortfolio concept and demonstrates the kind of information gathering and planning necessary for supporting an ePortfolio initiative on a university campus. This article was selected because it is based on a study by a recognized university, providing a practical example of how to plan for an ePortfolio implementation.

Wheeler, B. (2003, October 30). *ePortfolio Project: Open Source ePortfolio Release 2.0*.

Retrieved on January 12, 2005 from

https://oncourse.iu.edu/development/documents/Portfolio_Proposal_Public.pdf

This resource is a project proposal written to seek funding for an ePortfolio software project. In this proposal, Wheeler, the primary author/editor, describes the scope of the project, lists system features that the project plans to incorporate into the final product, and frames the history of the ePortfolio movement with the goal of supporting lifelong learning. All of this information provides important details for the parts of this study that describe ePortfolio system features and benefits.

This project proposal is pertinent to this study because it involves principal players in the ePortfolio development world. The University of Indiana and the Open Source Portfolio Initiative are the primary sponsors of this project and Wheeler is Dean of Information Technology, a role similar to that of a technology director as described in this study.

Method Reference

Leedy, P. D. & Ormrod, J. E. (2001). *Practical Research: Planning and Design* (7th ed.). Merrill/Prentice Hall: New Jersey.

This text offers a broad description of the larger literature review research method and the specific data analysis research strategy employed in this study. This study relies on this research text to understand the research process and to determine the strategy for conducting it. The data analysis spiral, discussed in chapter seven is used in the analysis of data chapter to organize, review, categorize, and synthesize the data into a meaningful outcome.

This text is used throughout the AIM program to introduce advanced research planning and design topics and to provide a reference point for conducting one's own research study. In its seventh printing, this textbook is widely used on college campuses.

Chapter III

Method

The larger research method selected for this study is literature review. Leedy and Ormrod (2001) describe literature review as the, “theoretical perspectives and previous research findings related to the problem at hand” (p.70). As a basis for understanding ePortfolios, a review of the literature leads to a discovery of why this subject is important to institutions of higher education, helping provide a context for framing a rationale to consider developing a campus ePortfolio system. An underlying assumption of this study is that understanding the basic ePortfolio concept and rationale is a central prerequisite (Wheeler, 2003) to outlining a process that technology directors can use to guide the development and implementation of an ePortfolio system that benefits key stakeholders (Jafari, 2004).

The data analysis is addressed within the framework of content analysis as a research strategy to collect, analyze, and interpret the data gathered through a careful review of the literature. Leedy and Ormrod (2001) define content analysis as, “a detailed and systematic examination of the contents of a particular body of material for the purpose of identifying patterns, themes, or biases” (p. 155). Content analysis is desirable as a strategy to conduct this analysis because it allows a thorough review and categorization of the data that leads to a synthesis and development of the current thinking about ePortfolios to be collected and presented in a useful form targeted at higher educational technology directors.

Data Collection

Using online library research databases, an initial search of the literature is performed on the basic terms of “ePortfolio” or “portfolio” to locate an initial collection of materials relevant to ePortfolios and the specific focus of this study. Using this collection of materials and the keyword descriptors contained within them, new search terms for subject matter and topic categories are discovered. These refined terms, listed below, are then used to locate additional resources. A number of Websites offering information from individual subject matter experts and non-profit organizations seeking to promote ePortfolio development, as well as material from professional conferences, supply other helpful resources. Internet search engines also prove a valuable tool in locating resources related to ePortfolio system development information, a more recent subject of consideration than ePortfolio use in general.

The following University of Oregon library research databases are used to locate the resources for this study:

- Academic Search Premier or EBSCO Host Research Database
- ERIC
- Lexis-Nexis Academic
- ECO
- ArticleFirst

The keywords used to search databases and Internet search engines (Google and Teoma) include the following, which are modified and refined as the collection grows:

- eportfolio; portfolio; web folio, electronic portfolio
- portfolio assessment
- eportfolio implementation
- eportfolio software
- educational technology – administration
- learner centered education
- computers – educational use – administration

Given the diversity of spelling and the variety of names for the same ePortfolio subject matter, (see Definitions: ePortfolio, for a listing of similar terms) the search strategy for collecting data relies more on multiple keyword searches with various spellings and less on standard subject descriptors. The only common descriptor title frequently used in several of the article title fields is “portfolio assessment” however, this proved to be an inconsistent identifier. It is noteworthy that the novelty of ePortfolio system information is made apparent in the research due to the absence of adequate subject descriptors in research databases.

While student portfolios (electronic or paper-based) have been in existence for quite some time (Brown, J.O., 2002), ePortfolio system and application development have only been actively pursued since approximately the year 2002 (ePortConsortium, 2003). Therefore, the research addressing aspects of ePortfolio system features have a naturally limited timeframe dating from 2002 to the present time of this study. Additional resources related to ePortfolios in general, campus technology directors, and other subject areas used to support this study are not restricted to this same timeframe.

Selecting a final group of resources, once located, is done by filtering the content relative to the ePortfolio concept in terms of the following specific criteria: higher education ePortfolio system features, benefits of an ePortfolio system, and/or system implementation planning. Filtering the content around these themes identifies those resources most pertinent to the focus of this study and establishes the criteria for discussing a rationale for ePortfolio system implementation. The initial search nets thirty-five meaningful resources, of which ten address topics related to the specified criteria. These form the basis of the primary resources used to complete this study.

