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Web-based portfolios in higher education

Marilyn Murphy
University of Northern Iowa

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Abstract

Portfolios offer an authentic means of assessment for higher education. The management of paper portfolios, however, is problematic,. Electronic portfolios solve many of the problems associated with paper portfolios and offer several added benefits. Making electronic portfolios accessible on the World Wide Web is advantageous for faculty, students, and employers. The problems associated with web-based portfolios are generally manageable.

WEB-BASED PORTFOLIOS IN HIGHER EDUCATION

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Marilyn Murphy

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Sharon E. Smaldino

May 10, 2001
Date Approved

Graduate Faculty Reader

Mary C. Herring

May 10, 2001
Date Approved

Graduate Faculty Reader

Rick C. Traw

May 14, 2001
Date Approved

Head, Department of Curriculum and Instruction

ABSTRACT

Portfolios offer an authentic means of assessment for higher education. The management of paper portfolios, however, is problematic. Electronic portfolios solve many of the problems associated with paper portfolios and offer several added benefits. Making electronic portfolios accessible on the World Wide Web is advantageous for faculty, students, and employers. The problems associated with web-based portfolios are generally manageable.

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Chapter One

Introduction

Portfolios have become an accepted means of assessment in higher education in the past decade. Portfolios are carefully chosen collections of student work that demonstrate effort, progress, and achievement. Portfolios have largely been adopted by educators because they have the potential to support the development of problem-solving, decision-making, and communication skills and to facilitate student reflection. Reflection is a major component to portfolio creation, since students may actually learn more from the reflection on their experiences than from the experiences, themselves. Student reflection allows the student to step back from the experience and form connective links, rethinking past experiences in the context of newer experiences and finding ways to apply knowledge gained from past experiences to future activities. Student portfolios, typically, include both the artifacts of the learning experiences and reflections on those experiences.

Traditionally, portfolios have been stored in notebooks. Sometimes these notebooks combined paper and audiovisual artifacts. Maintenance and storage problems with the notebooks, however, led educators to seek other storage solutions. CD-ROM appeared to be an ideal storage medium. It offered students the opportunity to save digital versions of the usual portfolio artifacts in one convenient place. The technological enhancements made possible by electronic

storage could add value to the portfolio. In addition, the technological skills needed to produce an electronic portfolio could be beneficial to the students.

In the past three years, a few institutions of higher education have started storing student portfolios on servers on the World Wide Web. Proponents of these web-based portfolios state that this type of storage solves many of the problems posed by CD-ROM based storage and holds even more promise for education.

Educational institutions are increasingly seeking effective methods for assessing student achievement and growth. Instructional programs are seeking authentic means for students to demonstrate competence in areas identified by national, state, and institutional standards. Portfolios offer a possible solution. But the use of portfolios in higher education is a recent, and largely unstudied, development. This review will study the benefits and challenges presented by the use of portfolios in higher education. It will look specifically at the use of CD-ROM and the World Wide Web as vehicles for storing and presenting portfolio artifacts. It will also examine the research pertaining to the use of web-based portfolios in higher education.

Methodology

The scholarly literature was searched for articles pertaining to the implementation of electronic or web-based portfolios in higher education. The ERIC database was searched. Emphasis was placed on finding articles published in the last three years, since the field is changing rapidly and electronic portfolios

are a relatively recent development. Other databases, such as PsychInfo, Expanded Academic Index, Humanities Abstracts, Cumulated Index to Nursing and Allied Health Literature, and WilsonSelectPlus, were also searched. Since most of the articles pertained to pre-service education students, a special attempt was made to locate articles in disciplines other than education. Only a few articles appear to have been published in other disciplines, however.

Since web-based portfolios are relatively new to higher education, the World Wide Web was also searched extensively, in pursuit of recent research. A number of conference papers were located on the web and included in this review.

