

Electronic Portfolios in Pre-service Education– Distinguishing Between Process and Product

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Abstract: This paper explores the use of electronic portfolios in the Faculty of Education, University of Wollongong, from 1997-2001, through the lens of ICT integration. Three subject cases are described noting the purpose of the portfolio, the degree of infrastructure support, the lessons learned and the issues that are informing our future program-level decisions. Electronic portfolios are not a uniform entity or a magic solution. Hartnell-Young and Morriss (1999) describe three types – formative (developmental), summative (assessment) and marketing. These translate simply into either a process emphasis (long term, foundational and iterative) or a product emphasis (short term, polished and highly audience specific). Students developing electronic portfolios require sound information management skills to support a sustained process, and clear understanding of target audience and assessment criteria for individual products. Without faculty level support via infrastructure and course level planning the true benefits of a process/product balance will not be realized.

Introduction

Lifelong learning, reflective practice, professional development and integration of ICT (information and communication technology) can all be addressed in pre-service teacher education through the use of electronic portfolios. Students have to demonstrate their technical, creative, organizational and reflective abilities to varying degrees, enabling them to explore multiple forms of expression and develop information literacy skills to equip them for greater use of electronic information sources. Lecturers gain the experience of handling bulk electronic material, dealing with issues such as collection, collation and distribution for marking, debating on-screen versus print format for reading, and determining various mechanisms for effective student feedback (Brown 1998). But electronic portfolios are not a uniform entity or a magic solution. They can be used inappropriately, or used to the exclusion of simple and practical alternatives. This paper explores the evolution of their use in the Faculty of Education, University of Wollongong, Australia over the period 1997-2001, through the lens of ICT integration.

Doctoral studies (Brown 1997) identified new activities for the teacher and learner in a constructivist classroom environment. The teacher is a process facilitator, a designer of tasks or cognitive tools, a resource organizer and a source of metacognitive support (strategy sharing, modeling and apprenticing learners as problem solvers). The learner is a producer of resources who needs to learn to organize those resources, share strategies, and work collaboratively and cooperatively with fellow learners. Collectively, the reciprocal actions of teacher and student are at various times active, reflective, individual, collaborative, cooperative, creative, expressive and most important of all – flexible. The background was there for the emergence of electronic portfolios.

Three subject cases are discussed (Tab.1) to illustrate a shift from subject to program-level thinking that now influences the purpose of each portfolio activity. Hartnell-Young & Morriss (1999) describe three types of electronic portfolio – formative (developmental), summative (assessment) and marketing. These translate simply into either a process emphasis (long term, foundational and iterative) or a product emphasis (short term, polished and highly audience specific). Each subject case is explored in relation to the purpose of the portfolio, the degree of support and infrastructure required, the lessons learned, and the issues that are informing our future program-level decisions.

Class Examples	1999	2000	2001
<p>Example A. Undergraduate Multimedia Electives (Primary Program 3-4 yrs)</p>	<p>Formative portfolio – reflective, skill development with different ICT multimedia tools</p> <p><i>Other tasks:</i> web site, HyperStudio activity and essay.</p>	<p>Summative portfolio – assessment of skills; teaching strategies to support group project</p> <p><i>Other tasks:</i> group project and resource database or concept map/essay.</p>	<p>Marketing portfolio – geared to employer for interview; drawing on past subjects.</p> <p><i>Other tasks:</i> client profile, design statement and group project for client.</p>
<p>Example B. Compulsory ICT Subject in first year (Primary Program 3-4 yrs)</p>	<p>No portfolio</p> <p><i>Tasks:</i> Exam, assignments, skill tests)</p>	<p>Formative – skill development aligned to roles (learner, manager, designer, researcher)</p> <p>(14 options)</p> <p><i>Other tasks:</i> online discussion for exam preparation and skill tests.</p>	<p>Formative – skill development aligned to roles - options based on 2000 cohort choices. (8 options)</p> <p><i>Other tasks:</i> pedagogical application of skills, software demonstration and online discussion analysis.</p>
<p>Example C. Compulsory ICT component of Pedagogy (GDE Program 1 yr)</p>	<p>No portfolio</p> <p><i>Tasks:</i> Exam, skill tests, assignment)</p>	<p>No portfolio</p> <p><i>Tasks:</i> Exam, skill tests, assignment)</p>	<p>Summative – Report, Formative - teaching resources, activities and student work</p> <p><i>Other tasks:</i> pedagogical application of skills and online discussion analysis.</p>