Data Analysis

Content analysis is the research strategy employed to analyze the selected literature, or data, comprising this study. Leedy and Ormrod (2001) describe the process of performing a content analysis as follows: “The researcher begins with a large body of information and must, through inductive reasoning, sort and categorize it and gradually boil it down to a small set of abstract, underlying themes” (p. 160). The authors name this data analysis strategy, “the data analysis spiral” (p. 161). Deliberately circling up from the collected raw data, the researcher engages in four activities that lead to a reportable study: (1) organizing the data into workable units, (2) perusing the data for an understanding of the overall themes, (3) classifying the data into meaningful categories, and finally, (4) synthesizing the data into an appropriate format to present the findings.

During the first activity in the data analysis spiral, a preliminary reading of the literature leads to the formation of a core set of resources focused on the rationale and benefits of an

ePortfolio implementation. Upon review and perusal of the data set, further research is required to identify additional resources related to a conceptual understanding of the rationale behind ePortfolio interest and a more complete description of issues pertaining to ePortfolio system benefits from the perspective of stakeholder groupings. As the collection of primary resources begins to stabilize, the following three topical categories emerge from the first data analysis activity:

- higher education ePortfolio unique features (or concepts)
- ePortfolio stakeholder needs or benefits
- ePortfolio implementation or system planning

Continuing the data analysis spiral activity, subsequent readings of the core set of resources are required to identify specific occurrences of the three topical categories in the individual resources. These readings, termed the perusal activities, are conducted to first understand the overall themes discovered in the data. The next step is to identify individual occurrences of those themes in the selected literature. The source files frequently refer to the same topic using different terms (e.g., “benefit” versus “advantage”). To account for these semantic differences and to take advantage of the categorization functionality in an electronic search tool called HyperResearch, the following terms are defined in the master coding list:

- System Feature
- Benefit: Student
- Benefit: Faculty
- Benefit: Institution

- Implementation Planning

By using electronic text versions of the resources and HyperResearch, each textual occurrence of the data categories is marked and organized. This process allows for quick retrieval of the pertinent sections, visible categorizations of the data, as well as a frequency count of the specific occurrences. The fourth activity in the data analysis spiral, synthesizing the data, is reserved for discussion below, in the Data Presentation section.

Data Presentation

The result of this analysis is presented in a table, listing the unique ePortfolio system features important for higher education technology directors to understand (see Figure 1 below for Features table template). Following the actual data analysis, eleven features are presented not only in this table format (see Figure 3 in Chapter 4, Analysis of Data), but also in a set of narrative descriptions examining how each one benefits one of the key stakeholder categories: students, faculty, and institutions. This set of feature descriptions is designed to introduce the ePortfolio system concept in a way most useful to higher education technology directors.

	System Feature
Benefits to Students	
Benefits to Faculty	
Benefits to Institutions	

Figure 1 – Template: Unique ePortfolio System Features Presented as Benefits to Constituencies.

Chapter IV

Analysis of Data

Using the filtering process described in the Data Collection section of the Method chapter, the ten primary resources used to complete this study are selected from the pool of collected data. Each of the resources addresses one or more of the three identified topical categories: higher education ePortfolio system features, benefits of an ePortfolio system, and/or system implementation planning information.

The data analysis spiral, as described by Leedy and Ormrod (2001) and outlined in the Data Analysis section of the Method chapter, is a four-step process. Each step is described here in greater detail to build a foundation for understanding how the data are examined and synthesized to obtain the results of this study.

The first step in the data analysis spiral (Leedy & Ormrod, 2001) is organizing the data into workable units. The second step in the data analysis spiral is reviewing the data for an overall understanding of what they mean. Each resource is reviewed multiple times and notes are taken to discover common themes and emerging patterns in the data. The third step, classifying the data, involves the use of a qualitative analysis software tool called HyperResearch. The data coding functionality in this tool is used to mark specific occurrences of the topical categories as they appear in the individual electronic text source files.

Each of the ten primary resources, configured as separate text source files, is then coded by highlighting specific occurrences in the individual text files. Once each source is coded, HyperResearch allows single-click retrieval of each coded instance and the generation of reports

that configure the research project by code name, source file, frequency, or other variables (see Figure 2 for a sample report). Most sources contain multiple occurrences of each of the topical categories. Where occurrences address one or more of the topics simultaneously, each topic is identified as a separate instance.

The screenshot shows the HyperRESEARCH 2.6 interface. The main window displays a report titled 'HRTEMP1.tmp' on page 5 of 5. The report contains a table with the following columns: Code, Frequency, Reference, and Source. The data rows are as follows:

Code	Frequency	Reference	Source
system feature	1	90234,90840	whitepaperV1_0-eportConsrt.txt
system feature	23	3024,3280	ePBoom-Batson.txt
system feature	23	1098,1683	eqm0441-cohn.txt
system feature	23	3962,4654	eqm0441-cohn.txt
system feature	23	12900,13379	eqm0443-johnson.txt
system feature	23	3571,3757	eportfolios-Siemens.txt
system feature	23	19236,19989	eportfolios-Siemens.txt
system feature	23	5472,5898	erm0441-greenberg.txt
system feature	23	13108,18257	erm0441-greenberg.txt
system feature	23	19782,20845	erm0441-greenberg.txt
system feature	23	1429,1922	erm0442-jafari.txt
system feature	23	11073,12365	erm0442-jafari.txt
system feature	23	5798,6419	love.txt
system feature	23	3191,4606	Portfolio_Proposal_Public-Wheeler.txt
system feature	23	7174,9832	Portfolio_Proposal_Public-Wheeler.txt
system feature	23	26767,27205	Portfolio_Proposal_Public-Wheeler.txt
system feature	23	9260,9960	whitepaperV1_0-eportConsrt.txt
system feature	23	55976,59208	whitepaperV1_0-eportConsrt.txt
system feature	23	3587,4173	eportfolio-Walz.txt
system feature	23	4176,10900	eportfolio-Walz.txt
system feature	23	4143,5469	erm0441-greenberg.txt
system feature	23	495,709	Portfolio_Proposal_Public-Wheeler.txt
system feature	23	1545,2239	Portfolio_Proposal_Public-Wheeler.txt
system feature	23	6506,9257	whitepaperV1_0-eportConsrt.txt