Research Questions

Web-based portfolios are gaining favor in higher education. Their use, however, raises a number of questions. This review will attempt to answer the following questions:

1. What are the benefits of using portfolios in higher education?

2. Are web-based portfolios more beneficial than paper or CD-ROM based portfolios?

3. What problems do web-based portfolios present and how can these problems be overcome?

4. What has research shown about the use of web-based portfolios in higher education?

Terms

Digital portfolio: A digital portfolio is a purposeful collection of work, all recorded digitally, that serves as an exhibit of individual efforts, progress, and achievements in one or more areas.

Electronic portfolio: An electronic portfolio is a purposeful collection of work, captured by electronic means, that serves as an exhibit of individual efforts, progress, and achievements in one or more areas. An electronic portfolio can include both digitally recorded materials and materials recorded in other electronic formats, such as videotape or audiotape.

Hypertext: Hypertext is a term coined in the mid 1960s for a collection of documents containing cross-references or links which, with the aid of browser software, allow the user to move easily from one document to another.

Hypertext Markup Language (HTML): Hypertext Markup Language is the hypertext document format used to write World Wide Web pages.

Portfolio: A portfolio is a purposeful collection of student work that demonstrates effort, progress, and achievement. The portfolio is generally used as a means of student assessment.

Web-based portfolio: A web-based portfolio is a purposeful collection of work, stored on a World Wide Web server, that serves as an exhibit of individual efforts, progress, and achievements in one or more areas. It utilizes hyperlinks to connect the various parts of the portfolio and to connect to the outside world.

Chapter Two

Analysis and Discussion

Paper portfolios. Paper portfolios can be an important part of the higher education experience. Campbell, Melenyzer, Nettles, and Wyman (2000) identify a number of benefits that can be derived from using portfolios in higher education. Using portfolios helps the faculty to assess student performance, communicate the relationships among various courses and assignments, and communicate the vision of a program. Portfolios also facilitate program evaluation and help students to be active, reflective, and autonomous in their learning. Student portfolios, furthermore, can serve as marketing and credentialing tools after graduation. Hartnell-Young and Morriss (1999) also found that portfolio development empowers students by encouraging reflective practice, encourages students to capitalize on their strengths, encourages students to self-identify areas for improvement, accommodates diversity, and facilitates a view of the whole student. Herman and Morrell (1999) stress that portfolio development allows learners to focus on developmental issues that are important to them and allows learners to demonstrate their skills over a period of time.

Assessment by portfolio often motivates interest in learning (Boulware, Bratina, Holt, & Johnson, 1997). Some authors suggest that students in classes using portfolio assessment feel less anxious about learning course content and, therefore, have more intrinsic motivation for learning (Read & Cafolla, 1997).

Wiedmer (1998b) similarly states that students who develop portfolios demonstrate more interest in learning, increased motivation to achieve, and a stronger sense of responsibility for their own learning. McKinney (1998) states that the reflective nature of portfolios allows learners to make connections, rethink past experiences in terms of new ones, and develop ideas for applying these insights to future activities. Georgi and Crowe (1998) state that portfolios allow for more integration and critical thinking; learners are given an opportunity to make connections between theory and practice and to reflect on change and growth. Portfolios can also be used to demonstrate learning outcomes to parents, accrediting bodies, funding resources, and other groups (Leeman-Conley, 1999).

Maintaining paper portfolios can be problematic and time-consuming, however (Koca & Lee, 1998). Storage of big, heavy notebooks is a problem. Colleges have difficulty storing several hundred binders each year and saving those portfolios for five to seven years. Maintaining the integrity of the portfolios is also a problem; materials can easily be lost or misplaced. Transporting the heavy notebooks from place to place is also difficult (Aschermann,1999; Georgi & Crowe,1998; Li, 1999).

The creation of only one copy of a paper portfolio causes problems with ownership and access. Students often want to take the portfolio with them upon graduation and colleges often need the portfolio for review and accreditation.

Access to paper portfolios is problematic because only one person at a time can review the document (Georgi and Crowe,1998).

