



Electronic-Portfolios as Cognitive Tools in a Teacher Education Program

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This paper summarizes a project at Fairleigh Dickinson University's School of Education (SOE) to implement electronic-portfolios into its teacher training program. The e-portfolio allows students to reflect, manipulate and discuss their ongoing process of learning and is thereby functioning as a cognitive tool, facilitating greater cognitive growth, problem solving ability, and reflective thinking on part of the user. The SOE has piloted the e-portfolio with three different populations: 1) faculty; 2) SOE students; 3) the K-12 population. This paper will discuss implementation issues/concerns that the SOE is addressing as it goes ahead with this initiative.

Keywords: electronic portfolios, assessment, teacher education

1. Introduction

There is much interest in using electronic portfolios (e-portfolios) in teacher education programs as a means to attain accreditation status (Barrett, 2003; Wilkerson and Lang, 2003). An e-portfolio is a collection of authentic and diverse evidence which is drawn from a larger archive representing what a person or organization has learned over time, on which the person or organization has reflected, and is designed for presentation to one or more audiences for a particular purpose. This definition specifies a certain conceptual framework: the portfolio will involve a careful process of thinking, planning, reflecting and organizing; that the portfolio will reflect pieces that the person chose for a specific reason from a larger body of stored work; that the process of developing the portfolio involves "deep learning" which is reflective, developmental, self-directive, and sustaining over a period of time; and that the portfolio will be presented to an audience for review.

With teacher training programs increasingly using e-portfolios for accreditation purposes, the definition of portfolios is also changing, moving toward numerical scoring of artifacts against rubrics with statistical analysis of data to validate assessment claims (Barrett, 2003). According to Barrett (2003), this is changing the concept of portfolios away from the more constructivist approach, in which the learner constructs a personal statement of his or her growth over time through the collection of meaningful artifacts, to a more positivist approach whereby pre-determined artifacts are chosen to reflect outside standards and students have little choice over the type of items they can include. Barrett claims that both purposes, the need to assess learning outcomes through aggregated data and the individual construction of an educational journey of growth over time, need to be addressed in programs.

Barrett makes a distinction between an e-portfolio and an assessment management system as a means to bridge these two approaches. The assessment management system is basically a reporting system used to aggregate and analyze assessment data. It is an institution-centered database used to collect faculty-generated assessment data based on tasks and rubrics. The e-portfolio becomes a personal creation whereby students tell their own story and express their own unique voice about what they have learned and value during a specific period of time. The learners then take ownership over their own ability to plan and assess and reflect upon their learning. By differentiating between assessment management systems and e-portfolios, institutions allow students to use technology tools for building individual e-portfolios which will help develop critical thinking, information literacy skills, and build upon students' own unique diversity and background. Keeping assessment management systems and e-portfolios separate allows an institution to develop a philosophical framework to support the development of e-portfolios that is consistent with the mission and philosophy of the program.

1 3) Portfolios can offer opportunities for selection and self-assessment. The selection of artifacts
2 to document growth and proficiency of standards over time becomes a key component in assessing the
3 student over time. The student has a choice as to which documents demonstrate that a specific standard
4 has been addressed and the portfolio represents decisions about quality and personal reflection.

5 4) Portfolios can offer a look at development over time. Students have a chance to document
6 professional practice and growth over a period of time.

7 The server configuration chosen by the SOE to model (as something easy for a school district or
8 school to set up and implement) consists of the following components:

- 9 1. *Hardware*: a standard Apple PowerMac G4 or G5 tower with 2 GB of RAM, 2 internal hard
10 drives each having 250GB of storage space;
- 11 2. *Operating System*: the standard version of Apple MacOS X installed on typical Mac laptop or
12 desktop computers.
- 13 3. *Software*: Two server software packages provide the core services driving the SOE's portfolio
14 server: Userland Frontier and 4D WebStar.
 - 15 a. The Userland software company's Frontier/Manila server software provides an easy to
16 configure and use "content management system" for the server, which gives students
17 and faculty the basic authoring tools directly built into the web browser; the SOE
18 called this system EdFolio.
 - 19 b. The 4D software company's WebStar V web server suite provides standard secure web
20 server and upload capability that complements the Userland software;
 - 21 c. Three additional server software utilities automate daily maintenance of the server: 1)
22 Dantz Development Corporation's Retrospect 6 automates daily backups at 3 a.m. as
23 well as long-term weekly backups; 2) Symantec Corporation's Norton Antivirus 9
24 automates daily antivirus scans of the server folder containing all uploaded files at 5
25 a.m. every day; and 3) Micromat Inc.'s TechTool Pro 4 and Drive 10 for monitoring,
26 optimization, and recovery of the server's hard drives (Brown, 2004).