Table 1: Focus of electronic portfolios and nature of accompanying assessment tasks in three class examples for 1999, 2000 and 2001.

Example A: Undergraduate multimedia elective

The undergraduate multimedia electives provided the test-bed for electronic portfolios within the faculty and it was the success of the first student electronic reflective “portfolio” in 1999 that drove a desire to adapt it for subsequent groups in different programs. From 1997 two multimedia electives were available for students in the fourth year of the primary (elementary) program – students who had barely touched a computer since a compulsory introductory ICT subject in first year. Electives were run as weekly three-hour workshops that aimed to help students develop technological fluency and problem-solving skills as they used a range of cognitive tools and experienced multimedia construction to support learning. Through 1997-1998 the lecturer was responsible for collating and archiving all assignment work so students could

obtain a CD-ROM of the class collection of resources for teaching. By 1999, influenced by cognitive flexibility theory (Spiro, Feltovich, Jacobsen & Coulson 1991) that suggests you “criss-cross the landscape” to gain understanding of complex or ill-structured knowledge domains (in this case multimedia construction), activities were designed to “flip” students from one multimedia construction tool and task to another. They were then asked to: “Create a portfolio to demonstrate what you have learned in this subject, and illustrate your skills in information technology. You should link to your web site, describe your HyperStudio project, list strategies for classroom use of the web site and HyperStudio stack, and also present a collection of web sites you have identified as useful resource collections or sites for student use.” Many were shocked by how quickly they forgot the mechanics of web site construction, as they proudly finalized their HyperStudio projects. Tools impacted on the way they processed information, but tools were evolving, so students had to move beyond reliance on a particular product to a deeper awareness of general principles of multimedia construction.

The purpose of this portfolio was to prompt students to reflect on what they had learned, demonstrate their skill development, relate their projects to classroom application and archive their work for the subject. Course structures evolve, and by 2000, these two electives were replaced by a flow of four more specialized electives that either emphasized one style of construction tool (such as web authoring or card-based multimedia presentation) or an aspect of production such as resource management or working with a “real” client. The portfolio task was retained as the final activity in each subject, and its purpose was re-oriented towards assessment, with a heavy emphasis on more specific and in-depth skill demonstration to do with a range of resource production tools. In 2001, within the final elective of the sequence, students were targeting future employers as the audience for their electronic portfolio. A number were accessed within job interviews with positive outcomes.

The infrastructure for these workshop mode classes has been rich, with plentiful access to hardware and software that has enabled students to engage in sustained media construction in a collaborative fashion. Careful group selection, peer tutoring and access to technical support can maximize the learning gains from group diversity and use of technology.

The key lessons learned from the evolution of electronic portfolios in these multimedia electives are their highly motivating nature when you allow some flexibility (such as choice of tool for construction), balanced by a need to clearly articulate the purpose, the target audience and the scope. The first element calls for early negotiation of assessment criteria; the second and third elements can be supported by access to past examples of a broad range of student work. Repetition of an activity within a flow of subjects diminishes student concern regarding the nature of the activity and allows them to focus more on the quality and depth of content.

Issues that inform future directions include the need to maintain these summative electronic “products” in an ongoing archive for subsequent deconstruction, adaptation or inclusion in the final marketing portfolio.