Electronic portfolios. Electronic portfolios can help to solve the problems often associated with paper portfolios. Storing portfolios digitally saves space (Tuttle, 1997). Electronic portfolios can be stored in a variety of formats including computer diskette, CD-R and CD-RW, high density floppy (Zip Disk), World Wide Web or Intranet, Jaz disk, or DVD-RAM (Barrett, 1999). Digital storage eliminates the problems of (1) cuing audio and video tapes to the correct spot; and (2) gathering all the equipment together to access the various components of a portfolio. Retrieval of artifacts is much simpler and faster when they are stored digitally, rather than in a combination of paper and tape. (Georgi and Crowe,1998; Oros, Morgenegg, and Finger,1998).

Ownership, access and transportation are also less problematic with an electronic portfolio. Since it is easier to make multiple copies of an electronic portfolio, the student and the college can both retain a copy. Several individuals can review a portfolio simultaneously. CD-ROM-based portfolios are small enough that they can be mailed to reviewers or potential employers (Li, 1999). The incidence of misplacing artifacts is also decreased, since the parts are stored digitally and connected with hyperlinks (Tuttle, 1997).

Benefits of electronic portfolios. Electronic portfolios present the same benefits as paper portfolios, but also have other benefits to offer. Barrett (1999)

states that electronic portfolios offer students practice in developing multimedia technology skills. Electronic portfolios to be a way for students to upgrade their technology skills and later use those technology skills in their workplace (Li, 1999). The need for technology literate professionals will continue to increase, according to Georgi and Crowe (1998), and electronic portfolio development can help to train these professionals.

Portfolios in the electronic format make it possible for students to display unique talents and abilities and allow students to see and hear their own professional growth. The electronic portfolio requires active participation from students, because students must decide the most effective way to allow the reviewer to see, hear and review the artifacts that demonstrate the student's abilities (Wiedmer, 1998a). Electronic portfolios maximize different learning styles by allowing communication with various media formats. Similarly, electronic portfolios address a variety of audience intelligences (Corbett-Perez & Dorman, 1999; Hartnell-Young & Morriss, 1999).

McKinney (1998) found that students also believed that the introduction of technology into the portfolio project had a positive impact. Her survey of undergraduates found that the nonlinear nature of the electronic portfolio allowed them to easily make connections. The students also said that technology gave them the ability to personalize the way they demonstrated their learning. The

respondents believed the technology put them on the cutting edge and would be helpful in finding employment and useful in their future work environment.

Problems posed by electronic portfolios. Electronic portfolios can be problematic for colleges, however. Several challenges to electronic portfolios have been identified. These challenges are the lack of time, the lack of support, and limited resources.

Lack of time is a major problem. Students lack the time to learn about the technology and its potential and lack the time to experiment with the technology in supportive environments. Portfolios, by their nature, need to be completed near the end of the semester at the end of the undergraduate program. This is a time when other projects and activities are due and time is most precious (McKinney, 1998).

Lack of support is also a problem. Many electronic portfolio projects lack both technical support and support from peers and administration. Electronic portfolio projects often point out uncoordinated campus infrastructures and disjointed attempts to infuse technology into the classroom (Diller, Eccles, Sawyer, & Vaughan, 2000).

Limited and always changing resources is the third challenge. Materials, software, hardware, and funding must consistently be available if the portfolio project is to be successful. Time and effort needs to be spent on hardware and software issues up front. Time and money can be lost if these issues are handled

poorly. Colleges need to give consideration to software licensing agreements and need to plan adequate storage and memory for large files (Wiedmer, 1998a). Ideally, the software and hardware should be available at home, as well as on campus.

Electronic portfolios also pose a training problem for many colleges. Colleges need to plan to train students to use technology. Electronic portfolio projects presuppose a certain level of technological skill. Some students possess those skills and other students are definitely lacking. Students will need extra assistance with technology, especially at the beginning of the portfolio project. Help is needed in the early stages of the project in order to build confidence and motivation and to help them see the value in spending time on learning the technology. Students producing electronic portfolios expressed initial anxiety about using technology to construct the portfolio and the anxiety continued throughout the portfolio construction process. When asked what kind of assistance they would need with the portfolio, all of the students in this study focused on technology assistance, rather than assistance with the conceptual issues behind portfolio construction (Diller et al., 2000).

