THE PROCESS OF ADOPTING ELECTRONIC PORTFOLIOS IN SCHOOLS OF EDUCATION

By

LINDA MENSING TRIPLETT*

DIANE JUDD** DAVINA PRUITT-MENTLE*** ARLENE BOTHWICK**** LAURA TURNER*****
JOYCE MORRIS****** ANN CUNNINGHAM*******

ABSTRACT

There have been many articles written about the variety of ways faculty and students define eportfolios, collect artifacts, write reflections, and use finished eportfolios. However, little has been written about the dynamic process of adopting electronic portfolios in schools of education. This study employs cross-case analysis to investigate implementation of electronic portfolio initiatives in seven schools of education. Case analysis shows the most commonly identified purpose for initiating an eportfolio system to be program evaluation for national accreditation. With program evaluation as the eventual goal of eportfolio development, at least eight design steps of an electronic portfolio process were found to be necessary for successful implementation. These steps are discussed and various methods of implementation are described. Case analysis results further suggest that the final step involving data gathering, aggregation and analysis has been most difficult for these schools to implement. None of the schools represented in this study have yet made use the data collected from eportfolios to make data driven decisions about their programs of study. Suggestions are made for further study into the use of eportfolio data for program evaluation, improvement and ongoing development.

Keywords: electronic portfolio, ePortfolio, assessment, program evaluation, case study, assessment systems, assessment technology.

INTRODUCTION

Electronic portfolios have become a part of many programs in colleges of education. Electronic portfolios are typically based upon national or state professional standards, and are used as a way for students to demonstrate that they have met these standards through their program of study. Because portfolios are repositories of student work, they are often called upon to serve program evaluation purposes. However, institutions of higher education are finds that for electronic portfolio systems requires to be engaged in complex planning and implementation processes to be used successfully for program evaluation. This study attempts to identify the steps in successful implementation of electronic portfolios within several schools of education. By learning from past experiences with electronic portfolios and by studying the steps other institutions of higher education have taken toward implementation, it is more likely that working electronic portfolio systems can be developed.

Portfolios have many important purposes within a college of education or program of study. Richard Stiggins (2005, p. 320) describes a student portfolio as "a collection of student work assembled to provide a representation of student achievement that is a function of the context, the purpose for assessing and communicating, and the learning targets" (goals and objectives) that are being assessed. Barrett (2005) describes portfolios as doing more than showcasing student accomplishments. They provide a rich picture of student work that documents growth over time. Mary Diez (cited in Gibson & Barrett, 2002) describes the portfolio as the mirror, the map, and the sonnet of a student's life. The benefits to students can include opportunities for increased learning effectiveness as well as opportunities to model professionalism.

Portfolios are also used as an instructional method to support reflections that are designed to help students understand their own learning. NBPT standards describe three levels of writing competency important for practicing teachers including: description, analysis and *reflection*. Assessment of student writing at all three levels is facilitated through the use of portfolios. Further, portfolios have the potential to make learners more personally responsible for the achievement of educational goals and professional standards. Teacher candidates trained and experienced in the use of portfolios are thought to have a competitive advantage. They can use their portfolio to demonstrate employment-related skills, as well as disciplinary expertise, and are better prepared to seek national certification (NBPTS). Portfolios promise a viable alternative to current, high-stakes testing, which focuses education on test-taking rather than teaching and learning. Through the use of portfolios, colleges of education give training for students to demonstrate their own learning and accomplishments, and are using this documentation for program evaluation purposes.

Implementing electronic or web-based portfolios is complex and difficult for any institution. Organizational structures and processes must be in place to provide portfolio systems that can manage input from multiple users as well as huge amount of data. Love, et. al. (2004) noted that authentic data must come from the collaborative work of students, teachers, and administrators. The best systems have methods for converting data into information for purposes of analysis, and can provide formative as well as summative feedback. Jafari (2004) discusses the "challenges in order to turn an electronic portfolio concept into a working system" (p. 38) and defines several steps to develop the system: conceptual design (functional and technical requirements), software design (human and computer aspects), and implementation plan (business plan, daily operation, and software upgrades).

This study examines the process of electronic portfolio implementation in seven different colleges of education in order to identify steps in the implementation process. Fullan (2001) describes change as a "detailed and snarled process" (p. 50). Fullan further notes that feedback about a change process gained through implementation in one phase can alter decisions made at earlier stages in the process. While, understanding that change is never a linear process and that no two institutions will implement a change process in exactly the same manner, determining how schools of education have implemented electronic portfolio systems - from their introduction through their use for program evaluation purposes – informs those who are considering development of ePortfolio systems.

