

Design, Development, and Evaluation of Electronic Portfolios for Advanced Degree Programs in Technology and School Media

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Abstract

Across the various programs of study, portfolios serve many functions and purposes. Electronic portfolios have been used as a culminating product for students in our Master of Library Science and Master of Education in Instructional Technology at East Carolina University. Two conclusions were drawn from this study - (1) authentic assessment using portfolios is useful for facilitating reflective thinking that results in self-regulated learning, and (2) student products in the form of electronic files can be archived, indexed and used as evidences in program evaluation.

Introduction

The need for authentic methods for assessing educational outcomes has led to a move from quantitative measures to a more an open-ended qualitative format. Through the use of portfolios, students are able to select and evaluate their own products of learning and present these for final certification before entering their respective professions. The portfolio provides, not only a method for assessment, but also is a catalyst for learning. These measures are dependent on process, as well as outcomes from the learning experience. Using the processes for selection, evaluation, and alignment of work samples with a particular standard for excellence would likely help the student transfer what is learned within the laboratory setting to the real world of work (Wolf, 1998).

Portfolio Formats and Functions

One of the earliest reported uses for the portfolio was in the visual arts for the purposeful collection of one's best work (Friedman Ben David, et al., 2001). Many schools continue the use of the showcase portfolio to display exemplary student products as a culminating experience and for prospective employers (Baltimore & Hickson, 1996). When using this type of showcase portfolio, there are no comparisons between entry-level work and expert performance by the student. Thus, the contents do not provide substantial evidence that training or education has had notable impact on the student.

Because of our society's evolution from industrial- lockstep work environments to more open-ended- informational environments, there is an important emphasis on authenticity in student learning experiences. Employers are looking for candidates who can examine their environment, draw logical conclusions, and develop problem-solving strategies based on a given situation (Weiner, 2000). This is accomplished through the use of situated problem solving and authentic assessment of outcomes from learning (Young, 1995).

Another important use of portfolio is program evaluation. Portfolio assessment requires the careful analysis of program goals and objectives and how these are transferred to the course activities and assignments. Student artifacts should mirror program goals. When this is evident within the portfolio, evaluation of the program of study is facilitated (Koretz, 1992; Payne, 2000).

Portfolios and Learning

Regardless of format, function, or purpose, portfolios can be classified as either capstone experience (showcase) or a record of process in learning (assessment portfolio). The capstone portfolio includes stand-alone evidence for mastery of program objectives, examples of student's best work, and documents from culminating experiences. Typically, accomplished students who are about to enter their chosen profession are associated with the "capstone" category. Programs that require the capstone (or showcase) portfolio should specify work samples that will be of interest to prospective employers and artifacts that are cognizant of the profession. In addition, expectations and standards for best practices must be clearly communicated to the student (Skawinski & Thibodeau 2002).

A second category is the "process or learning portfolio." The contents represent processes for cognitive growth, interrogation of the learning environment, self-assessment using recognized standards, and transference of learning to the workplace. For the instructor or faculty member, there is a responsibility to the student to monitor cognitive growth as a result of assigned projects and field experiences. By providing cognitive

scaffolds for reflection, self-assessment, and strategies for making changes, the process approach to learning is exemplified within the contents of the portfolio (Murphy, 1997). The instructor/assessor acts as a guide or proctor during the development of the portfolio, and models collaborative practices as mentor and mentee work together to select artifacts and other evidence that show growth over time. An important role of the instructor/assessor is to provide critical commentary and invite the student to defend, justify, and make adaptations to his or her work samples. The dialog between faculty and student can be very productive during these advising sessions.

In addition to evaluation of student learning, either process or capstone portfolios, are useful for the analysis of a program of studies. Program evaluation is facilitated when key players for the portfolio process are committed to the necessary time requirements, practices for self-evaluation, and adoption of authentic assessment methodologies (Johnson, et al., 2000; Campbell, et al., 2000; Baume & Yorke, 2002). For the student, this means gaining skills as a reflective practitioner. He or she must be willing to adopt the process-approach for learning. This means entering the program as a novice, accepting critical commentary, working through revisions, and planning for the future. For the assessor, it requires a commitment for adequate time with students for mentoring and modeling for reflective practices (Freidus, 1996). In addition, there must be time devoted to careful planning for program goals, objectives, and classroom activities that reflect these objectives.