An over-emphasis on technology can also be a potential problem with electronic portfolios. Some students tend to spend more time on learning the technology than on choosing the content of the portfolio (Diller et al., 2000). McKinney (1998) found that students sometimes include technological bells and

whistles, at the expense of content. Wiedmer (1998a) expressed a concern that electronic portfolios could be used to distort reality about performance; high-tech features in a portfolio could mask a student's lack of knowledge or lack of performance.

The technology, itself, sometimes poses problems for portfolio developers. Georgi and Crowe (1998) report that files can be accidentally or maliciously destroyed, computer systems can crash, and students frequently forget their passwords. Students find that long documents have to be reduced to fit the slide or card when using PowerPoint or HyperStudio (VanMetre, 1998). Students frequently need to rework projects so they are compatible with portfolio software. Software and hardware compatibility issues also pose problems (Diller et al., 2000).

Storing electronic portfolios. Another problem posed by electronic portfolios is the issue of storage. Early versions of the electronic portfolio were usually stored on CD-ROM. Using CD-ROMs for portfolio storage offers a number of advantages. A CD-ROM can store up to 650 megabytes and is cost-effective, especially when purchased in bulk. CD-ROMs are easily transported, since they are small and lightweight, and they are virtually indestructible. CD-ROMs are a good medium for storing data in an incorruptible format, since they are not erased easily. The standardization of the CD-ROM data-encoding process makes it easy for any CD-ROM drive to read any CD-ROM (Wiedmer, 1998a).

Storing portfolios on CD-ROM, however, can also pose problems. CD-ROMs can be difficult to change or upgrade. Access to computers with CD-writing hardware and software and sufficient hard drive space and system speed to efficiently burn CDs can be problematic. Access to hardware and software could be especially difficult for graduates who would no longer have access to specially-licensed software in use on their campuses. Making multiple copies of CDs is also difficult, since it usually takes ten to thirty minutes to burn a single CD-ROM. New rewritable CD-ROMs cannot be read by older CD drives (Aschermann, 1999; Porr, n.d.; Wiedmer, 1998a).

The use of CD-ROMS for portfolio storage may also pose problems for prospective employers. Li (1999) surveyed ten school districts, asking whether they would be open to receiving applicants' portfolios on CD-ROM. Districts expressed concern about losing the CDs, not knowing how to file the CDs, and not having easy access to a computer with a CD-ROM player.

Storing the electronic portfolio on a web server can solve some of the problems associated with CD-ROM storage. Web browser software and HTML were designed to render web pages on a variety of computer platforms (Barrett, 1997; Read & Cafolla, 1997). Diller et al. (2000) report fewer problems with hardware and software compatibility and equity and access, since specialized software is no longer used for portfolio creation. Since most people are familiar with browser software, reviewers need not learn how to navigate a new software

package in order to view a portfolio (Leeman-Conley, 1999). Web-based portfolios can be easily upgraded since HTML editing software can be downloaded for free from the web. These portfolios can also be accessed simultaneously be multiple people, solving the problem of multiple access during the interview process (Aschermann, 1999).

Benefits of web-based portfolios. Storing the electronic portfolio on the web can offer other benefits, as well. Watkins (1996) sees the major benefit of web-based portfolios as the ability to link to outside works and resources. Web-based portfolio projects encourage students to conduct research on the World Wide Web and link the results of that research to their portfolios (Chappell & Schermerhorn, 1999). Making connections with the resources found on the web and applying the information found there involves critical analysis and information-processing skills (Goldsby & Fazal, 2000). Hypermedia provides opportunities to find and form connections in dynamic, non-conventional, and learner-controlled ways (McKinney, 1998).