Methods

This study employs case methodology with cross-case analysis to investigate implementation of electronic portfolios in seven teacher education programs. The study was initiated as the result of interactions between faculty members from seven different colleges of education across the United States. Information was exchanged over the 2004 – 2005 school year via a professional listserv on the topic of electronic portfolios. Online conversations about electronic portfolio implementation produced a proposal for a panel discussion, which was held at the 2005 NECC conference in Philadelphia. Each member of the panel reviewed the literature and wrote a full paper on the electronic portfolio implementation process in their respective schools. Each paper followed a similar format, based on a template agreed between panel members. These papers were shared on a website, and discussed online as well as in telephone conference calls. This study is a review and synthesis of those formal papers written by each member of that panel in June 2005. The seven sites examined included: Black Hills State University (BHSU), Lesley University (Lesley), National College of Education, National-Louis University (NLU), University of Maryland College Park (UMD), Valdosta State University (Valdosta), University of Vermont (UV), and Wake Forest University (WFU). Drafts of this paper were reviewed by all participants.

Findings

Each of the case studies was analyzed and cross-case

comparisons were completed. Case analysis was organized by the following themes: 1. rationale for electronic portfolios; 2. The methods used to establish electronic portfolio systems; 3. the components necessary for a functional electronic portfolio system adequate for all purposes defined by each school; 4. changes that were necessary during the implementation process and the reasons for those changes; and 5. internal and external environmental factors that presented challenges. A detailed analysis of each case study was also conducted to determine the types and nature of the technologies used to support electronic portfolio systems.

What were the purposes defined for portfolios?

Each of the seven schools in this case study had a paper-based portfolio process in place before they moved toward adoption of electronic portfolios. Paper based portfolios served a range of purposes. Most common among them in schools was the need to provide evidence of student achievement of professional standards; so that students could gain licensure and/or employment. Evidence of student achievement was also needed by each institution for program evaluation and accreditation.

Following is a list of the purposes for paper portfolios as identified by the seven institutions of higher education taken for research:

Storage space for student work samples, artifacts, multimedia files, digital video files, etc.

Student demonstration of knowledge, skills and understanding gained through their program of study.

Assessment of student learning and achievement in a course and/or throughout a program of study

Documentation showing that students have met state, national and/or professional standards.

Documentation that students have met requirements for professional licensure.

Documentation of professional growth over time.

Performance records helping students make connections between theory and practice

Performance records promoting collaboration among students and their classmates, course instructors, and seminar leaders.

Support for reflections on learning and teaching, on curriculum, pedagogy, and learning theory, and for student self-evaluation.

Reflections to reinforce practice and professional growth over time.

Evidence used as the basis for feedback to students about course/program outcomes.

To showcase skills for employment and other professional purposes.

For Program evaluation.

Evidence assuring alignment between courses and field experiences.

Evidence used to ensure that each course assignment is unique to that course across a program of study.

Evidence demonstrating that the program of study has helped to students meet goals and professional standards.

Evidence and data for NCATE/ TEAC accreditation. Data for national, state, and university reports.

Several of the schools were responding to state portfolio requirements for pre-service and/or practicing teachers. These state accredited teacher preparation programs had responsibility for recommending students for initial licensure based upon a portfolio demonstrating student fulfillment of state standards.

What factors contributed to the shift toward electronic portfolios?

Program review by the National Council for Accreditation of Teacher Education (NCATE) was the driving force behind vigorous exploration and eventual adoption of electronic portfolio system in several of the schools. In each of the seven schools, electronic portfolios slowly began to replace other types of portfolios. In most of the schools, the choice of creating an electronic portfolio

was initially optional and the decision to use them left to faculty and/or the students, on a course-by-course or program basis. Gradual acceptance for the use of technology, accompanied by the need for efficient methods of documenting student achievement eventually resulted in wider electronic portfolio initiatives. Two case examples are provided below:

WFU: Accreditation requirements have also influenced the use of electronic portfolios by increasing faculty appreciation for using technology to easily archive student performance. External expectations influenced the faculty to embrace more efficient methods for capturing, storing, and presenting documentation of candidate performance. The use of electronic portfolios has also been in response to faculty acceptance and appreciation of students' ability to use digital tools, access to new technologies (both software and hardware), and program specific needs/desires for demonstration of candidate knowledge, skills, and dispositions. Evolving technologies most certainly permit faculty to design portfolio expectations that relate to what is known about quality teaching and technology integration. Aim of selecting electronic portfolio options is for supporting the needs of the students and the teacher education curriculum. It is important for students to develop technology skills. The move to electronic portfolios enhances the development of their technology skills for communication and demonstration of abilities, dispositions, and practice.

UV: State accredited teacher preparation programs were given responsibility for recommending students for initial licensure based upon a portfolio that demonstrated their fulfillment of state standards. The electronic portfolio is neither systematic nor non systematic, and is still evolving. However, faculty experiencing students' electronic portfolios have noted easier navigation and substantially lighter portfolios to transport. In addition, faculty notes that electronic portfolios can be easily duplicated, stored, shared, and used as models for other students.

What roles the other factors played on the adoption of electronic portfolios?

