A WEB-BASED E-PORTFOLIO SUPPORT SYSTEM FOR TEACHER EDUCATION STUDENTS

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INTRODUCTION

There is increasing interest in electronic portfolios (e-portfolios) as a means of collecting and presenting information about an individual’s attributes and experiences. As part of their course of study, learners may be asked to assemble information into a portfolio about their learning experiences and paths over an extended period of time to provide a detailed, evidenced account of what they have learnt. Employers are also beginning to use portfolios to identify employees that match their requirements. Portfolios have the potential to address the limitations of transcripts of academic achievement and references, which present a view of achievement that is mostly isolated from the learning context and the student’s experiences on their path to gaining qualifications. Electronic portfolios extend this capability by enabling easy storage of documents in digital form, and tools for linking documents and reflections to create a coherent account tailored for a particular audience.

Portfolios also offer a means for professionals and students preparing to become professionals to demonstrate evidence of their competency. In some professions standards have been established by which an individual’s performance, knowledge and skills may be assessed. The Professional Teaching Standards developed by The NSW Institute of Teachers reflect the view that teacher development as a process that begins during teacher training and continues throughout a teacher’s career. These standards clearly identify how key attributes should be satisfied by graduate teachers as well as teachers achieving professional competence, professional accomplishment and professional leadership. In its role of preparing pre-service teachers, the Faculty of Education must assist teacher education graduates provide evidence of their experiences leading to the accomplishment of the graduate teaching standards.

As a Teaching and Learning Scholar I worked with the teaching, administrative and technical staff of the Faculty to design and develop a Web-based e-portfolio system which would allow students to document their performance towards achieving the range of professional standards, graduate attributes and course outcomes expected. In the first instance the system was designed around the Professional Teaching Standards established by The NSW Institute of Teachers, however attention was given to the ability of this system to inform the development of a broader application. The aim was to develop the system for use by students commencing their studies in 2007.
LITERATURE ON ELECTRONIC PORTFOLIOS

The notion of an individual creating a portfolio to demonstrate his or her knowledge and expertise is not new. For instance, portfolios have a well-established place in design-oriented professions (such as photography, graphic design and architecture) in which they are used to document an individual’s body of work, as a student and/or a practicing professional, to demonstrate abilities, skills and knowledge. In the past decade there has been increasing interest in using portfolios as evidence of competency in other professions (such as teaching and nursing), and in using portfolios as a more general approach to enhance learning in formal education and in informal settings. More recent technological developments have further excited interest in electronic portfolios (e-portfolios) because they offer greater flexibility in terms of storage capacity and multiple formats than their paper-based counterparts (Gathercoal, Love, Bryde, & McKean, 2002).

This interest has resulted in a dramatic increase in the literature on professional and learning e-portfolios, however this is largely anecdotal with many articles extolling their advantages but with little empirical evidence provided to support the claims made. Much of the e-portfolio literature available is published on the Internet in personal blogs or as presentation slides or notes. While such sources provide access to current thinking about the topic, they tend to be anecdotal and not based on research. Also common in the literature are descriptive case studies that present e-portfolios as a novel educational approach, as is often the case when new technologies are applied to education. An enthusiasm for the e-portfolio approach has led some authors to claim that e-portfolios will revolutionise e-learning (cf. Acosta & Lui, 2006). Though e-portfolios are unlikely to result in major changes in education, they should not be discounted, as more circumspect commentators provide some well-argued reasons for their inclusion in higher education programmes, many of whom refer back to the significant literature on the portfolio approach in general. Research evidence specifically investigating the effectiveness of electronic portfolios is only beginning to emerge.

A review of the literature reveals an array of definitions of e-portfolios within which “the word ‘portfolio’ itself is used in a bewilderingly diverse number of ways” (Gibson, 2006, p. 135). This is the result of the diversity of purposes advanced for e-portfolios, which can be loosely grouped into three main categories - those focusing on demonstrating professional competence, those on improving student/professional learning, and those focusing on creating a record of lifelong learning*. As suggested by Barrett and Carney (2005), the differing definitions and purposes have potential to create confusion. For example, they argue that being required to demonstrate externally specified competencies for professional accreditation is at odds with the use of a reflective portfolio to deepen personal understanding. Thus, when analysing the literature it is important to discern the purpose proposed when considering the merits and implications of different approaches.

National contexts also influence the literature on e-portfolios. For example, in the United Kingdom electronic portfolios are seen as a potential tool in higher education to support personal development plans (PDP) that foster lifelong learning and widen participation (Marcould-Burlinson, 2006). This is consistent with a more widespread push in Europe for greater recognition of qualifications and experiences amongst a highly mobile trans-national population. In the United States there is significant interest in e-portfolios to support student mobility between colleges and between stages of post-compulsory education (Plater, 2006).