Reliability and Validity Using Assessment Portfolios

A major consideration with implementation of portfolio assessment is reliability of measures and validity of the assessment. Latrobe and Lester (2000) discovered in their Library Science program that establishing valid measures is difficult because competent performance may... “vary in depth, in approach, and in the specificity of the professional work addressed....”. Although it is difficult to gather data related to reliability in portfolio assessment, (Friedman Ben-Davis & et al., 2001) as a result of this review, several studies were identified, and were supportive of, portfolios for assessment purposes (Baume & Yorke, 2002). Other reports are not as encouraging (Koretz, 1998). There are, however, certain characteristics that were apparent in programs with reports for reliable use of portfolio assessment. Measures are reliable when there is evidence that portfolio contents represent an accurate picture of the program goals/objectives or other recognized standards for the profession (Bullock & Hawk, 2001; Campbell, et al., 2000; Pitts, Coles, & Thomas, 2001; Routledge & Willson, 1997). In addition, correlations among assessors’ scores are high when there is evidence for clear-cut indicators of acceptable performance. Another characteristic associated with the reliable use of portfolios is the selection of artifacts; either specified in advanced or self-selected by the student, these should be representative of program goals and objectives. Along with specific criteria, there are standardized levels of difficulty and consistency in characteristics of the evidence or artifacts. Reports from the literature suggest that correlations can be very low when there are inconsistencies among artifacts. Reliability measures were high when clear-cut criteria for evaluation had been agreed upon by assessors and performance indicators were representative of the standards or competencies adopted by the program. Reliability measures were also high with reports for sufficient training of assessors.

One strategy used by programs to ensure strong reliability and validity measures was through collaborative meetings to reach consensus on scores. When planning implementation of portfolios, faculty should meet to analyze the strength of relationships between program goals, performance indicators, and quality of the portfolio contents. Typically, there are three assessors assigned to a team. Contents are evaluated by the first 2 assessors who score independently. When there are wide differences in scoring, a third assessor reads and evaluates only those sections with disparate scores. (Baume & Yorke, 2002; Friedman Ben David, et al, 2001; Davis, et al., 2001; Skawinski & Thibodeau, 2002) Of the studies reviewed, the third reader usually scores in agreement with “pass” or “marginally pass”. Careful alignment of program objectives with course activities, clear communication of expectations aligned with these objectives, and a specified standard for formatting and presentation of the portfolio were all associated with valid and reliable measures.

Purpose of the Study

The purpose of this study was to identify specific advantages for the use of assessment portfolios and how these advantages might support the graduate programs' goals and objectives. To satisfy these purposes, a formative evaluation of student reflections and faculty satisfaction for use of portfolio as a method for assessment was conducted. Three main areas were the focus of the study - student response to portfolios with reflective writing as a metacognitive process, validity of the evaluation methods, and solutions to management of data for program evaluation.

Self-regulated Learning and Reflective Writing

As a method for evaluating student response to electronic portfolios, end of course surveys were sent to students enrolled in the graduate level course "Development of Electronic Portfolios". The course was offered as an elective for students enrolled in any of the department's three graduate programs. The two main objectives for the course were (1) guide students through the reflective writing process, and (2) teach skills for file management and design of the portfolio using web editors. Students also increased their comfort level in the use of tools for electronic file transfer and online development of the course projects. The course received high evaluations and has been requested for subsequent semesters. There are two reasons for this. First, students recognized the need for developing their portfolios with skill, accuracy, and as a true measure of academic achievement. The course seemed to meet this need. Secondly, students were able to interact with the instructor (also their faculty advisors), and with each other, for feedback on their progress in developing the portfolio. Dialog was constructive within a nonthreatening environment thus students experienced a formative assessment of their work contributing to greater confidence for completing the portfolio.

An important concept built within the course was self-regulated learning using the reflective writings for each artifact. Self-regulation as a method for achieving learning goals leads to increased motivation, self-monitoring, attention control, application of learning strategies, and other metacognitive thinking processes (Ormrod, 1999). Using a theoretical base for self-regulated learning (Zimmerman & Bandura, 1994), questions for the survey were designed to gather information in how students used the development of their portfolios and reflective writings for the following thinking processes - focus their thinking and goal-setting, self-assessment of quality of work based on standards, and time management strategies. Table 1 provides a summary of comments related to each main area of self-regulated learning.