In each of the schools, the need for evidence of student mastery of program goals and applicable standards, as well as the need for aggregated assessment data for accreditation and program evaluation purposes eventually became imperative, and it was found that electronic portfolios functioned better for these purposes than did paper portfolios. Case examples are provided below:

UMD: Gearing up for the National Council for Accreditation of Teacher Education (NCATE) visit (along with their new requirements) seemed to be the driving force to have the College explore more vigorously adapting an e-portfolio system.

BHSU: Changes in NCATE accreditation requirements are pushing the university toward use of electronic portfolios. Changes in state and national standards make it important to consider use of electronic portfolios.

NLU: As NCATE moved toward standards-based assessment and the state of Illinois established standards for certification, the portfolio became an end-of-program capstone- benchmark assessment. With NCATE, ISTE, and state reviews of the program, the portfolio requirement became a standards-based assessment, with less focus on documenting candidate growth during their participation in the program.

In all seven case studies, there was enough top-down and bottom-up leadership to result in an administrative mandate for the use of electronic portfolios. Further, as mandates moved forward, other faculty and staff became involved. The vision was either sold to others on campus or was rapidly adopted by the community, or a combination of both.

WFU: Electronic portfolios were adopted by faculty in the Department of Education in response to ISTE NETS*T in 1999 and are an integral part of the curriculum.

Valdosta: Dean of the College of Education (COE) supported electronic portfolios, and faculty representatives from every department in the College of Education, were invited to work on the eportfolio committee.

Lesley: A state accreditation agency (NEASC) made recommendations for more effective program

evaluation. In response, a Director of Assessment and Program Evaluation was hired and a campus-wide electronic portfolio committee was created. Though an electronic portfolio adoption process has not yet been fully initiated, several programs of study have begun pilot projects.

What are the steps involved in the implementation of an electronic portfolio system sufficient to address all important assessment purposes?

Cross case comparisons identified eight design steps in an electronic portfolio system that each school had put in place to ensure that electronic portfolios could be used for all identified purposes, including program evaluation. Those design steps are listed below:

Design Step 1: Defining the purposes for ePortfolios

Design Step 2: Defining the goals and standards to be assessed via ePortfolios. Multiple sets of standards were typically identified by the schools of education in this study.

Design Step 3: Curriculum mapping – matching goals and standards to the requirements of a program of study, by course, by licensure area, or for the whole program of study.

Design Step 4: Determination of the ePortfolio technologies to be used.

Design Step 5: Descriptions of portfolio requirements – instructions providing information about the role of students in the portfolio process, as well as the types and nature of artifacts to be included.

Design Step 6: Assessment systems for portfolio artifacts. Assessment methods need to be defined for evaluation of student work and for determining whether students have met goals, standards and/or licensing requirements.

Design Step 7: Program evaluation systems for data gathering, data aggregation, and analysis.

Design Step 8: Using data to provide feedback for improving teaching, learning and program design.

The methods each school used to implement these components were examined and the technologies used by each school were identified. Below is a discussion of how the various schools made these Design steps operational:

Design Steps 2 and 3 - Standards identification and curriculum mapping.

Program evaluation for NCATE, TEAC, or regional accreditation agencies became the most important purpose for each of the seven schools studied. The program standards each of these accreditation agencies used for evaluating programs, pushed development of a "culture of evidence" with its basis in sampling student work across an entire program of study. Electronic portfolios were found to be valuable for this purpose.

Each of the schools in this study found it necessary to start the ePortfolio design process by aligning their courses and programs of study with a wide range of standards. Curriculum Mapping was undertaken, with most schools addressing multiple sets of standards including: 1) national standards in all academic areas [INTASC, English-Language Arts, Math, Science, Technology, etc.]; 2) state professional teaching standards; 3) NCATE or TEAC program evaluation standards; 3) U.S. Department of Education mandates and laws pertaining to special education and students who have special needs. To align courses and programs with various sets of standards, the schools used various technology resources as described in the cases below:

UMD: A Standards/Syllabus Alignment Tool (SSAT) was designed to assist faculty of the College of Education with alignment of their course syllabi to a given set of standards. Faculty use a web-based system of forms to view the set of standards and indicate if their individual syllabi address those standards.

Lesley: An online relational database is used to align courses in the Technology in Education program with goals and standards. Course assignments are aligned with the various standards, and the course professors review those relationships to ensure accuracy. The database is used to determine whether and how programs of study are aligned with national standards

and to respond to requests from our Regulatory Office for information about how the programs address standards in the various states where the research has been conducted.

BHSU: Faculty completed a curriculum mapping project before implementing portfolios. Those curriculum maps, enabled to pull together a portfolio format that is based on the INTASC standards.

NLU: Colleges in the researcher's state (Chicago) are now working together to develop benchmark assessments and assignments that will address state professional teaching standards.