A secondary window on the right shows a detailed view of a selected instance, with columns for Type and Reference. The visible data includes:

Type	Reference
TEXT	3024,3280
TEXT	4296,4787
TEXT	5868,6795
TEXT	6798,7635
TEXT	7638,8808
TEXT	9547,12530
TEXT	1098,1683
TEXT	3962,4654
TEXT	446,916
TEXT	6463,7201
TEXT	12900,13379
TEXT	7580,8347
TEXT	2890,3526
TEXT	3571,3757
TEXT	5997,6448
TEXT	6451,6730
TEXT	6733,7056
TEXT	10008,10957
TEXT	10960,12194
TEXT	13228,13902
TEXT	17206,18741
TEXT	19236,19989
TEXT	5472,5898
TEXT	13108,18257
TEXT	19782,20845
TEXT	1429,1922
TEXT	2010,2731
TEXT	2733,2941
TEXT	2943,3679
TEXT	5636,6140
TEXT	8939,9441
TEXT	11073,12365
TEXT	11073,12365
TEXT	2507,4030
TEXT	5798,6419
TEXT	6894,7179
TEXT	3191,4606
TEXT	7174,9832

Figure 2 – Screen Capture of Generated Report Showing the Coded Instances “System Feature”.

The final step in the data analysis spiral is a synthesis of the data into a format or presentation style that supports the intended outcome of the study as described in the Full Purpose section of the Introduction chapter. The outcome, a set of descriptions of the unique ePortfolio

system features and benefits, is presented below in two forms: first a summary table (see Figure 3) of system features, as these are defined as benefits for each of three constituency groups: students, faculty, and institutions. Then a discussion of each of the stakeholder categories and related benefits follows. In the Conclusion of this paper, these unique features are extended into a discussion of how an ePortfolio system can be important to the evolution of education, providing a rationale for technology directors to consider the learning opportunities that an ePortfolio system presents to higher learning.

ePortfolio System Features and Benefits

A basic assumption in this study is that technology directors at higher educational institutions must understand the ePortfolio system concept or the features that comprise it (Jafari, 2004). Such an understanding leads to a rationale for its use in higher education, which is necessary before attempting to lead a campus initiative (Hawkins, 2004) to plan an ePortfolio system implementation. This set of system features, summarized below in Figure 3, is organized in terms of benefits provided to each stakeholder. The numbering is for identification purposes only and offers no significance in ordering or rank. A discussion of each stakeholder category follows the Figure.

	System Features
Benefits to Students	1. Lifelong Access or Control
	2. Reflection
	3. Flexible management and organization
	4. Communication, connections, and interaction
	5. Portability and sharing
Benefits to Faculty	6. Demonstrate learning achievement
	7. Instructor evaluation
	8. Professional development
Benefits to Institutions	9. System integration
	10. Common data structures / interoperability
	11. Assessment accreditation

Figure 3 – Summary of ePortfolio system features as benefits to stakeholders.

Discussion of Benefits to Students

Feature #1: Individual Ownership, Lifelong Access and Control.

According to results of the data analysis, one of the primary purposes of an ePortfolio system is to “transform learning to a more student-centered and outcome-oriented system” (ePortConsortium, 2003, p. 43). Walz (2004), supports the same understanding that “the ePortfolio has...come to be seen as a major tool in the pedagogy of student-centered learning and student-directed development” (para. 4). Wheeler (2003) describes the effect of this transformation and the impact it has on students at all levels of learning:

Individual ownership of his or her life-long learning information is revolutionary. It shifts ownership of an educational record from passive management among many disparate organizational systems (e.g., K-12 schools, universities, professional career development in corporations, etc.) to active management by the individual. The individual assembles collections of artifacts from his or her ePortfolio into a view and grants access to that specific view to specific individuals/organizations for a period of time. (p. 2)

In this evolving view of education, the ePortfolio becomes central to an individual's quest for learning, where, "formal education is only a stage of learning. Learning continues in virtually all aspects of life. Schools assign grades to demonstrate competency. Learning through life experiences creates artifacts instead. The ability to include these is an important motivation for (ePortfolio) development" (Siemens, 2004, para. 8). The theory is that students who utilize the ePortfolio concept are better able to pursue a self-directed education throughout their lifetime and remain in control of and responsible for the accomplishment of their learning objectives as driven by the ePortfolio. Walz (2004) explains why: "ePortfolios allow students to plan, document, assess, and improve upon their learning by significantly changing the manner in which their education is understood and managed... By giving students the tools and the context necessary to construct and reflect upon their identity over time" (para. 4).

Feature #2: A Tool for Reflection.