Despite the different forms and purposes, the importance of student ownership is a strong common theme. This arises partly from the argument for the need to establish portfolio development as part of lifelong learning activities such that it becomes integrated into the process of learning, formal or informal. In this way the portfolio becomes a centralised record of an individual’s learning processes and achievements, and therefore cannot be owned by an institution or employer. Ownership must rest with the individual. Thus, it is the individual’s responsibility to update and maintain his or her portfolio. The notion is also strongly aligned with the more general philosophy of learners being active decision-makers in directing, planning and reflecting on their learning experiences (Tosh et al., 2005).

Another key idea in the literature is of the role of the e-portfolio in tracing the learning process, rather than learning being measured by the end product, most commonly a grade or a mark for a completed unit of study. The argument is made that a list of grades provides little information about the learning process for an individual, nothing about the development of knowledge and skills over time, and nothing about how what has been learnt has been integrated into an individual’s wider work and life context. A portfolio can enable such developments to be traced, thus also supporting higher order skills such as planning, reflection and abstraction.

Portfolios in Teacher Education

Research into teaching portfolios was pioneered in teaching and teacher education in the late 1990s (Shulman, 1998). Initial efforts were concerned with developing teachers and pre-service teachers as professionals. Later came interest in portfolios for accrediting individuals and teacher education programmes. Wolf and Dietz (1998) categorised three types of
portfolio: (1) the learning portfolio, which promotes reflection and “ownership of the learning process” (p. 15); (2) the assessment portfolio, which “presents educational organizations with information about a teacher candidate’s” (p. 15); and (3) the employment portfolio, which “provides prospective employers with information about a teacher’s suitability for a position” (p. 15). Each of these different types of portfolio implies differences in what evidence is selected, for what reason, and the manner in which it is presented.

Some researchers have found that integrating reflective processes with portfolio creation is beneficial for pre-service and beginning teachers (Campbell, Cignetti, Melenzer, Nestles, & Wyman, 2001; Lyons, 1998). To quote Wolf and Dietz, “With reflection, the portfolio can become an episode of learning; without reflection, the portfolio may be little more than an exercise in amassing papers” (p. 14). Once again it is important to consider how the nature of the portfolio has implications for the nature of the reflection. Wieseman (2004) distinguishes between critical reflection, which is based on a commitment to personal growth, and reflection that is guided by external mandates, such as demonstrating competence according to others’ criteria. The difference between the two is important when considering how learners should be supported in building their portfolios. Reflective frameworks can be used to improve the quality of learners’ reflections and focus them on developing their professional stance (Robbins, 2004).

In a study across four colleges in the United States, Wetzel and Strudler (2005; 2006) identified the following key issues for students in the implementation of e-portfolios:

- The significant amount of time students required to create an effective portfolio, which was hampered by a lack of time available especially during student practicum,
- Poor articulation between the curriculum learning objectives and the professional standards,
- A lack of guidance and explanation from teaching staff, and
- Complex software.

Their findings identified a series of implementation issues, such as student dissatisfaction arising from changes made to the portfolio part-way through their programme, inconsistencies between teaching staff in the way the portfolio was explained or implemented, disorganisation in the implementation leading students to believe that the portfolio had been ‘tacked on’, and poor timing of checkpoints that were designed to support students complete their portfolios. Many students in the study experienced difficulties in accessing the technology. Students without a broadband Internet connection at home faced long waits while trying to upload files or had to use on campus facilities. Many did not have the equipment to scan in documents, such as student work, to include in their portfolios. Some students required Web authoring tools to develop their portfolios, but only had access to this software on campus. There were also complaints from students that they were being asked to reflect multiple times on the same piece of work and that the effort they put in to developing their portfolios was not matched by the time teaching staff allocated to providing feedback. Recommendations from this work include: providing students with a clear purpose and explanation; providing simple, reliable software with appropriate support and training; ensuring reflection is focused and not over-used; and determining the role of teaching staff in assessing or checking portfolios. The authors also suggested an incremental approach to implementation that builds to full faculty participation over time. These findings lend some weight to concerns that students are rebelling against portfolios, seeing them as another externally imposed layer of assessment (Atwell, 2005) and suggestions that “when portfolios are used for accountability purposes, to document pre-service teachers’ achievement of standards-based competencies, teacher candidates viewed their portfolios as a hoop they needed to jump through to graduate, and not the lifelong reflective tool that had been envisioned” (Barrett & Carney, 2005, p. 3).