Design Step 4 - Determination of the ePortfolio technologies to be used:

Prior to making a decision about the specific electronic portfolio technologies to use, each school had to evaluate its technology infrastructure in order to identify how and in what ways that infrastructure could support the initiative. It was important to determine whether students would have adequate access to the technologies they would need to create, and maintain electronic portfolios. Schools need to determine whether their infrastructure was adequate for providing access to web or other online portfolio technologies. If not, or where funds were not available for building online portfolio infrastructures, electronic portfolios that used common software tools and CD's or USB drives for storage were chosen. Other common infrastructure concerns included adequate student access and support for the use of digital video. Many of the electronic portfolios used in the schools included a requirement that students provide video of teaching sessions and include these videos with reflections in their electronic portfolio. Part of the decision regarding the technologies to be used for portfolios included determining the nature of institutional, faculty and student access to student portfolio artifacts and assessments. Security concerns also included distribution of usernames and passwords, and decisions regarding who had access to aggregated assessment data.

Allocation of financial resources, as well as commitments to future resource allocations by the institution, were considered vital to the success of electronic portfolio initiatives. All the schools found it necessary to provide financial resources for technology, faculty working on portfolio initiatives, and staff to assist with the electronic portfolio process. Financial resources were secured in a variety of ways, including grants for pilot studies and to help initiate electronic portfolio projects.

UMD: The university provided financial and technical support for all phases of the electronic portfolio initiative including: the use of *LiveText*, the Standards-Syllabus Alignment Tool (SSAT), and the Performance Based Assessment tool (PBA) used online by faculty.

UV: Grants from IBM were used to build an electronic portfolio system, which is made available to students state-wide. To ensure that the electronic portfolio process continues to evolve, there are now three different committees at the university working on the project. The Unit Assessment Committee oversees the organizational portfolio, a system designed to respond to accreditation data and self-improvement. The College's Technology Committee is developing a plan to include adequate support services to institutionalize electronic portfolios, and the Portfolio Committee is actively involved with state efforts to revise and improve the initial licensure process and its connection to student-constructed portfolios.

Valdosta: The College of Education received two grants, PT3 (Preparing Tomorrow's Teachers to Use Technology Program) and GSTEP (Georgia Systemic Teacher Education Program). These have supported the development of electronic portfolios.

WFU: WFU is a laptop school, and a totally wireless computing environment committed to pursuing the latest in electronic resources that support teaching and learning. The greatest challenge the department faces is providing enough digital video equipment to support the growing interest in video-editing technology to use with electronic portfolios.

There was quite a bit of variability between the schools in their choice of electronic portfolio technologies. In several cases, electronic portfolio technologies changed over time as more uses for portfolio assessment were

defined within the school or institution. Excerpts from the case studies below highlight the variety of technologies chosen:

UMD: Currently several eportfolio systems are being used at the university: *LiveText, iWebfolio,* and *Open Source Portfolio Initiative (OSPI)*.

NLU: Beginning in 2003, both undergraduate and graduate students across the College were required to purchase *LiveText* to be used in support of program and college assessment.

Valdosta: LiveText is used because it can house the College of Education portfolio template for preservice teachers, and allows faculty to evaluate preservice teachers' portfolios online.

WFU: The use of candidate developed websites began in 2000. Portfolios include digital video components. Candidate growth is documented with video clips selected from footage captured during student-teaching and videotape of the candidate reflecting on the significance of the clips to his/her growth as a professional.

UV: At present, portfolios are generated using generic webdesign programs (Composer, DreamWeaver, and Word). Recently, the State of Vermont has been participating in a Reinventing Education Grant, (RE3) with IBM, to build a comprehensive portfolio system for the state to facilitate initial and re-licensure approval for teachers. Eventually there will be a state required electronic portfolio which demonstrates that students meet state and national professional standards. Through this grant, candidates for licensure have now been given access to Teachers' Workplace to create and present their re-licensure portfolios.

BHSU: Students create a web based portfolio (Front Page was used by the researchers at this point) but they do not to publish it, except on the campus intranet. Students save their portfolio information on a CD or put it on a USB drive so that they can take their portfolio with them when they complete graduations. If they transfer, they can also take their information with them.

Lesley: Thus so far far in both the Technology in Education and the Arts in Education Programs, eportfolio technologies have been limited to the use of PowerPoint or another multimedia design tools with hyperlinks to course assignments. These ePortfolios are copied to a CD and mailed to course faculty, then stored as evidence of student achievement of standards. Some students in Technology in Education choose to publish portfolios on the web. Students are not as yet provided with web access by the university; this is left to the individual student to find for themselves. Often students have web publishing access via their Internet Service Provider. Trial studies using a variety of electronic portfolio services have been undertaken. Those examined in trials with students include: Taskstream, LiveText; and ChalkandWire. There has also been some exploration of FolioTek and TrueOutcomes, though no trials have yet been completed with students. Both of these are specifically designed with extensive data management and reporting tools for program evaluation purposes, though they also include eportfolio services.