Example B: Compulsory first year IT subject in a 3-4 year program

The core compulsory ICT subject within the three-year primary degree has been designed to embed ICT functionally within the life of a teacher, based around four teacher roles – learner, manager, designer and researcher (Brown 2002). Since 2000, this framework has been made explicit as a required electronic folder structure that is to house a collection of tasks the students choose from a set of options. Fourteen options were offered in 2000, and the number was reduced to eight in 2001, based on the popular choices from the previous year.

The purpose of this portfolio is formative, even though it represents a collection of discrete “products”. Students are required to create a collection of folders as one potential structure for an ongoing archive of the electronic documents they generate from university and classroom activities. The aim is to equip students with the skills to organize and manage a collection of files. The hope is that they will maintain the habit throughout their course. Earlier activities in the subject ensure students develop some familiarity with database, web site and card-based multimedia construction tools. They get the opportunity to extend these skills through a range of the portfolio activities that are richer tasks. It is always delightful to see the ease with which students hop from one application to another after they have re-visited tools and processes a number of times in self-determined, peer or tutorial-driven sequences.

The infrastructure required for weekly one-hour tutorials is laboratory access with adequate hardware and core software tools. Presentation facilities are vital for *student* presentations, and tutorials

allow tutors and fourth year demonstrators to model a vast array of teaching strategies in a laboratory environment. A substantial team of lecturers, tutors and demonstrators are available for student support. Flexible attendance (ability to attend *extra* tutorials) caters for students who need additional help and reduces the stress associated with assignment submission that is constrained largely to tutorial time.

The key lessons learned from this experience are associated with portfolio assignment submission. Many students have little faith in electronic submission and wish to give you wads of paper “just in case”. The “teachable moment” lies at the point of submission, and if your attitude is supportive and you help students correct obvious problems or take the time to demonstrate that their files are functional, this can be the most productive moment for the student in the subject. One person needs to coordinate assignment collection and this means a very heavy week for that person. The paper trail that accompanies submission requires students to self-assess their work and allows them to comment on any extenuating circumstances related to equity. It remains vital evidence of receipt of electronic material.

Issues that inform future directions include the need to apprentice other staff to the key coordination role that is crucial as a model for students and faculty, faculty wide awareness of student capabilities so newly acquired skills can be re-visited and refined through options offered in other subjects, adequate technical infrastructure so students can maintain their momentum in a self-regulated way, and faculty level consideration of the value of a product oriented portfolio at the end of the course that builds on the process this subject initiates.

Example C: Lecture and tutorial series in an annual subject and degree

The Graduate Diploma of Education is a one-year course currently composed of both annual and semester-long subjects. ICT integration is formally addressed in a six-week slice of the annual subject “Pedagogy” early in the year, and informally continues throughout the year. This allows the portfolio activity to feature a seven-week school practicum mid-year. Although the four teacher roles described in Example B are discussed in the lecture series, they are adapted to suit the availability of schools, and re-organized to mirror the teaching cycle. Students first *research* their school ICT environment, *design* activities with their supervising teacher, *manage* those activities and *evaluate* what they have learned. A structured report stitches the experience together, accompanied by electronic folders containing resources, activities and student work. Submission protocol mirrors that for Example B.

The purpose of this portfolio is both formative and summative. The formative nature is anchored to the folder organization and the request for students to collect all available resources and target student work. Unless they have evidence of what the students achieved, they cannot make a meaningful self-assessment of their performance or the value of the ICT they used. The report is the summative component that is assessed as a product.

The infrastructure required for six weeks of one-hour tutorials is laboratory access with adequate hardware and core software tools. Presentation facilities are vital for *tutor and demonstrator* presentations, given the short time frame. Two lecturers and demonstrators manage the group. Flexible attendance (ability to attend *extra* tutorials) is offered to support those in need, and additional tutorials are programmed throughout the year to allow for staggered assignment submission and support.

The key lessons learned from this experience relate to the staggered nature of the “subject” and the ability to focus ICT use on a school practicum. Although students “switch off” to the tasks when the lecture series is complete, the break leads to a more realistic self-appraisal of what they initially learned. The school-driven agenda that emerges from the practicum ensures that students have many rich and unique experiences to share on their discussion forum for later review and analysis.

