
WHAT ARE THE FEATURES OF E-PORTFOLIO IMPLEMENTATION THAT CAN ENHANCE LEARNING AND PROMOTE SELF-REGULATION?

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Abstract: This paper presents a literature review focusing on the ways in which e-portfolios are currently used in teacher education and the potential of e-portfolios to support learning. Implications for processes and pedagogies will be identified, and the benefits of e-portfolios and issues of implementation will be considered. Mahara is a fully featured open source electronic portfolio, which was developed in 2006 by the New Zealand e-Portfolio Project funded by the NZ Tertiary Education Commission. Victoria University of Wellington College of Education has implemented Mahara with an entire cohort of first year students in the Bachelor of Teaching conjoint degree. The purpose of the e-portfolio is to assist students to advance their learning and improve their teaching through: (1) collecting and using evidence to critically reflect on their learning and teaching, (2) collaborating with peers and their mentor to critically evaluate their progress, (3) critically analysing their practice in relation to theory and research, (4) self directed learning by systematically setting and reviewing personal professional goals. The paper will discuss the features of Mahara in the light of the literature review, and the ways in which the implementation addresses some aspects of processes and pedagogies to support learning.

Keywords: teacher education, reflection, self-regulation

Introduction

The first part of this paper will report on the ways in which e-portfolios are currently used in teacher education. The potential of e-portfolios to support learning will be explored, and implications for processes and pedagogies will be identified. The benefits of e-portfolios and issues of implementation will be considered. The second part will report on the implementation of an e-portfolio within a teacher education programme at Victoria University of Wellington (VUW), and how this implementation considers and addresses some of these aspects.

Part 1: e-Portfolios in Teacher Education

The Purpose of e-Portfolios

There are many different purposes and ways of using e-portfolios which determine the format, structure and implementation. The use of e-portfolios in teacher education fall into three broad categories (Abrami, Barrett 2005; Smith, Tillema 2003; Wade, Abrami, Sclater 2005; Zeichner, Wray 2001). The first category is those portfolios which are used by institutions, organisations and providers as assessment tools to:

- ensure programme coverage,
- meet institutional / regional / national standards,
- determine whether a student has met the requirements for certification or graduation.

The second category is that of showcase or presentation portfolios which are used to present accomplishments and evidence of competence and may be used to put the 'best foot forward' in proposals and job applications. Teitel, Ricci and Coogan (1998) acknowledge that portfolios can be used in this way as public relation tools. In the third category are those portfolios which are designed primarily for the benefit or personal development of the author. These can be defined as learning portfolios (Wolf & Dietz, 1998), which Strudler and Wetzel (2005b) say are 'based on constructivist philosophy, where students may be expected to take responsibility for selecting artifacts, making connections to standards, and interpreting their own learning' (p. 2). Learning portfolios, therefore, are more student-centred, with the potential to develop reflective and critical thinking skills. It is the learning portfolio that will be the focus of this paper, and the way in which the tools, processes and pedagogies can support and contribute to student learning.

e-Portfolios and Learning

A portfolio is defined by Shulman (1998) as ‘a structured documentary history of a set of coached or mentored acts of teaching, substantiated by samples of student portfolios, and fully realised only through reflective writing, deliberation, and conversation’ (pp. 36, 37). It would appear therefore, that it is the process of creating the portfolio, and not the product, that is the primary focus. Shulman (2004) highlights the virtues of the learning portfolio as a tool to examine a teacher’s work over time, enabling critical evaluation of strategies and tools used. Key components of the learning involved in the process of creating and maintaining a portfolio are metacognition, critical reflection and collaboration (Klenowski, Askew, & Carnell, 2006). Blackburn and Hakel (2006) report that self regulated learning is a tool which can enhance metacognition, and they explore Pintrich’s four stages of self regulated learning: goal setting; monitoring; regulation and reflection. Based on their findings, they recommend that e-portfolio processes and software should:

- encourage and make provision for students articulating their learning and development goals,
- incorporate self-monitoring and self assessment of progress towards goals, and include guidelines for self assessment,
- provide for mentor/advisor feedback and promote the use of feedback to inform future goals,
- encourage and make provision for students articulating strategies for attaining their goals,
- promote evaluation of, and linking feedback to self assessment and attainment of goals,
- prompt students to assess and reflect upon their portfolio entries.

Critical reflection is neither easy nor straightforward. Students require structured support and sensitivity, as engaging in personal development reflection can be an uncomfortable and frightening experience (Riedinger, 2006). Riedinger suggests some ‘mining exercises’ and workshop activities to introduce reflection and create a sense of ownership and ‘ease the transition to more analytical thinking’ (p. 97). According to Riedinger, the e-portfolio ‘opens wide the possibilities for reflections of all types: in action, before action, after action, in solitude, in consultation with peers, in consultation with instructors, coaches, and advisers, written, spoken, videotaped, or graphically represented’ (p. 93).