Design Step 5 - Descriptions of portfolio requirements

Portfolio requirements were typically defined by faculty through the use of templates or through a set of written requirements and instructions. Templates were designed specifically to be used with the eportfolio technologies chosen by the school. Most schools have more than one template, as these are customized to fit the needs of the different programs and departments within the college or university. Templates and/or written instructions provide information about the role of students in the portfolio process, the types and nature of artifacts to be included and also typically described the role(s) of reflection. Several of the schools used "Directed" portfolios with required assignments and reflections as a way of ensuing that the portfolio demonstrated student achievement of standards.

UV: The Teachers Workplace webportal for the teachers defines the data to be included in the portfolio and has a tool licensure candidates use for aligning artifacts to standards. It also provides models of portfolios that exemplify quality.

NLU: The eportfolio program relies upon the use of 8 benchmark assignments to provide evidence that students meet standards. Students select some of the benchmark assignments to include in their portfolios. Students are provided with a portfolio template, listing each required course in the program sequence along with required fields for data entry. Data entry fields include: (1) the artifact, (2) an artifact description, (3) standards met, (4) rationale for how the artifact demonstrates that students meet the standards listed, (5) reflection on what the project meant to the student's professional growth, and (6) reflections on the course including how the course may have helped them to meet diverse student needs and how the course enabled them to design or implement professional development activities.

Once decisions regarding the technologies to be used were made and portfolio requirements were defined, most schools found that they needed to provide support to help faculty and students to gain necessary technical expertise and master the portfolio process. Technical support was designed to help both faculty and students to understand the various purposes of the portfolio, the portfolio process, and how to use the technology.

Design Step 6 - Assessment systems for portfolio artifacts

In all cases examined, a portfolio assessment process needed to be put in place. Issues that were addressed included: determining who would assess not only the individual artifacts in a portfolio but the entire portfolio and how that assessment would be done; the assessment tools (rubrics, etc.) to be used; and designing assessments to insure that student work demonstrated achievement of standards. Providing faculty with the time necessary for summative portfolio evaluation and reimbursement for that time were issues in some of the schools.

UV: A (summative) portfolio rubric is provided by the state to promote reliable and uniform assessment.

WFU: Formative assessment of candidate products occurs within the courses where the products are required. Summative assessment occurs in a variety of ways. The Department of Education faculty use external evaluations of candidate portfolios as an opportunity to receive feedback. The state required technology portfolios that are evaluated by a group of external evaluators that include local teachers and technology professionals from the school systems and the university. This process ensures that the program of study continues to address needs generated from the field.

BHSU: A review team of three faculty members examine the portfolio using a rubric that has been designed to assess the portfolios in three major areas. These sections are weighted with #3 carrying the most weight: 1) Quality of the Personal Data Section; 2) Overall Organization and Appearance of the Portfolio; 3) Overall Quality of the Rationale Statement of the Self-Selected Artifacts (required artifacts and accompanying rationale statements have already been reviewed).

NLU: Current portfolio evaluation process of NLV is very instructor dependent. Although the authors have a program-established rubric for evaluating portfolios, they find that some instructors waive selected requirements. It was pleasing to see a number of external visitors, who attended the final portfolio presentations. It has been, and continues to be, a challenge to determine the best way to collect feedback from these external sources. It is even a challenge to determine the most meaningful information to collect from this audience.

Design Step 7 - Program evaluation systems for data gathering, aggregation, and analysis:

Decisions had to be made by each of the schools regarding how data gathered through the use of electronic portfolios would be used for program evaluation. The tools and methods for data collection, aggregation and analysis had to be determined, and a process of analysis described and initiated. Technical training and support were also needed to ensure that the portfolio data collected could be aggregated and analyzed.

NLU: The College Assessment Committee now requires annual Assessment Reports from each program as well as summary data which is collected by *LiveText*. The data