Once students possess an ePortfolio, they must use it. Siemens (2004) explains that, while institutions can introduce the ePortfolio concept to students,

...effective use needs to be driven by the learner's understanding of applicability and use... However, the value of portfolios is largely lost when learners discontinue using them at graduation of (sic) course/program conclusion. Those enamoured (sic) with the concept may find that they would like to spoon-feed adoption, but effective life-changing use is dependant on the learners themselves seeing the value and benefits. (para. 29)

One mechanism being constructed in the ePortfolio conceptual model is a practice called reflection (Johnson & DiBiase, 2004). Walz (2003) defines reflection as students "documenting and evaluating their own growth over time" (para. 9). Greenberg (2004) infers that the principal difference between a transcript or resume and an ePortfolio is reflection: "ePortfolios are intended to personalize [students'] learning experiences, share authentic examples of work that goes (sic) beyond the grades on transcripts, help students consider career goals, and demonstrate learning from non-classroom experiences" (p.31).

The ePortConsortium White Paper (2003) describes in detail how some pioneering ePortfolio software vendors have made the reflection concept an actual feature of their ePortfolio products:

Reflection functionality enables users to explore their work, describe their feelings, and review their strengths and weaknesses. All of the surveyed solutions offer reflections on all or part of an ePortfolio via an attached response, typically based on a pre-developed form. The Blackboard, ePortaro and Mosaic solutions enable reviewers to add comments to students' ePortfolios. Blackboard allows all portfolio viewers (i.e., faculty, peers, academic advisors) to provide comments. Mosaic provides this functionality by uploading

files or accessing URLs, while the ePortaro solution makes reflections available to peers, mentors and faculty through the use of discussion threads. (p. 44)

Feature #3: Flexible Management and Organization.

An ePortfolio system should permit users to be able to manage and organize their collection of artifacts, reflections, and other portfolio components in ways that reflect the user's latest experiences or understanding. Greenberg (2004) believes ePortfolios should support the organizational preferences and styles of learners allowing, "the ePortfolio author [to] reach back in time across official and unofficial projects to make new connections. This ongoing reorganization of work can be well-thought-out and clear, or it can be spontaneous and messy" (p. 32).

Siemens (2004) describes this same flexibility associated with other system features, such as user control over retrieval and display:

An ideal eportfolio system should allow flexible **input** (each item can carry its own metadata and be treated as a unique object), **organization** (objects/artifacts can be hierarchically organized in folders), **retrieval** (objects can be searched based on eportfolio owner's specifications), and **display** (items can be grouped and permission granted to intended audience). If these criteria are followed, an eportfolio can be used as a very versatile tool to meet the needs of all potential participants in the process. (Benefits and Uses, para. 5)

Wheeler (2003) includes similar features representing user flexibility and control in his description of core ePortfolio capabilities: “Addition and management of digital artifacts (Digital repository), Presentation and management of sharable views, [and] Managing access” (p. 9).

Feature #4: Communication, Connections, and Interaction.

ePortfolios can act not only as collection points for learning artifacts and learner reflections, but also as gathering places for peers, instructors, and others to interact and communicate with each other. These interactions can also be captured as part of the ePortfolio learning record. The ePortConsortium (2003) describes this system feature:

Like a traditional portfolio, teachers, mentors, colleagues and friends can be invited to review and comment on work. Unlike traditional portfolios, participation is not limited to who can be physically present at any time or place. By organizing work to meet specific needs and managing access, the author can control the nature of the interaction. Teachers and mentors might exchange comments privately with the student/author about work in progress, colleagues and classmates might discuss their work with each other, the author might request feedback about specific issues and concerns, and students/authors can reflect on their learning experiences. In addition, work also can be made public for viewing and comments. (pp. 11-12)

Feature #5: Portability and Sharing.

Students must have continual access to their ePortfolios, even after leaving the institution. This requirement could be accomplished through alumni services offering ePortfolio access by subscription or other means (Jafari, 2004), or it could be met by allowing the transfer of

ePortfolios from one service to another or to other institutions or organizations. According to the ePortConsortium (2003), “electronic portfolios will have to be portable so students can take their work with them if they transfer to other institutions, move on to graduate school, or continue their education throughout their careers” (p. 12).

Another system feature similar to portability is the ability of students to share or present a view of their ePortfolio with a potential employer, instructor, associate, etc. Love, et al (2004) describe a level of ePortfolio maturation that includes the ability of students to grant “permission to users to view work samples and achievements. Prospective employers can view [ePortfolios] online, as well as assignments, student-generated descriptions, syllabi, and units of work associated with the [ePortfolio]” (p. 32). Walz (2004) explains that by giving students the ability to share their ePortfolios with others and for a variety of purposes, they are also learning valuable communication skills:

By creating presentation pages for specific objectives, students learn how to communicate with various audiences, how to present documents for a purpose, and how to constructively reflect upon and write about artifacts. Students would control access to these presentation pages, restricting them to certain audiences, e.g., classmates, faculty, employers, graduate schools, friends, or family. In the end, students would have a number of presentation pages, built from the student’s main interface, and designed for specific purposes and specific audiences. (Communication, para. 2)

Discussion of Benefits to Faculty

Feature #6: Demonstrate Learning Achievement.