Issues that inform future directions include the impact of staggered student-driven access to facilities on timetabling and staffing, and the need for more meaningful links with the supervising teachers in schools.

Discussion

Electronic portfolio construction has emerged from an intensive workshop environment with localized infrastructure (Example A) and is occurring in a more student-driven environment without routine laboratory contact (Example C). There is no doubt students engaged in electronic portfolio construction in Example A have the opportunity to utilize the power of electronic composition environments. For students

in Examples B & C, faculty wide support is required to capitalize on the benefits of these subject-based experiences. Jonassen (1998) attributes the failure of many projects to poor implementation because the designers or technology innovators “ failed to accommodate environmental and contextual factors affecting implementation. Frequently they tried to implement their innovation without considering important physical, organizational, and cultural aspects of the environment into which the innovation was implemented.” Good ideas can be foiled by lack of attention to the day to day practical details. To gain value from Examples B & C, the faculty needs to support the idea by addressing three key issues—infrastructure, staff professional development and curriculum leadership.

Infrastructure encompasses hardware and software (sufficient lab access for regular student use), technical support (relative to student needs, rather than simply hardware focused), storage space (for ongoing student storage of their work archive) and backup facilities (particularly for staff) to ensure some degree of student use equity. Staff professional development is needed for electronic assignment collection techniques if they are to understand how ICT can change classroom management. Alternately, there should be a system developed for collection of electronic material across the faculty, possibly staffed by fourth year students for whom the experience would be highly relevant to school protocol. Professional development should also embrace staff links with teachers who are supervising our students. Curriculum leadership is necessary to consider flexible timetables and team teaching where deadlines are staggered. It is also a program level curriculum decision to adopt electronic portfolios.

If the faculty were willing, then I would make a series of recommendations. Begin with a process approach that emphasizes file management associated with electronic archive production. Students need to develop their own mental model of how they wish to organize their work. Providing an initial top-level folder structure can support student management of electronic documents and help them keep track of their electronic work. Support staff professional development if the process approach is applied to an electronic collection of student work throughout the program. Individual lecturers can be involved as little or as much as they feel comfortable. Many lecturers don’t think outside the scope of their subject, but student access to archival material permits them to stitch ideas together, re-visit theoretical material and annotate it with class examples, and juxtapose different theoretical models to rationalize differences. Balance the process approach with product focused portfolios that help students refine reflection and presentation skills. Complete the program with a marketing portfolio geared to employers, that pushes students back through their course material to illustrate what they have learned.

References

- Brown, C. A. (1997) Learning Through Construction of Interactive Multimedia. Unpublished Doctoral Thesis. University of Wollongong.
- Brown, C. A. (1998) Generic Class Management Strategies for an Education Lecturer in Information Technology. Proceedings of the 15th Annual Conference of the *Australasian Society for Computers in Learning in Tertiary Education* (ASCILITE), Wollongong, Dec 14-16, 1998. p 107-120.
- Brown, C. A. (2002) Simple and Effective – Teacher Roles Remain a Powerful Framework to Embed ICT within the Practice of Teaching. (This volume)
- Hartnell-Young, E. and Morriss, M. (1999) *Digital Professional Portfolios for Change*. Arlington Heights, Illinois: Skylight Professional Development.
- Jonassen, D. (1998) Designing Constructivist Learning Environments. In C. M. Reigeluth (Ed.), *Instructional Theories and Models*, 2nd Ed. Mahwah, NJ: Lawrence Erlbaum. CLE prototypes and environments can be examined at: <http://www.ed.psu.edu/~jonassen/cle/>
- Spiro, R. J., Feltovich, P. J., Jacobsen, M. J. and Coulson, R. L. (1991) Cognitive Flexibility, Constructivism, and Hypertext: Random Access Instruction for Advanced Knowledge Acquisition in Ill-Structured Domains. *Educational Technology*, 31 (5), 24-33.