Design Step 1	Defining the purposes of ePortfolios	Purposes for portfolios as identified by the seven institutions of higher education included in this study: **Support for Instruction and Student Assessment** Storage space for student work Helping students connect theory and practice Support for reflection on learning and teaching Demonstrating growth in content understanding and pedagogical skills **Support for Program Evaluation** Documentation of student progress toward meeting goals and standards Documentation that students have met requirements for licensure State and national accreditation and program approvals
Design Step 2	Defining the goals and standards to be assessed via ePortfolios. Multiple sets of standards were typically identified by the schools of education in this study.	For Program evaluation purposes, ePortfolios needed to provide data that would allow schools to meet NCATE, TEAC, and/or the standards adopted by regional accreditation agencies. ePortfolio assessments needed to include evidence that teacher candidates met state professional teaching standards. EPortfolio assessments also needed to include evidence that teacher candidates could effectively teach state curriculum standards to their students (K-12 standards).
Design Step 3	Curriculum mapping - Matching goals and standards to the requirements of a program of study, by course, by licensure area, or for the whole program of study.	All standard sets to assessed through an ePortfolio process needed to be analyzed to identify required competencies. "Standards crosswalks" or matrices to show relationships between sets of standards were developed. Course syllabi were examined to identify assignments, activities, and performance tasks demonstrating standards based / required competencies for each course in a program of study, and for an entire program of study. Many of the programs selected a set of required assignments and performance tasks to be included in the ePortfolio. These assignments were those that demonstrated important or required competencies. The result was a "Directed" ePortfolio in which students were not given total freedom to choose the artifacts to be included their ePortfolio (though in most cases students could add artifacts beyond those that were required).
Design Step 4	Determination of the ePortfolio technologies to be used.	Most schools went through a process similar to the steps identified here. Evaluate the school's technology infrastructure. Consider financing and budget for ePortfolio implementation and maintenance. Preview ePortfolio systems. Conduct trials using several selected ePortfolio systems. Review technological requirements of preferred systems. Consider technical implementation and support. Gain consensus on one ePortfolio system based upon design, and implementation requirements. Consider reporting systems reporting systems must provide access to important ePortfolio data for: students, faculty, academic programs, and for the institution as a whole. Consider security issues for all ePortfolio information and data.
Design Step 5	Descriptions of portfolio requirements instructions providing information about the role of students in the portfolio process, as well as the types and nature of artifacts to be included.	Faculty defined ePortfolio requirements by creating written task descriptions or templates for selected course assignments and performance tasks. Faculty defined additional ePortfolio design criteria - identifying extraneous features such as neatness, organization, graphics, and other required components Professional development for faculty in all aspects of the ePortfolio system became critical at this point in the implementation process. Faculty technology skills were an important consideration in the choice of technologies to be used and in the types of professional development necessary. However, professional development needed to be made available on a long-term and on ongoing basis. Students must also be provided with training on the ePortfolio system on a long-term and on ongoing basis
Design Step 6	Assessment systems for portfolio artifacts.	Assessment methods needed to be defined for evaluation of student work and for determining whether students have met goals, standards and/or licensing requirements. Responsibility for assessing student ePortfolio work needed to be defined, particularly responsibility for final ePortfolio evaluation.
Design Step 7	Program evaluation systems for data gathering, data aggregation, and analysis.	How ePortfolio data would be used for program evaluation was determined by: Determining what data from ePortfolios to gather Defining a process for gathering data. Determining the relationship of ePortfolio data to other data sets including: State teacher test performance, Student grades in their program of study, Student teacher or practicum evaluations, Decisions were made about who would aggregate and evaluate data. Faculty and/or staff needed to be identified who would maintain, aggregate and analyze assessment data and keep assessment records necessary for program evaluation purposes.
Design Step 8	Using data to provide feedback for improving teaching, learning and program design.	Data was used to provide feedback for improving teaching, learning and program design. Effective and efficient methods needed to be determined for using the ePortfolio system as tool for conducting program evaluation that results in program improvement. ePortfolios needed to be made efficient enough for gathering data to help answer questions such as: "What do I need to do to help this student get to this standard?" "What changes should I make in this course?" "What changes need to be made in this program of study?"

Table 1. Summary Table of Design Steps in the ePortfolio Process

shows how many students are "below", "meeting", and "exceeding" program expectations.

UMD: A method was needed to aggregate the enormous amount of data required for NCATE and the state accreditation programs. The eportfolio system became a means to more easily aggregate, disaggregate and cross reference data across the college wide programs. The *Performance Based Assessment System* and *Standards/Syllabus Alignment Tools*, along with departmental and content unit assessments are also used.

Valdosta: The *LiveText* portfolio system provides the College of Education with evidence that preservice teachers have met standards and a way to gather and evaluate data as evidence for accreditation. *LiveText* portfolio data is aggregated for university, state, and NCATE reports. Each academic program has aligned their program with the NCATE Standards, then created a *LiveText* portfolio template designed around those standards. Students submit artifacts as evidence of achieving each standard, and these are graded with a rubric. The data is aggregated in *LiveText* and presented in tables and graphs. *LiveText* is serving the important purposes of aggregation and evaluation of data.

UV: An online tool is allowing faculty to collect assessment data from each of the 16 teacher preparation programs. These data sets include GPA, Praxis Scores, and a PADA (Professional Attitudes and Dispositions Assessment) which is completed by faculty as well as student. The university will be linking student ePortfolio artifacts and reflections into the data collection system so that they can demonstrate student performance outcomes.

Design Step 8 - Using data to provide feedback for improving teaching, learning and program design

This last step in an ePortfolio process is focused upon program improvement. There was general agreement among participants in this study that it is only when eportfolios provide information that faculty can use for improving the quality of courses and programs of study, that a feedback loop will be completed, ensuring high quality programs. It is only when such a feedback loop is in place, that all the national and state efforts of developing and implementing professional standards will produce highly effective teachers. Despite this understanding, data collection and aggregation was the final step described for most schools in this study. None of the case studies provided a clear, step-by-step description of how data analysis led to program evaluation or program improvement.