Implications for this project

The evidence from the research literature suggests that an effective e-portfolio approach must be designed to meet the specific purpose for which it is intended. In the case of this project the primary aim is to design an approach which will assist students create records of learning experiences that allow them to demonstrate the attributes of a graduate teacher as established in the professional standards. While this is most effectively achieved through a process that includes reflection to make those links, the purpose of the portfolio is not focused on enhancing teaching and learning through the creation of an on-going assessable portfolio. The philosophy most appropriate to the creation of this professional portfolio is that it is a non-assessable, personal repository that students will take responsibility for, but which teaching staff will support continuously throughout the degree programme.

The overall project should be concerned with designing an approach that integrates across the curriculum to include subject-based and practicum learning experiences, develops students’ understanding of the professional teaching standards and their purpose, and scaffolds a portfolio creation process that is based on linking experiences and standards through personal reflection, all supported by a Web-based system that does not require specific software skills. This e-Portfolio approach will have application across all professional preparation programmes for which standards exist or can be identified.
PROFESSIONAL STANDARDS AND TEACHER EDUCATION

In 2000, the New South Wales Government’s review of teacher education recommended the establishment of the NSW Institute of Teachers to enhance the professionalism of teachers and teaching (Ramsey, 2000). It was proposed that the Institute be responsible for developing standards for professional performance and accrediting individual teachers and endorsing teacher training programmes. Accordingly, the Institute was established by an Act of Parliament in 2004 (http://www.nswteachers.nsw.edu.au/).

As part of its remit and in consultation with more than 7000 teachers and the institutions responsible for teacher training, the Institute developed a set of professional teaching standards (NSW Institute of Teachers, n.d.) that provides a framework to guide a teacher’s development throughout his or her career. The standards were validated in a study conducted by the University of New England (see http://fheds.une.edu.au/Education/CRI/LT/).

The standards describe aspects of teachers’ work across three domains: professional knowledge, professional practice, and professional commitment. Seven elements describe the areas encompassed within these domains:

- Teachers know their subject/content and how to teach that content to their students.
- Teachers know their students and how students learn.
- Teachers plan, assess and report for effective learning.
- Teachers communicate effectively with their students.
- Teachers create and maintain safe and challenging learning environments through the use of classroom management skills.
- Teachers continually improve their professional knowledge and practice.
- Teachers are actively engaged members of their profession and the wider community.

Within these elements, aspects are describe for four stages in a teaching career (as illustrated in Figure I):

- Graduate teachers beginning their teaching careers in NSW,
- Professionally competent teachers who have demonstrated successful teaching experience,
- Professionally accomplished teachers recognised by their peers to have in-depth knowledge of subject-matter and pedagogy, and
- Teachers who demonstrate professional leadership.

<table>
<thead>
<tr>
<th>ELEMENT I</th>
<th>TEACHERS KNOW THEIR SUBJECT CONTENT AND HOW TO TEACH THAT CONTENT TO THEIR STUDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASPECT</td>
<td>GRADUATE TEACHER</td>
</tr>
<tr>
<td>Knowledge of subject content</td>
<td>1.1.1 Demonstrate relevant knowledge of the central concepts, modes of enquiry and structure of the content/discipline(s)</td>
</tr>
</tbody>
</table>

Figure 1: Excerpt from NSW Professional Teaching Standards

Implications for this project

The standards for ‘graduate teacher’ will apply to students who commencing the Bachelor of Education degree in 2007. In preparation for this the Faculty of Education at the University of Wollongong has begun to identify possible links between the standards and the subjects and practical experiences offered. The e-portfolio system must enable students to link their portfolios entries with the applicable ‘graduate teacher’ standards. The system must include the standards as they appear in the official documentation, however this should accompanied by some further explanatory text prepared by UOW staff to assist students link the standards to their experiences. Because the standards for professional competence, professional accomplishment and professional leadership do not apply to UOW students in the near future they will not be included in the initial version of the software, but could be included in a future version.

At this stage the required format of the portfolio to be submitted to the NSW Institute of Teachers has not yet been specified. Therefore the design of the report generation features of the system will need to be flexible to allow for students to customise and adapt the format to the particular requirements.
THE E-PORTFOLIO SYSTEM

The e-portfolio system was constructed to support the process of students' portfolio development by providing a repository for evidence, providing a means to link that evidence to a particular standard or standards, and by providing scaffolding for student reflection. I worked closely with the design team from the Faculty of Education's emlab in a process that began with meetings to assess the needs of students and staff. Consultation was sought with senior Faculty members involved in the accreditation of the pre-service teaching program, with administrative staff and with teaching staff.

The process led the team to develop the following design principles:

• The system would be tailored to the Faculty's needs, that is it would support students develop an e-portfolio based on the NSW Professional Teaching standards. Therefore it would not be developed as a tool for internal assessment and in the first instance there would be no assumption that staff would read and comment on student's entries, although this capability would be allowed for in the design.