The primary benefactor of an ePortfolio system is the student who is presented with a tool that can direct and document learning over the course of a lifetime (Siemens, 2004). However, faculty and administrators also benefit directly and indirectly from the implementation of an ePortfolio system. Wheeler (2003) identifies the growing attention being paid to student learning achievement as an opportunity for ePortfolios to impact higher education. The current model (“certifying a number of classroom hours and GPA for a degree”), he says, is inadequate from the perspective of the faculty member:

Student work products and experiences, however, have long been used to demonstrate ability. For example, a transcript that documents 15 credit hours of sculpture courses is less compelling evidence of artistic ability than seeing three works of art. Faculty and administrators believe that this same principle of demonstrating learning achievement can be applied very broadly to higher education through [ePortfolios] and pervasive digital networks. (p. 2)

According to Love, et al (2004), by accessing students’ ePortfolio entries for a particular course, faculty would be able to better “ascertain which students met or exceeded standards linked to specific assignments. As a result, educators can use the assessment data generated within the [ePortfolio] system each semester to assist with course revision” (p. 32).

Feature #7: Tool for Instructor Faculty Evaluation.

According to the literature, an ePortfolio system could facilitate better faculty or instructor evaluations. Batson (2002) says that, “Adding access to the work students have done in the faculty member’s classes can better make a case for teaching excellence, an area of review that has been historically under-documented and not sufficiently objective” (Why Should We Believe, para. 4). The ePortConsortium (2003) explains that an ePortfolio system “allows external evaluators, such as those who are responsible for teacher credentialing, to link to databases that allow rubrics and standards to be easily searched and associated with student work” (p. 22).

Jafari (2004) describes the faculty value of an ePortfolio system in terms of this feature: “Faculty members see the ePortfolio as a powerful tool that eases the tenure process and the preparation of promotion dossiers, as well as provides a straightforward method for compiling annual faculty reports” (p. 40). With the availability of a system feature that allows instructor evaluation, faculty would have easy access to actual documented evidence to support assessment criteria.

Feature #8: Document Professional Development and Activity.

While most ePortfolio systems are student-centered (Walz, 2004), there is potential for their use among faculty as well. Batson (2002) suggests that “Faculty members also have a vested interest in electronic portfolios. Just as students do, professors can use such a tool as their own resume builder, providing more teaching data in their promotion and tenure reviews” (Why Should We Believe, para. 4). This system feature is also addressed in the ePortConsortium’s White Paper (2003), where it describes ePortfolios being used by working professionals (post-

university student, faculty, etc.) to demonstrate skills, career advancement, or other areas important to employers. “Faculty, too, can use portfolios to collect and organize student work from classes and course materials they prepare, as well as personal credentials including research data and reports” (p. 11).

Discussion of Benefits to Institutions

Feature #9: System Integration.

A typical higher education campus has a number of already established computer information systems, including course management systems, human resource systems, learner information systems, and other enterprise applications. (Wheeler, 2003). A feature related to how higher educational institutions add value to their campus is to ensure that an ePortfolio system can connect to and share data with other information systems. The ePortConsortium (2003) describes the rationale for this feature:

ePortfolio systems will need access to learners’ personal information (such as demographics, directory information and accessibility requirements), transcripts and other official records of educational progress, and group memberships (such as classes and clubs). This information may be stored in student information systems, HR systems, and other enterprise systems, some of which may be external to an institution. (p. 32)

Feature #10: Common Data Structures / Interoperability.

Siemens (2004) explains that standardization and data interoperability reduce levels of system freedom and flexibility, but similar to the evolution of the Internet within an interoperable framework, it is a necessary step to increase use and further adoption. Because ePortfolios are a recent phenomenon, standardization efforts are just beginning (Wheeler, 2003). The ePortConsortium (2003) provides an example of why common system languages and structures are a necessary ePortfolio system feature:

In order for data to be meaningfully shared and represented across systems, the systems will need to support common data structures for each type of content ... Elements of the structure of the portfolio itself — whether or not it includes a goals section and what the structure of a goal is defined to be, for example — need to be agreed upon and supported by interoperating systems to make full use of the data being shared. (p. 32)

Feature #11: Assessment Support Accreditation Process.

Certain colleges or departments within higher education have recognized the institutional value of a tool like an ePortfolio system for accreditation purposes (Jafari, 2004). Batson (2002) provides a list of explanations about how an ePortfolio system supports an institution's accreditation process:

- Creating a system of tracking student work over time, in a single course, with students and faculty reflecting on it.
- Aggregating many students' work in a particular course to see how the students as a whole are progressing toward learning goals.

- Assessing many courses in similar ways that are all part of one major and thus, by extension, assessing the entire program of study. (para. 7-9)

Wheeler (2003) states that ePortfolio systems should provide program and institutional administrators “access at the institutional, departmental level, and course level to assessment data crucial to evaluating the strengths and weaknesses of efforts to promote learning and to participation in credentialing and accreditation processes” (p. 3). For this reason, schools of education have been using systems similar to ePortfolios for years (ePortConsortium, 2003).

Chapter V

Conclusions

The purpose of this study is to give technology directors at higher educational institutions a resource that describes the fundamental system features and benefits of an electronic portfolio computer system. An awareness of these benefits provides a framework for understanding the process of planning an ePortfolio system implementation. The outcome of this study is a set of eleven descriptions of system features that introduces the ePortfolio system concept from the context of those users directly impacted by ePortfolios. Emphasis is on how students, faculty, and institutions can benefit from an ePortfolio system implementation.

The remaining sections of this chapter use data gathered from the literature to provide an overview of the value ePortfolios can bring to institutions, to emphasize the technologically driven evolution of education, and to capture recommendations related to planning an ePortfolio implementation.