UMD: The electronic portfolio component is considered one measure of student achievement of standards and is used with their *Performance Based Assessment System* for program evaluation. However, the report did not include a description of a process that made use of data sets to determine program effectiveness

Valdosta: Portfolio assessment is used to provide evidence for accreditation as well as for internal evaluation of its programs. LiveText is able to provide aggregate data needed for both internal and external evaluations. However, there is no description of how that data is used to improve teaching and learning was included in the report.

NLU: An assessment committee gathers data from LiveText on how many students are meeting standards. LiveText is able to provide aggregate the student achievement data needed for the state and NCATE accreditation programs. Again, however, there is no feedback system described that moved from data collection to the kinds of analysis of data that could be used for improving teaching and program design.

Lesley: The ePortfolio system used in two programs does not provide for data aggregation or analysis, and therefore does not support any program evaluation process. However, the university is working toward adoption of a system that will be more effective for these purposes.

Two schools are using evaluation of students' electronic portfolios rather than aggregated data to improve their programs of study.

WFU: A process for using electronic portfolio presentations has been identified: "The faculty use external evaluations of candidate portfolios as an opportunity to receive

feedback. The state required technology portfolios are evaluated by a group of external evaluators that include local teachers and technology professionals from the school systems and the university. This process ensures that the program of study continues to address needs generated from the field".

NLU: External evaluators are brought in during student eportfolio presentations to provide feedback. However, there has not yet been an effective method identified for using the feedback that these external evaluators provide for program improvement.

Conclusions

Cross case analysis in seven schools of education shows the impetus behind adoption of electronic portfolio systems, to have the result of regulatory requirements substantially for program evaluation from accreditation agencies including state education departments, NCATE, and TEAC. Electronic portfolios serve program evaluation purposes by providing storage space for student work samples which are used to demonstrate that students have met state, national and/or professional standards, and/or requirements for professional licensure.

Cross case analysis shows effective electronic portfolio systems to have at least eight important design steps that include: 1) clear definitions of the purposes that eportfolios will play within the college or university; 2) identification of the goals and standards to be assessed via eportfolio; 3) curriculum mapping to match goals and standards to the task requirements of each course in a program of study; 4) identification of the electronic portfolio technologies to be used; 5) descriptions of portfolio requirements. Many schools used a partially "directed" portfolio process in which certain assignments were required because these demonstrated student achievement of multiple standards; 6) assessment systems such as rubric sets for determining whether portfolio artifacts met standards; 7) data collection systems for gathering, aggregating, and analyzing data to be used for program evaluation purposes; 8) a process for using the data gathered to improve teaching, learning and program design. This last step, involving the use of eportfolio data for program improvement has not yet been clearly defined by any of the schools of education in this study. These design steps were not necessarily addressed in the order listed by all schools, or given the same degree of importance. However, all design steps were found to be important to eportfolio processes intended to be used for regulatory and accreditation purposes.

Despite the fact that the impetus for adoption of electronic portfolios was identified as being (at least in part) for program evaluation purposes, these case studies provide very limited information about exactly how eportfolio data are used for improvement in teaching, learning, course and/or program design. The focus was instead based upon such issues as the technologies chosen for collection, the storage of artifacts, and the training for faculty and students in the use of these technologies. Thus, findings indicate significant weaknesses in the program evaluation components of eportfolio processes. Further, this study raises questions about how eportfolio data is used to understand specifically what strategies actually work for helping teacher candidates to meet professional teaching standards. Information gathered through portfolio assessment is not being used to investigate which teaching strategies are specifically associated with educating great teachers. Instead, data collection is most typically defined as the final component.

Few of the schools in this study addressed issues of data accuracy. Only UMD has the capacity for triangulation of data, as they collect results via electronic portfolio and their PBA system. However, other schools in this study are not gathering data that would allow them to do any triangulation, nor did the reports suggest that they are looking at student achievement information from multiple perspectives. None of the schools reported that they were using eportfolio data reports supplemented with graphic images, charts, or graphs to help faculty and students to advance to the next level of professionalism and achievement. Professional development designed to help faculty master the skills of advanced data driven decision making was not mentioned in any of the reports.

Where technology systems are used for data aggregation and analysis, questions must be raised about whether findings can be analyzed regularly enough and in a manner that makes them useful to the ongoing effort of program improvement. Reeves (2004) suggests the development of "Data Walls" for this purpose. Rather than having one "data guru" responsible for doing the analysis of results, he suggests that all faculty members get involved and use an entire wall of a room to post data, charts and graphs. Further, he states that these should not be static displays, but should be updated regularly and provide feedback that focuses on the most successful teaching techniques. Reeves states that such techniques help faculty to focus on identifying and replicating best practice.