• The system would be simple and its design targeted towards meeting the immediate needs of the Faculty and students. Many of the commercially available packages have a wide variety of features that we would not implement in the first version of the system.

• The entries created by students would be private by default. This would mean that only students could view their entries unless they made them available to other users of the system (i.e. other students, teachers, administrators or guests).

• There would be an emphasis on students taking responsibility for the content of their e-portfolios and an expectation that use of the system would be consistent with conditions of use for all university IT systems. This would mean that teaching staff would not 'vet' content, so any inappropriate material added by students to their portfolios would be their responsibility.

• Students would be encouraged to see their portfolio as integrated across their degree programme to include learning experiences arising from subjects studied at university and experiences while on practicum. Teaching staff and supporting text within the system would assist students make links between these types of experiences and the teaching standards.

• The system would be designed to require little maintenance and be created to be adaptable to multiple standards and formats, and allow for technical interoperability.

System features

1. Authentication
To log into the system a student enters his or her UOW username and password, which is then authenticated using the University's central systems. This avoids the need for a separate username and password and allows data from the student administration system (such as course and subject information) to be accessed by the e-portfolio system.

2. My Profile
A student creates a personal profile to store biographical details, a welcome message and a photo. Some items are compulsory, while optional items and preferences allow for a degree of customisation. Current enrolment details and completed qualifications are drawn from the student administration database.

3. My Portfolio
This part of the system allows students to create entries to record their learning experiences. An entry consists of a title, a reflective comment, links to one or more documents stored in the system (attachments) and/or URLs, and links to one or more standards. Figure 2 shows the upper section of the entry creation window. In this example a student has chosen to upload a software evaluation assignment as a Word document with a link to the Web site evaluated.
An entry can be linked to multiple documents, multiple URLs or to multiple standards. Documents and standards in turn can be linked to more than one entry. Entries can be saved as ‘In Progress’ allowing a draft version to be completed at a later date. When the student decides the entry is complete the entry status can be changed to ‘Ready’.

In the lower section of the entry creation window (Figure 3) the student assigns one or more standards to the entry. In the example shown the student has linked the software evaluation to two standards to demonstrate knowledge of subject content and to demonstrate knowledge of information and communication technologies.

Students can also create folders to store entries, allowing them to file entries according to categories they create to manage the entries.

4. My Standards
The NSW Professional Teaching standards and the UOW Graduate Attributes1 (http://www.uow.edu.au/about/teaching/graduate_attributes.html) have been included in the current version, however the system will also allow students to create their own learning goals or to import other sets of standards.

This section (shown in Figure 4) also offers an alternative means to create an entry by first browsing through and choosing a standard or standards, then selecting a folder in which to file the entry, and then selecting ‘Create Entry’, which then leads to the entry creation screen shown in figures 2 and 3.

1 These will be updated in the system database when changes are made to the standards.
5. Reports

The reporting tool (currently still under development) will allow students to create reports from the system either as a series of entries sorted by date or title, or as entries grouped according to a set of standards. The report is fully customisable, showing only the entries selected by the student to be published. Formats for reporting will include the following options:

- An overall checklist allowing students to view the records linked to each standard and the status of each record (in progress or ready). This will allow the student (or staff member) to quickly determine which parts of the portfolio still need to be completed.
- A rich text format document with output from records selected by the student. This will provide the text of each entry in a format compatible with word-processing software programmes on multiple platforms. Students will be able to edit the output to customise their portfolio. This will enable the student to create a printable document.
- A copy of each the attachments (which may not be in text-based formats) output as a compressed file which can expanded into a directory structure corresponding to the records that have been selected for reporting. This will allow students to provide their attachments on CD-ROM to accompany a text-based printed portfolio.
- An html version which could be downloaded and copied on a CD-ROM for presentation, or which could be viewed on the Web. This option allows maximum flexibility in terms of file linking.

IMPLEMENTATION PLAN

During the development of the system four sequential phases of formative evaluation were completed with key members of staff and two groups of first year students. In response to each phase the software system was updated to improve the interface and functionality, and to address programming errors.

The implementation will take an incremental approach, beginning with first year students in the Primary education programme, who will be introduced to the NSW Teaching Standards and the e-portfolio system in a series of co-ordinated lectures and tutorials across two compulsory subjects in Week 11 of Autumn session 2007. In the tutorials students will be assisted in accessing the system and scaffolded in developing a reflection on an assignment they created earlier in the session. First year students enrolled in the Early Childhood and the Secondary Physical and Health Education programmes will be introduced to the e-portfolio in Spring session 2007.

Information will be provided to staff initially through a presentation by the Associate Dean (Undergraduate) at a Faculty meeting. This will be followed by targeted professional development for staff directly involved in the first year programme, and then gradually expanded to involve all Faculty of Education staff.

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