Table 1. *Student comments related to self-regulated learning and use of portfolios.*

For focused thinking, students commented:

Writing the reflection is usually a pretty long process for me that takes a few rough drafts before the final draft is complete. It is almost like I am constantly reflecting on my reflection, if that makes any sense. Hopefully I will become better and more focused on writing my reflections with more experience of doing so. . . . The portfolio definitely forces one to focus upon what one has accomplished. The reflective writings, in particular, has helped me to focus on what I did, why it was important, how it could be improved, and how my future will be impacted by what I did.

For self-assessment of progress, students commented:

I do think that my portfolio will help me assess my progress as I complete more courses during my degree. Hopefully the quality of my artifacts and reflections will improve each course and by adding those to my portfolio will help me see if this happens or not. I also think that my portfolio layout will probably change over the course of completing my degree. I will reflect as well on the layout and design to hopefully make it look even better and more professional for others get a clearer picture of who I am and what I have to offer. . . . The reflective writing process enabled me to assess my progress (where I've been) and decide the future path to take (where I want to go).. . . Through reflection I have learned to assess the strengths and weaknesses of a project, which in turn helps me decide how I can plan the next project more efficiently.

For Time-management, students commented:

I do feel that the portfolio has contributed to my planning and organization, but do not feel the reflections have done the same. . . I would have completed the portfolio in a timely manner regardless of disciplined planning. I have difficulty with time management, and I cannot honestly say that the portfolio has contributed to better organization. . . . the reflective writing did not affect time management.

Students reported less than favorable improvement in time management associated with

reflective writing and the portfolio process. It likely that additional time needed to learn new skills for developing the electronic portfolio had a negative effect on their perceptions for time management. In addition, students may have misinterpreted the survey question and answered as time required to develop the portfolio rather than the actual intent - improved time management skills for course assignments as a result of the reflective writings.

Reflective Writings for Self-assessment

Each artifact in a student's portfolio must be aligned with a standard, professional competency, or program objective. Program areas vary in their decision to allow students' self-selection of artifacts. Reports in the literature suggest student self-selection is beneficial for self-assessment and monitoring of one's own learning. However, for program evaluation, our program area faculty have consistently recommended pre-selected artifacts that can be archived and used for program evaluation and accreditation purposes. Each core course within their degree program includes an assignment that is designated for the student's final portfolio. The student must analyze the requirements and final outcomes from the assignment to determine appropriate standards, competencies, or objectives. Students are taught to describe the what, how, and where of an assignment, describe outcomes ("are you satisfied, what would you change about your final product?") and to align their assigned work sample as evidence for meeting the standard, objective, or competency. Students must also reflect on how the assignment will impact their future career goals. The rationale for including this requirement to the reflection is to aid in transfer of skills and concepts to future work environments. In Table 2, is a student's reflective writing that provides clear and consistent evidence that a competency has been met and that transfer to the workplace is highly probable.

Table 2. *Sample of Student Reflective Writing.*

LIBS 6014 Introduction to Reference. Reflection MLS Program Objective 3: To answer reference questions using print and electronic resources

In LIBS 6014, students were asked to "compile a pathfinder of reference sources on a specific topic designed for a specific user group and based on a review of the existing literature in any given subject field." I chose to create a pathfinder on plants since I am teach third grade Science, and this would be useful to me in my classroom since the North Carolina Standard Course of Study includes plant adaptation and growth as Goal 1 in third grade. . . . Since creating this pathfinder, I have been compiling pathfinders on other thematic units that I currently teach as well as others that I think will help my colleagues. I have shared my pathfinders with my colleagues and media specialist at my school. Whenever a teacher begins a new thematic unit, they now come to me for guidance.

Artifact: Pathfinder for 6018:

"Election Year Politics: The Political Right vs. the Political Left: What Does it All Mean?"

This project exemplifies MLS Objective 3: To answer reference questions using print and electronic resources

A pathfinder is a useful tool that points people to sources of information. I chose this topic because it is very relevant to American culture in this election year. This pathfinder will help someone without a political background read and comprehend an article about the election.