27 **3. Implementation of E-Portfolios**

28 3.1 Faculty

29 The SOE has been training faculty within its own school as well as faculty from the arts and
30 sciences to develop their own e-portfolios. All faculty members at FDU are given their own laptop with
31 Microsoft Office installed; a requirement for participation in this grant was that all faculty members must
32 bring their own laptops to the sessions. Faculty met seven times during the course of the academic year
33 in the new Prototype Classroom of the Future. It has been designed as a technology-enriched environ-
34 ment whereby technology integration is a key component but technology itself is not driving instruction.
35 This wireless classroom contains 18 laptops (9 Windows-based IBMs and 9 Apple laptops), moveable
36 and flexible furniture to accommodate different configurations of learning, a raised floor to accommo-
37 date the need for flexible placement of power outlets, projection devices, video capture stations, digital
38 cameras, a whiteboard, and different peripherals such as printers and scanners. Therefore, during their
39 training, faculty members had an array of technological resources available for use.

40 As part of the process to have faculty understand the process of using portfolios in classes, they
41 developed their own portfolios. These portfolios were "loosely" defined so that faculty could use this
42 website for archiving material, showcasing research, posting syllabi or class notes on-line, and
43 presenting material for a presentation or conference. The faculty members were given the freedom to
44 develop the website as they desired to fit their own needs and purposes. Most of the participants had
45 never done any web authoring before, although a few were quite advanced in their technological
46 abilities. As of January 2005 twenty faculty members had developed e-portfolios. These portfolios
47 ranged from very basic to quite advanced depending upon the faculty member's level of expertise. All
48 showed significant growth as none of them had an e-portfolio developed at the start of training.
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3.2 FDU Students

In an introductory instructional technology class, faculty members instructed the students on how to set up an e-portfolio using EdFolio. Approximately 140 students have developed portfolios, uploading artifacts that they developed as assignment for this class. In the upcoming year, eight more adjunct faculty members are targeted for training and using e-portfolios in technology classes.

One full-time faculty member who teaches in the 5-year accelerated undergraduate program has also been trained to use the EdFolio system and is incorporating the use of e-portfolios in her classes. These students spent a semester learning how to use the system and developed standards-based e-portfolios with artifacts that support the New Jersey Professional Teaching Standards. Approximately 60 students created e-portfolios in these two sections over the past 2 years. These students' comments on an assessment sheet were overwhelmingly positive. When asked to describe some of the things they liked about the electronic portfolio, they wrote: "The ability to reflect and see all of your accomplishments and progress. I also enjoyed looking at my peer's work, and comparing it with mine;" "How convenient and easy it is to keep track of our work;" "A great way to demonstrate what I did this past semester;" "It made the classroom environment more lively and added fun and excitement to our lessons;" "That all the work I did on the computer was easily posted and didn't have to be put into a portfolio and organized—it was much faster and easier;" "It helped me to actually see all the work I have done during the entire semester; it also helped me to see what I've learned." These comments sum up many of the advantages that e-portfolios have in enhancing instruction and functioning as a cognitive tool. These responses show that the students took this initiative seriously and felt that the process of developing e-portfolios helped to clarify the significant ideas and concepts they learned from the class and helped them to reflect upon these ideas and their own learning.

At least 350 students have now been trained on using e-portfolios in their coursework and have accounts on the SOE server. Some of these students are undergraduate students, some are graduate pre-service teachers, and some are certified teachers.

3.3 K-12 Students

A graduate student instituted e-portfolios into her 6th grade class as part of an action research project for her final thesis. Due to the fact that the teacher did not have space on a server to provide her students and she had a limited amount of time to institute the portfolios, she chose to use the Discussion Forum component of her own e-portfolio to have students post writing samples. She gave her students mini-lessons in specific writing strategies and then had the students upload their writing samples to her Discussion Forum where they would receive feedback electronically from both the teacher and their peers. "When they began, their stories were about a paragraph with the exception of 2 students. They all thought this 1 paragraph was it--their final copy. They had no idea that they could create such detailed, lengthy essays. They learned tools necessary to revising their content--although these tools would have to continuously be reviewed for the students to automatically use them. The students loved the idea of the virtual hard drive--no risk of losing info or disks. I can say that many of them do not like to write usually so this held their attention for quite some time compared to normal writing situations" (Mauro, 2004). This case-study of one teacher instituting e-portfolios into a 6th grade classroom illustrates how a technologically proficient teacher who was trained at FDU can use technology effectively within a classroom to better serve the k-12 population. The education students who develop e-portfolios in their SOE courses plan on using them within their own classrooms and will thereby impact the quality of instruction that their students receive. Many of their portfolios show artifacts that reflect creativity, professional growth, content knowledge, technological skill proficiency, and reflective thinking.