Overall findings raise questions about the effectiveness of eportfolio processes for program evaluation and improvement. Only when electronic portfolios provide information that faculty can use for improving the quality of courses and programs of study, will a feedback loop be complete which ensures that all the national and state efforts of developing and implementing professional standards will produce highly effective teachers. Questions need to be asked regarding whether portfolios are actually an effective and efficient means of conducting program evaluation for improvement purposes. Can portfolios, even in their electronic version, be made efficient enough for gathering data that they help answer faculty questions such as: "What do I need to do to help the student to get to this standard?" "What changes should I make in this course?" "What changes need to be made in this program of study?"

References

[1]. Barrett, H. C. (2005). Information about electronic portfolio development. Retrieved March 14, 2005 from http://electronicportfolios.org

[1]. Barrett, H.C. (2005). The reflect initiative. Retrieved Oct. 29, 2005 from http://electronicportfolios.org/reflect/white paper.pdf

[3]. Danielson, C., & Abrutyn, L. (1997). An introduction to using portfolios in the classroom. In H. Barrett, *Introduction to electronic assessment portfolios.* Retrieved April 3, 2005 from http://herlenbarrett.com/ALI/intro.pdf

[4]. Fact Sheet: No Child Left Behind. Retrieved Oct 16, 2005 from http://www.whitehouse.gov/news/releases/2002/01/20020108.html

[5]. Fullan, M. (2001). *The new meaning of educational change, 3rd Edition*. New York: Teachers College Press.

[6]. Gibson, D. & Barrett, H. (2002). Directions in electronic portfolio development. Retrieved Oct. 18, 2005 from http://it.coe.uga.edu/itforum/paper66/paper66.htm

[7]. Love, D., McKean, G. & Gathercoal, P. (2004). Portfolios to webportfolios and beyond: Levels of maturation. *Educause Quarterly*, 27 (2). Retrieved Oct. 16, 2005 from http://www.educause.edu/ apps/eq/eqm04/eqm0423. asp

[8]. Jafari, A. (2004). The "sticky" ePortfolio system: tackling challenges and identifying attributes. *Educause Review*, 39 (4) July/August, p. 38–49. Retrieved October 16, 2005 from http://www.educause.edu/apps/er/erm04/erm0442.asp

[9]. Reeves, D. B. (2004). Taking data analysis to the next level. *Focus on Achievement*, Vol. 5 (3).

[10]. Stiggins, R. J. (2002). "Assessment crisis: the absence of assessment FOR learning." Phi Delta Kappan, June 2002. Retrieved July 17, 2004 from: http://www.pdkintl.org/kappan/k0206sti.htm

[11]. Thorn, Christopher A. (2001). Knowledge management for educational information systems: what is the state of the field? *Education Policy Analysis Archives,* 9(47).

[12]. Tosh, D. & Werdmuller, B. (2004). ePortfolios and weblogs: one vision for ePortfolio development. Retrieved June 2, 2004 from: http://www.eradc.org/papers/ePortfolio_Weblog.pdf

ABOUT THE AUTHORS

** Assistant Professor, Co-Director, Technology in Education Program*
*** College of Education, Valdosta State University*
**** Director, Educational Technology Outreach, College of Education, University of Maryland College Park*
***** Professor Emeritus, national College of Education, National-Louis University*
****** Associate Professor, and Technology Services Librarian, Black Hills State University, Computer Technology Instructor for the College of Education*
******* University of Vermont, College of Education and Social Services, Elementary Education, University of Vermont*
******** Associate Professor, Instructional Design, Department of Education at Wake Forest University.*

Dr. Triplett has been a member of the faculty of Lesley University since 2000. She received her B.A. From University of Minnesota, and M.S. Ed and Ed. D from University of Wisconsin and University of Massachusetts respectively. She focuses her teaching and research on curriculum design to integrate technology, and technology-based assessment practices. Since 2002 she has been a member of the university-wide committee working to implement web-based electronic portfolios for Lesley University students, and has done numerous presentations at conferences on the topic of electronic portfolios. As part of her work in curriculum design, Dr. Triplett has explored the many uses of educational websites, and has been involved in the collaborative design and technical implementaiton of numerous course websites. Her interest in doing online collaborative course design has resulted in research into server-based technical tools that facilitate collaborative curriculum design. She has made numerous presentation on this topic for Microsoft Corporation, at NECC and AACTE conferences. Dr. Triplett was the Academic Adviser and Instructor for Project LIFT2 (Leadership Initiative for Teaching and Technology).

Prior to teaching at Lesley University, Dr. Triplett was one of five co-founders for the Center for Applied Special Technology (CAST.org). She worked as a neuropsychologist and psycho-educational diagnostician at North Shore Children's Hospital in Salem, Massachusetts. She has also been a school psychologist, classroom teacher, and school district technology coordinator in the Massachusetts public schools. In addition to teaching in Massachusetts, Dr. Triplett has been the technology coordinator for the American Community Schools in Athens, Greece, and has taught courses for British Open University at Hong Kong Baptist College.