The Value of Features to the Institution

Institutions of higher education are in a unique position to introduce students to ePortfolios. As a new tool in the educational toolbox (Wheeler, 2003), an ePortfolio system helps students achieve lifelong learning objectives and encourages continued institutional involvement, providing opportunities for future learning even after they have completed their formal educations (Jafari, 2004; ePortConsortium, 2003). The key is for individual learners to have lifelong access to and control of their ePortfolios (Wheeler, 2003).

Reflecting on learning experiences is an important component of the ePortfolio concept and should be included in the curriculum and instructional practices of faculty to encourage student use of ePortfolios (Batson, 2002; Siemens, 2004; Love, et al, 2004) and to “help students better understand their learning processes” (Greenberg, 2004, p. 34). When students have an ePortfolio system that offers control and flexibility over the organization and management of their ePortfolios, it is, “much more than a Web site that simply organizes and presents final projects. [ePortfolios] can foster learning spaces where the author can gain insights and a better understanding of him/herself as a learner” (ePortConsortium, 2003, p. 12).

Greenberg (2004) suggest that providing the system feature of student interaction and communication might possibly be the greatest challenge facing ePortfolio systems, but also the greatest benefit. Because ePortfolios are “document/work-centric”, having a record of the history associated with a communication or interaction is critical to understanding the learning process. “Using ePortfolios to expose the learning process through comments, discussions, feedback, and reflection holds perhaps the greatest promise for advancing student learning and achievement and supporting new models for learning” (p. 34).

As students complete their formal schooling, being able to transport their ePortfolios enables and encourages lifelong access and control over educational records and learning objectives. Jafari (2004) suggests that transporting an ePortfolio from one system to another is best accomplished through the establishment of interoperability standards, which are currently under development. Wheeler (2003) agrees that “Standards for portability of ePortfolios are essential for lifelong individual and institutional value” (p. 2).

Students who wish to be able to share all or a portion of their ePortfolios as an enhanced résumé with potential employers can do so within the framework of an ePortfolio system. According to the ePortConsortium (2003), sharing an ePortfolio can be done at “near zero-cost.” Comparing this feature to a popular online invitation service, “portfolio creators can invite anyone to view and comment on their ePortfolio. The portfolio user simply needs to have access to the Internet, a URL and a password” (p. 21). Sharing and transporting ePortfolios are important system features that allow students to make ePortfolio use a lifelong pursuit, encouraging involvement in perpetual learning opportunities.

The ePortfolio and the Evolution of Education

The system features described in the Analysis of Data chapter demonstrate the unique features that make an ePortfolio system important to the evolution of education and help explain the rationale for technology directors to consider the learning opportunities and benefits that an ePortfolio system presents to students, faculty, and higher educational institutions. The emergence of ePortfolios is indicative of the technological trends that are shaping and changing the way students learn and instructors teach (Batson, 2002; Siemens, 2004). Greenberg (2004) summarizes the impetus for technology directors to carefully consider the role an ePortfolio system should play on their campuses:

Electronic portfolios provide a starting point for the type of learning communities that higher education will need to offer future students—students who will be experienced with ongoing, self-directed learning by the time they enter a college or university. With K–12 school districts starting to implement electronic portfolios to support more

authentic, long-term assessment of student achievement, college and university admissions officers should not be surprised to see submissions of student ePortfolios showcasing accomplishments that do not appear on transcripts and that are not reflected in standardized tests or advanced placement exams. (p. 36)

Planning an ePortfolio Implementation

As technology directors gain a deeper understanding of how an ePortfolio system can benefit their constituents on campus, they become better qualified to lead an initiative to prepare their institution for system implementation. Batson (2002) admonishes: “Despite a general recognition of the usefulness of an ePortfolio, the key to success is how well the campus population is prepared for using this new tool” (Let’s Do It, para. 2). Preparing students, instructors, and administrators for an ePortfolio system implementation is the technology director’s responsibility. Hawkins (2004) describes some qualities that technology directors should possess in order to effectively influence the adoption of such a new technology:

The ability to effectively deal with multiple audiences and get the “buy in” for technological changes is essential to being a [technology director]. The [technology director] also needs to be a coalition builder, which requires a strong ability to listen. He or she needs to be relatively facile in public speaking as well, since the position often involves putting forth future plans and doing so in a persuasive manner. This persuasion will ultimately depend on the individual’s credibility, which in turn depends on two critical elements ... First, the [technology director] should present the capabilities of the technology realistically, not overselling technology and its benefits. Second, ... the

[technology director] ... should be able to converse reasonably about key issues facing the other senior officers... To be effective, the [technology director] (perhaps more than most other senior executives) needs to have a working knowledge of a variety of areas so that the administrative and academic systems that are being supported by IT can best serve the changing needs of these other areas and thus the campus. (p. 101)

Obviously this is no easy job! However, once stakeholders understand the vision of the technology director, then, according to Hawkins (2004), the technology director can begin planning an ePortfolio system implementation by becoming, “an active participant in campus discussions and [being] able to help other institutional leaders understand the complexities of information resources, service delivery, technologies, and the information demands of the community” (p. 102). This includes articulating the impact of an ePortfolio system and the need to incorporate its adoption into everyday teaching and learning experiences. Batson (2002) warns that even though all of the faculty on a campus may accept ePortfolios without resistance, “students still may not see their value because the faculty have not re-thought their courses to accommodate electronic portfolios. Unless they do, the ... initiative ... may be undermined” (Let’s Do It, para. 3).