Web-based portfolios support the constructivist view of education (Read & Cafolla, 1997). The constructivist view purports that learning is a process of building knowledge structure by connecting what is known to new information and integrating them to form new understandings. Milman (1999) asserts that web-based portfolio creation is a constructivist process that promotes an examination of students' beliefs, philosophies and objectives. Students have to

decide what to include, determine how to organize it on the web, and work collaboratively with others in the class.

Web-based portfolios offer unlimited possibilities for interaction among students and faculty worldwide (Georgi & Crowe, 1998). Placing portfolios on the web gives students the opportunity to share their on-going portfolio construction with their fellow students. Jacobsen and Mueller (1998) concluded that students gained from viewing models of other students' writing, design, and organization. Research conducted by McKinney (1998) found that students liked being able to discuss ideas with other members of their class and that they viewed their cohort group as a source of support. Because web-based portfolios can be accessed from anywhere, it is also possible to include alumni and other constituencies in the review process. The value of an external perspective could have a real impact on the quality of student work (Rogers & Williams, 1999).

The quality of student work could also be impacted just by placing the portfolio on the web for the entire world to view. Aschermann (1999) reported that students took greater effort and pride in their portfolios, when Missouri Western State College switched from paper portfolios to web-based portfolios. Jacobsen and Mueller (1998) also found that students were more careful about editing and proofreading when writing for a worldwide audience. Publishing on the web for the whole world to see could also lessen students' temptation to

recycle papers or plagiarize the work of others, according to Leeman-Conley (1999).

Publishing portfolios on the web also gives students experience using HTML. In a comparison of various software packages, Barrett (1999) found HTML editing software to be easier to use than most other portfolio software, including hypermedia software, relational database software, multimedia authoring software, and presentation software. A survey of students who completed web-based portfolios showed that almost all students agreed that knowledge of HTML would be valuable to them in the future (Jacobsen and Mueller, 1998).

Web-based portfolios are generally viewed positively by both their student creators and by the outside community. Leeman-Conley (1998) surveyed adult students who had completed web-based portfolios. The mean rating on interest in developing an electronic portfolio was eight on a scale of ten. Learning the technical skills necessary to develop the portfolio and web page was the students' main interest, with a mean rating of 8. Using the portfolio with potential employers or for career advancement also scored an 8. Having the portfolio as an archive after graduation rated 7.6. Research conducted by Milman (1999), with students at the end of a web-based portfolio project, found that students perceived the project to be a very positive process which enhanced their technology skills and made them for marketable for teaching positions.

Chappell and Schermerhorn, (1999) identified benefits seen by various stakeholders. For university administrators, the identified benefits are (a) outcome assessment, (b) meeting the objectives of accrediting agencies, and (c) the fact that it is a selling point to outside constituencies. For faculty the benefits are (a) shifting responsibility for learning back to the students, (b) providing a consistent technology platform across classes, (c) holistic student evaluation, and (d) comprehensive curriculum development. For students the benefits are (a) a comparison across students, (b) inter-disciplinary support of technology, (c) an integrative view of career development, and (d) the ability to continue to use the portfolio after graduation. For employers the benefits are (a) an inexpensive means to examine the credentials of applicants, (b) a long-lasting relationship with the institution, (c) elimination of distance as a hindrance to career placement, and (d) excellent documentation for interviews. For parents and alumni the benefits are (a) a recruiting tool, (b) increased feedback, and (c) the promotion of career readiness at the time of graduation. Employers, students, faculty, and university administrators can identify the benefits of web-based portfolios.

Problems posed by web-based portfolios. While web-based portfolios are beneficial for most constituencies, they are not without their problems. One of the primary concerns is privacy. Students may be reluctant to share their artifacts with the world. Students may be reluctant to share their in-progress works on the web, out of fear that they might be copied by other students. Students may not want to

include personal information if the site is open to the public. Colleges may want to restrict access to instructors and other specific individuals by using password protection, in order to maintain student privacy (Aschermann, 1999; Diller et al, 2000; Goldsby & Fazal, 2000).