I found most of my sources in Joyner Library on the ECU campus, but many, if not all, of these sources can be found at any public or academic library. . . . In the future I might change the pathfinder by adding a section aimed at school-age children or by re-writing it with that audience in mind. . . . If I added this section to the pathfinder or re-wrote the whole thing, I would actually strengthen my mastery of Objective 3 because I would be helping answer even more reference questions using print and electronic sources. . . . This project was a valuable one for me because I will be creating pathfinders often as a school media specialist. Overall, the project was very time consuming, but in the end, I was able to acquire or hone the above-mentioned skills for future use in my professional field.

There is one disadvantage for designating a specific project for the portfolio. Students may devote an unbalanced amount of time and energy to the identified project and neglect other equally important assignments/projects. See this student's comment and how she has spent the majority of her time on designated projects -

I initially thought that we would undergo several projects in each class and we would choose our best to be presented in our portfolio. However after these last two semesters, I see there's only one main project per course so now I contribute more planning time to that one project b/c I know it will be presented in the portfolio and it needs to be my best work.

This student unwittingly admitted extra time for the portfolio project as she responded to the survey question on "time management".

Inter-rater Reliability

A major challenge was bringing faculty to consensus on collection methods and format for data used as evidence in the portfolio. Initially, faculty envisioned the evaluation process as a duplication of efforts. "Why should I evaluate student products if they've already been evaluated and graded?" was the general response. With time, faculty began to see the evaluation of the reflective writings as one valid measure of students' mastery of key concepts and skills in the courses.

Simple logistics such as how and when to establish evaluation committees also presented obstacles. Rubrics had to be developed with clear indicators that were directly aligned with either the Program Objectives or standards and competencies recommended by state agencies and learned societies. Much deliberation was required before all faculty were in agreement. Once this was accomplished, committees were formed and student portfolios were efficiently and reliably evaluated at the end of each semester. Students were notified of deadlines well in advance of due dates. This allowed faculty adequate time for the evaluation process and provided the student time to make necessary revisions or updates to their final product.

Each portfolio was evaluated by at least three faculty members. Each indicator within the rubric included a scale of 0 to 5. Total points possible for each indicator being 5 and total points for the entire portfolio being equal to the number of indicators for the entire rubric. The expectation was that 100% of the students reached mastery following recommendations for revisions.

Recommendations

Two advanced degree programs at East Carolina University have used electronic portfolios as the culminating project before graduation. The Master of Library Science began using the electronic portfolio in 2001 (Brown & Boltz, 2002), and more recently, the Master of Education in Instructional Technology requires a similar product during the student's final semester. Upon entry into an advanced degree program, students usually must enroll in one or more introductory courses related to their profession. Seminars or modules devoted to the development of electronic files and use of public domain file transfer software (e.g. WSftp) will prepare students to master the basic technical skills needed for their portfolio. Use of a dedicated, and password protected, server is recommended for maintaining the database with all student portfolios. Access should be restricted to the student's personal directory and limited to faculty teaching in the program area. A screen shot of the database is displayed in Figure 1. Only faculty with administrator passwords can view the entire database. Students may provide prospective employers with the URL to their portfolio homepage and these can be viewed by any browser.