Johnson and DiBiase (2004) describe how Penn State University addresses ePortfolio integration into classroom work through, “The development and offering of practicum courses in professional [ePortfolio] development for second-, third-, and fourth-year students” (p. 20). Jafari (2004) says similar efforts should be made to help faculty understand ePortfolio functionality through “discussion groups and round-table sessions, seminars, and workshops for faculty and technology administrators” (p. 46).

Another important factor in planning an ePortfolio system implementation is considering the long-term impacts of the system. The ePortConsortium (2003) recommends establishing policies for usability, security, maintenance, and other issues that encourage continued use and support. Jafari (2004) suggests that a sustainable business plan also be developed to help ease concerns about funding. Incentives such as, “lifelong e-mail, professional Web hosting, certified file-server services, continuous college or university affiliation, and personal networking benefits. And further innovative thinking will surely lead to new ideas for funding sources for the ePortfolio project” (p. 44).

A final implementation planning factor frequently mentioned in the literature is to approach ePortfolio system deployment with a slow, deliberate pace. Love, et al (2004) warn that trying to implement an all encompassing ePortfolio system is, “a recipe for disaster” (p. 24) given the complex nature of the system. “Without incremental steps from one side of the river to the other, students and faculty colleagues may be unwilling participants because there is no logical explanation for change and because the ultimate goals are not made clear. Disparate and overly ambitious goals without an incremental plan of action lead to confusion, frustration, and disillusionment” (pp. 24-25).

In an effort to establish a framework and taxonomy for ePortfolio maturation that helps institutions avoid this frustration and disillusionment, Love, et al (2004) describe five levels of ePortfolio systems, each with increasing degrees of complexity and functionality. The ultimate goal is to arrive at level five (the highest level) where all stakeholders benefit most equally. Siemens (2004) offers a similar description but frames the levels of progression as organizational

issues, “As the levels progress, the concerns shift from the learner to implementation challenges for the institution and the industry” (Process of Eportfolio Creation, para. 3).

Technology directors have an important opportunity, as leaders of higher educational technology initiatives and policy, to address the changing needs of those they support in the pursuit of learning and teaching. The emergence of the ePortfolio concept, in response to these changing needs, presents a valuable tool to enhance the learning activities of students, the curriculum and practices of faculty, and the ability of the educational institution to serve its constituencies.

Bibliography

- Alexiou-Ray, J. A., Wilson, E., Wright, V. H., & Peirano, A. (2003). Changing Instructional Practice: The Impact of Technology Integration on Students, Parents, and School Personnel. *Electronic Journal for the Integration of Technology in Education*, 2. Retrieved on January 31, 2005 from <http://ejite.isu.edu/Volume2No2/AlexRay.pdf>
- Barrett, H. (2004, November 19). *Supporting Reflection in Electronic Portfolios*. Retrieved on December 28, 2004 from <http://electronicportfolios.com/portfolios/ReflectionUBC.pdf>
- Batson, T. (2002, December). The Electronic Portfolio Boom: What's It All About. *Syllabus*. Retrieved on January 3, 2005 from <http://www.syllabus.com/article.asp?id=6984>
- Brown, J.O. (2002, May). Know Thyself: The Impact of Portfolio Development on Adult Learning. *Adult Education Quarterly*, 52, No. 3, pp. 228-45. Retrieved on January 24, 2005 from <http://0-search.epnet.com.janus.uoregon.edu:80/login.aspx?direct=true&db=aph&an=7217000>
- Brown, J. S., (2002). *Growing Up Digital: How the Web Changes Work, Education, and the Ways People Learn*. United States Distance Learning Association. Retrieved on December 10, 2004, from http://www.usdla.org/html/journal/FEB02_Issue/article01.html
- Cohn, E. R., Hibbitts, B. J. (2004). Beyond the Electronic Portfolio: A Lifetime Personal Web Space. *EDUCAUSE Quarterly*, 27, pp. 7-10. Retrieved on December 28, 2004 from <http://www.educause.edu/ir/library/pdf/eqm0441.pdf>

- Dubinsky, J. (2003, December). Creating New Views on Learning: ePortfolios. *Business Communication Quarterly*, 66. Retrieved on December 22, 2004 from <http://search.epnet.com/login.aspx?direct=true&AuthType=cookie.ip.url.uid&db=buh&an=11595453&loginpage=loginpage=login.asp>
- EDUCAUSE (2005). *What is EDUCAUSE?* Retrieved on January 18, 2005 from http://www.educause.edu/faq/1616?CODE=EDUGENERAL&FAQ_ID=2
- Egendorf, L. K.(Ed.). (2004). *The Information Revolution*. San Diego, CA: Greenhaven Press.
- E-Learning Framework, The, (2004). *What is an ePortfolio?* Retrieved on January 5, 2005 from http://www.cetis.ac.uk:8080/frameworks/learning_domain_services/eportfolio/petal/whatisportfolio/view
- ePortConsortium, (2003, November 3). *Electronic Portfolio White Paper*. Retrieved on January 22, 2005 from http://www.eportconsortium.org/Uploads/whitepaperV1_0.pdf
- ePortfolio Portal, (2004). *What is an ePortfolio?* Retrieved on December 10, 2004 from <http://www.deskootenays.ca/wilton/eportfolios/whatitis.php>
- Gathercoal, P., Love, D., Bryde, B., & McKean, G. (2002) On Implementing Web-Based Electronic Portfolios. *EDUCAUSE Quarterly*, 25, pp. 29-37. Retrieved on January 12, 2005 from <http://www.educause.edu/ir/library/pdf/eqm0224.pdf>