Cost is another concern. Goldsby and Fazal (2000) state that there will be initial set-up costs. These costs include costs for computers and digital equipment, costs associated with training faculty and supervisors, and ongoing support costs. The cost of disk space and web-site maintenance may make it difficult for an institution to make the portfolios available on a web server indefinitely (Diller et al., 2000).

Technical training is the primary concern about web-based portfolios. All electronic portfolios require technical skills. Chappell and Schermerhorn (1999) found that students initially have problems moving from paper portfolios to online portfolios; student thinking patterns must adjust to the nonlinear nature of the web. Students' lack of computer skills and vocabulary, and resistance to taking time to read the instructions were also problems. Barrett (2000) states that web page development also poses a steep learning curve for the students; web pages require more file-management skills than the other types of portfolio management software. Milman (1999) also found that students perceived web-based portfolios to be complex and demanding. The amount of information available on the web can pose a problem for portfolio developers. Students should be encouraged to

include links to resources on the web, but they must also be taught to distinguish between reputable and unreliable sites (Goldsby & Fazal, 2000).

A number of strategies have been suggested for coping with the training issue. Chappell and Schermerhorn (1999) suggest using an online tutorial with step-by-step instructions and links to sample portfolios, frequently asked questions, and an HTML tutorial. They also suggest using defined deadlines, regular feedback to students, the provision of successful examples, and using student workers to provide technical support. Leeman-Conley (1999) advocate the development of a portfolio handbook, assigning each student a portfolio adviser, and creating a buddy system in which students teach other students. Instructors should also be aware of differing student levels of technological ability and be willing and able to offer differing amounts of instruction and support (Jacobsen & Mueller, 1998).

One strategy for dealing with training is a technology course or workshop series. Goldsby and Fazal (2000) suggest teaching a technology course early in the student's program of studies and providing the portfolio evaluation rubrics to the student early, as well. Read and Cafolla (1997) describe the use of four training seminars for students. In the first seminar, students are instructed in using HTML files, gathering student samples, obtaining graphics, locating demonstration teaching videos, and developing sound recordings. Other seminars are devoted to importing text files and audio and video components. A fifth seminar devoted to placing the portfolio on the web is planned.

Instructors can play a major role in the training of students. Leeman-Conley (1999) suggest training all of the instructors and asking the instructors to pass the technology skills on to their students. A hands-on lab for faculty and faculty-development-liaisons may facilitate the training of faculty. Faculty can also prepare students for the portfolio process by incorporating technology in other assignments in the program (Diller et al., 2000).

Chapter Three

Conclusions and Recommendations

The use of student portfolios as assessment tools in higher education has been fairly generally accepted in the past decade. Portfolios have been shown to help faculty authentically assess student performance, communicate the relationships among various courses and assignments, facilitate program evaluation, and help students become more active, reflective, and autonomous in their learning.

Paper portfolios are difficult to manage, however. Electronic portfolios offer the same advantages as paper portfolios, but are easier to manage and share. Typically, these electronic portfolios have been stored on CD-ROM. Problems with CD-ROM storage, however, have recently prompted a few educators to pilot web-based portfolio projects.

Web-based portfolios, the literature seems to indicate, offer the same benefits as paper and CD-ROM based portfolios and solve many of the problems associated with those two formats. Web-based portfolios allow students to link to related resources and engage in a constructivist learning process, to easily share their work with colleagues and the outside world, and to gain expertise with technology and HTML. Web-based portfolios pose some problems for colleges, however. These challenges include the issues of student privacy, the cost of developing and maintaining the portfolios, and the need for technology training for students.

The research on web-based portfolios is new and somewhat limited. Many of the web-based portfolio projects have been pilot projects, involving only those students who volunteered to participate. Virtually all of the research has been conducted with preservice teachers; it is not known whether the conclusions would be valid for students in other disciplines. While the web-based portfolio seems to be a valid, manageable assessment instrument, further research needs to be conducted before higher education adopts this assessment tool on a wide-scale basis.

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