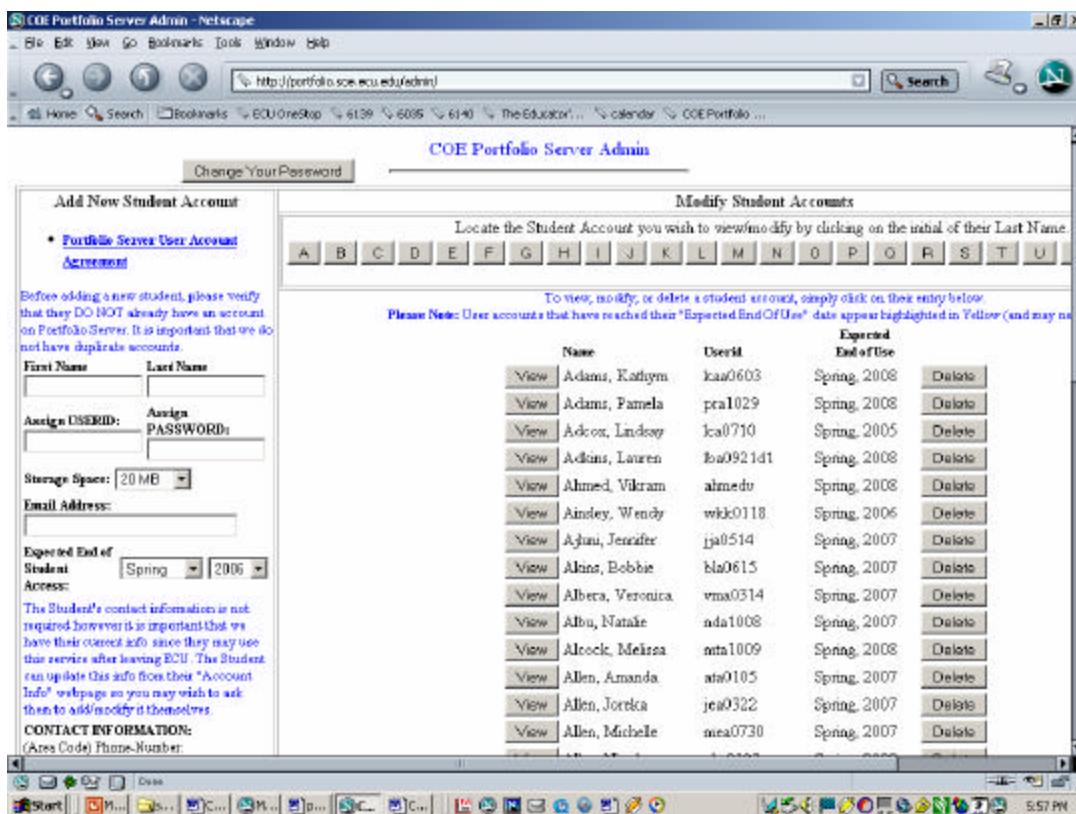


Figure 1. First screen of database with all student portfolios.

This ensures privacy for students and allows a systematic method for indexing student products that can be used for evidences needed for accreditation and program approval by state departments of education. The dedicated server eliminates the necessity for storing student work samples, semester after semester, on faculty hard drives and file cabinets. In addition, students may use the URL to their directory for personal job searches and promotions. The program areas described in this paper allows student access to their personal directory and files for a time period of up to three years after graduation. This provides an incentive for students to invest additional energy and creativity into the quality of their artifacts and design of the portfolio.

Faculty from these programs report favorable responses from students. Students have adopted the use of portfolios as a method for reflectively reporting their personal reaction to course projects and assignments. Support for these conclusions come from (1) anecdotal comments from students and their advisors, (2) written responses to end of course surveys, and (3) reflective writings that justify student artifacts as representative of standards and competencies. Students have become increasingly more sophisticated in their knowledge and understanding in the portfolio as a tool for authentic assessment. Although, many professional programs include the "showcase" portfolio as part of the student's culminating experience, a higher purpose for the use of portfolios is its use as a tool for constructed learning (Paulson & Paulson, 1994). The student must be able to articulate how his or her products reflect the criteria established by the standard. This facilitates transfer to actual working situations as the student enters his or her initial professional setting.

As the instructor/assessor guides and provides council during the development of the contents of a student's portfolio, there is opportunity for dialog and exchange of ideas. The student is able to see the modeling of professional behaviors, attitudes, and skills from a closer perspective than the usual interactions within the classroom setting. This is particularly important advantage for virtual classes and online degree programs. Indeed, the continual evaluation of assignments, and how these relate to professional standards, affirms the student's professional goals, or in some cases, leads to consideration for a change in career paths. For the instructors and faculty of the program, there is opportunity for collaboration with colleagues to examine and evaluate program goals and objectives. Individual evaluation of program objectives and how these are reflected in course syllabi, activities, and assignments are a natural product of the process portfolio.

There is growing evidence that portfolio assessment is a valid measure of skill and concept attainment,

and that there is reliability of measurement for predicting student achievement following graduation. However, research in this area of assessment is still limited. It is difficult to obtain data. There are misconceptions about the purpose and functions for portfolios, and authentic assessment requires a large investment of time. Additional time is needed for training of assessors and for counseling students. From this review and from my own observation of the portfolio process, the additional time needed is outweighed by benefits for student learning and for program improvements. The issues for validity and reliability should be considered before implementation. Faculty should clearly define any or all of the following: program objectives, national or professional standards and competencies, and performance indicators that represent the standards. These should be communicated to the student when entering the program. In addition, students should be advised and mentored with regard to quality of portfolio contents and how these reflect the specified standards and objectives. Finally, assessors should be trained in both consensus scoring and independent scoring procedures, and in determining a holistic evaluation of the final product.

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