Gorard, S., Selwyn, N., & Madden, L., (2003, May). Logged on to learning? Assessing the impact of technology on participation in lifelong learning. *International Journal of Lifelong Education*, 2003, 22, pp. 281-97. Retrieved on January 4, 2005 from

<http://0-search.epnet.com.janus.uoregon.edu:80/login.aspx?direct=true&AuthType=cookie,ip,url,uid&db=tfh&an=9780333>

Greenberg, G. (2004, July/August). The Digital Convergence: Extending the Portfolio Model. *EDUCAUSE Review*, 39, pp.28-36. Retrieved January 3, 2005 from

<http://www.educause.edu/ir/library/pdf/erm0441.pdf>

Hawkins, B.L. (2004, November/December). A Framework for the CIO Position. *EDUCAUSE Review*, 39, pp. 94-103. Retrieved January 5, 2005 from

<http://www.educause.edu/ir/library/pdf/erm0465.pdf>

Hudson, L. & Walther, K. (2002). Impact of the Web on Higher Education: A Case Study Approach Offered for Discussion. Retrieved on January 31, 2005 from

http://0-newfirstsearch.oclc.org.janus.uoregon.edu/WebZ/FSPage?pagetype=return_frameset:sessionid=sp06sw04-63988-e4pow7us-5k3wso:entitypagenum=11:0:entityframedurl=http%3A%2F%2Fwww.eric.ed.gov%2Fcontentdelivery%2FServlet%2FERICServlet%3Faccno%3DED478811:entityframedtitle=ERIC:entityframedtimeout=5:entityopenTitle=:entityopenAuthor=:entityopenNumber=:

ISP Glossary (2005). Feature. Retrieved on February 26, 2005 from

<http://isp.webopedia.com/TERM/F/feature.html>

Jafari, A. (2004, July/August). The “Sticky” ePortfolio System: Tackling Challenges and Identifying Attributes. *EDUCAUSE Review*, 39, pp. 38-49. Retrieved January 3, 2005 from <http://www.educause.edu/ir/library/pdf/erm0442.pdf>

Johnson, G. & DiBiase, D. (2004). Keeping the Horse Before the Cart: Penn State’s E-Portfolio Initiative. *EDUCAUSE Quarterly*, 27, pp. 18-26. Retrieved on January 12, 2005 from <http://www.educause.edu/ir/library/pdf/eqm0443.pdf>

Leedy, P. D. & Ormrod, J. E. (2001). *Practical Research: Planning and Design* (7th ed.). Merrill/Prentice Hall: New Jersey.

Love, D., McKean, G., Gathercoal P. (2004). Portfolios to Webfolios and Beyond: Levels of Maturation. *EDUCAUSE Quarterly*, 27, pp. 24-37. Retrieved on December 28, 2004 from <http://www.educause.edu/ir/library/pdf/eqm0423.pdf>

Minnesota Virtual University (2005). *Glossary*. Retrieved on February 10, 2005 from <http://www.mnvu.org/mnvu/265.jsp>

National Learning Infrastructure Initiative, (2004). *Definition and Importance of ePortfolios*. Retrieved on December 10, 2004 from <http://www.educause.edu/ElectronicPortfolios/2600>

Panettieri, J.C. (2004, May). Can ePortfolios Connect? *University Business*, 7, pp. 93-96.

Retrieved January 3, 2004 from

<http://0-search.epnet.com.janus.uoregon.edu:80/login.aspx?direct=true&AuthType=cookie.ip,url,uid&db=aph&an=13125074&loginpage=loginpage=login.asp>

Plymouth State University (2005). *PSU Student Handbook*. Retrieved on February 7, 2005 from

<http://www.plymouth.edu/psc/stulife/handbook/definitions/>

Rogers, G. M., Williams, J. (n.d.). *Building a Better Portfolio*. Retrieved on January 5, 2005 from

http://www.prism-magazine.org/january/html/building_a_better_portfolio.html

Savarese, J. (2004, August). The Killer CIO. *University Business*, 7, pp. 29-31. Retrieved January

18, 2005 from <http://0-search.epnet.com.janus.uoregon.edu:80/login.aspx?direct=true&db=aph&an=13918818>

Siemens, G. (2004, December 16). *ePortfolios*. Retrieved on December 28, 2004 from

<http://www.elearnspace.org/Articles/eportfolios.htm>

Walz, P. (2004, February 19). *EPortfolios: What's behind the hype?* Retrieved on December 28,

2004 from <http://istpub.berkeley.edu:4201/bcc/Spring2004/eportfolio.html>

Wheeler, B. (2003, October 30). *ePortfolio Project: Open Source ePortfolio Release 2.0*.

Retrieved on January 12, 2005 from

https://oncourse.iu.edu/development/documents/Portfolio_Proposal_Public.pdf

Writing@CSU (1997-2005). *Overview: Content Analysis*. Retrieved on January 15, 2004 from

<http://writing.colostate.edu/references/research/content/index.cfm>

Young, J. R. (2002, March 8). 'E-Portfolios' Could Give Students a New Sense of Their

Accomplishments. *Chronicle of Higher Education*, 48, pp. 31-32. Retrieved on January

24, 2005 from <http://0-search.epnet.com.janus.uoregon.edu:80/>

[login.aspx?direct=true&db=aph&an=6351408](http://0-search.epnet.com.janus.uoregon.edu:80/login.aspx?direct=true&db=aph&an=6351408)