4. Summary

The SOE has made great strides in implementing the e-portfolio initiative into its teacher training program. In order to move ahead to full implementation, the following issues will need to be addressed:

- 1 • *Development of rubrics:* As faculty and students start to incorporate e-portfolios into their
- 2 classes, rubrics need to be developed to help guide their development and assessment
- 3 • *Support of faculty and students:* Faculty and students will need technical and pedagogical
- 4 support as they go through the process of developing e-portfolios.
- 5 • *Developing technology skills and standards-based context:* An important consideration is
- 6 where to introduce the e-portfolio within a particular program. The SOE used two models in
- 7 its pilot: 1) The e-portfolio was introduced into a technology class where students learned the
- 8 technical skills to develop an e-portfolio but not the theoretical basis for correlating the
- 9 artifacts to the national and state standards. The instructors who taught these classes are
- 10 technically proficient but do not have the background in national and state standards. 2) The
- 11 e-portfolio was introduced in a required education course, which usually focuses on
- 12 pedagogy and theory. Faculty members who teach the pedagogy courses have the theoretical
- 13 background but oftentimes do not have the technical expertise. This dichotomy needs to be
- 14 discussed and resolved as the SOE moves forward.
- 15 • *Obtaining a shared vision with the faculty members:* A key to the success of implementing
- 16 e-portfolios is that all faculty need to support its development and implementation.
- 17 • *Institutional support:* The university administrative structure needs to support efforts of the
- 18 SOE as it moves forward technologically

19 The SOE is developing a framework from which to train future teachers to use new pedagogical
20 tools that facilitate greater cognitive growth, problem solving ability, and reflective thinking on part of
21 the user. Future teachers will hopefully use these new tools in their own teaching and thereby impact
22 student population. The SOE believes that, ultimately, its students from kindergarten through graduate
23 school will benefit from this initiative by developing the literacies that will help them survive and
24 prosper as valuable citizens in an increasingly global society.

25
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28 29 30 **References**

- 31
32 [1] Barrett, H. (2002). *Electronic portfolios*. Retrieved April 2004, from <http://electronicportfolios.org>.
- 33 [2] Barrett, H. (2003). *Differentiating electronic portfolios and online assessment management systems*. Paper
34 presented at AERA and AAHE's Assessment Conference.
- 35 [3] Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and*
36 *school*. Washington, DC: National Academies Press.
- 37 [4] Brown, A. (2004). *Electronic portfolio server notes*. Unpublished report, Mid-Atlantic Regional Technology
38 Education Consortium.
- 39 [5] Cambridge, B. L. (2001). Electronic portfolios as knowledge builders. In B. L. Cambridge (Ed.), *Electronic*
40 *portfolios: Emerging practices in student, faculty, and institutional learning*. Washington, DC: AAHE.
- 41 [6] Derry, S. J., & Lajoie, S. P. (1993). A middle camp for (un)intelligent instructional computing: An introduction.
42 In S. Lajoie & S. Derry (Eds). *Computers as cognitive tools*. Hilldale, NJ: Lawrence Erlbaum Associates.
- 43 [7] Morris, J., & Buckland, H. (2000). *Electronic portfolios for learning and assessment*. Paper presented at
44 SITE2000. Retrieved January 2005, from <http://www.uvm.edu/~jmorris/site2000electport.html>
- 45 [8] Pea, R. D. (1985). Beyond amplification: Using the computer to reorganize mental functioning. *Educational*
46 *Psychologist*, 20, 167–182.
- 47 [9] Perkins, D. N. (1985). The fingertip effect: How information processing technology shapes thinking.
48 *Educational Researcher*, 14, 11–17.
- 49 [10] Salomon, G., Perkins, D., & Globerson, T. (1991). Partners in cognition: Extending human intelligence with
50 intelligent technologies. *Educational Researcher*, 20, 10–16.
- 51 [11] Wilkerson, J. R., & Lang, W. S. (2003). *Portfolios, the pied piper of teacher certification assessments: Legal*
52 *and psychometric issues*. Retrieved April 2004, from <http://epaa.asu.edu/epaa/v11n45>.