Boud’s (2000) concept of sustainable assessment is one which he defines as ‘development that meets the needs of the present without compromising the ability of the future ... which encompasses the knowledge, skills and predispositions required to underpin lifelong learning activities’ (p. 151). Moving towards sustainable assessment therefore requires assessment to be put in the hands of the learners rather than the assessors, and requires learners to be able to undertake assessment of their learning throughout their lives. Learners, therefore, should be equipped to be lifelong assessors. He identifies some features that assessment tasks should promote if they are to be regarded as part of sustainable assessment. They include:

- exploration of criteria and standards which apply to any given learning task,
- active engagement with learning tasks with a view to testing understanding and application of criteria and standards,
- development of devices for self monitoring and judging progression towards goals,
- practice in discernment to identify critical aspects of problems and issues,
- access to learning peers and others with expertise to reflect on challenges and gain support for renewed efforts,
- use of feedback to influence new ways of engaging with the learning task,
- care in the use of language to avoid creating premature closure on ongoing learning.

The use of the e-portfolio in teacher education programmes has great potential to support Boud’s notion of sustainable assessment incorporating the key components of learning (Klenowski, Askew, & Carnell, 2006).

Shulman (2004, p. 396) acknowledges the importance of collaboration, and Moseley and Ramsay (2005) cite Hilliard (1991), as emphasising: ‘[teachers] need to experience the joy of collaborative discussion, dialogue, critique, and research’ (p. 36). Moseley and Ramsay suggest that this is also true for student teachers, and that peer collaboration and mentoring can add value to the e-portfolio process as a means of authentic assessment. The extent to which collaboration and mentoring takes place

within the portfolio construction process, however, varies immensely from those who work largely on their own, to those who have significant peer and mentoring incorporated into the portfolio development process (Davis & Honan, 1998; Freidus, 1998; Zeichner & Wray, 2001).

Pedagogies and Processes of e-Portfolios

It is essential that whenever embarking upon implementation of an e-portfolio within a teacher education programme, the purpose should be absolutely clear to students and faculty: 'the power of e-portfolios and reflections can be squandered if their purposes are not clearly defined.' (Riedinger, 2006, p. 96). The purpose of the e-portfolio will determine the pedagogies and processes of implementation. Attwell (2006) acknowledges that 'there is not one generic approach but multiple approaches that are based on different pedagogic understandings of the purposes and processes of using e-portfolios for teaching and learning'. In Strudler and Wetzel's (2005b) study of universities with 'mature' implementations of e-portfolios; their recommendations for those in earlier stages of implementation included fostering faculty support, and clarifying and sharing the purpose for e-portfolios.

Challis (2005) suggests that the processes and pedagogies involved in e-portfolios are much different to those of their paper counterparts due to the ease of manipulation and interrogation of digital evidence/data and the ability to rework and reconsider material over time. She also identifies the enriched possibilities of interaction due to potential of global readership of web e-portfolios. It is important to consider, therefore, which aspects of learning the e-portfolio implementation is intended to promote, and which features of the tools and processes will contribute to that purpose.

Benefits of e-Portfolios

An e-portfolio provides a structured framework within which student teachers can present text, images, audio and video in a 'fluid' form which is easily edited and updated, with hyperlinks enabling ease of cross referencing. The digital portfolio can also incorporate online communications facilities (Abrami & Barrett, 2005; Wade, Abrami, & Sclater, 2005). The benefits of e-portfolios over their paper counterparts are centred on the multimedia, hypermedia and communications capabilities of the digital media. The ease of storage and accessibility allows for continuous documentation of lifelong learning and demonstration of growth over time. The power of multimedia to represent knowledge and experiences and to scaffold reflection on learning in real contexts is not fully realised yet, but e-portfolios provide the potential for authentic learning and professional development (Challis, 2005). e-Portfolios can reflect the multidimensional nature of a teacher's work in classroom contexts and are based on self and collaborative assessment (Schwartz & Rolheiser, 2001). The choice of e-portfolio software and systems, however, impacts on aspects such as ownership, authorship, access and equity (Challis, 2005; Cooper & Love, 2001; Gibson, 2006; Tosh, Light, Fleming, & Haywood, 2005; Zeichner & Wray, 2001)

Jonassen (2000) urges the use of the computer as a Mindtool; an intellectual partner in the learning process, and he provides a model of integrating technology to engage learners in the learning process and facilitate constructive, critical, higher order thinking. He argues that multimedia authoring tools can be used for knowledge construction and reflection on learning. An e-portfolio, therefore, falls into the category of Jonassen's definition of a 'knowledge construction tool' (2000, pp. 205, 274).

Richards (2002) suggests that the use of the e-portfolio 'addresses the convergent need for an applied approach to different types of learning in the digital age' (p. 1). His model is significant in that it integrates ICT in education in a powerful way which engages the learner in an activity-reflection cycle. The e-portfolio framework provides a means of formative and summative assessment which addresses the acquisition of knowledge and skills as well as the higher order reflective processes. This aligns with Laurillard (2002) and her plea to move from the transmission model of learning and exploit the potential of new technologies to meet the demands of the digital age. She urges higher education educators to be creative with new technologies. She proposes the more progressive 'conversational framework' model by exploiting the communicative and adaptive capabilities of the new technologies.

Issues of Implementation

The use of the e-portfolio as an assessment tool can be fraught with difficulties of authentication, misrepresentation and validity. (Delandshere & Arens, 2003; Meeus, Questier, & Derks, 2006; Shulman, 2004). Jorgensen and Hansen (2004) cite the work of Borko, Machalic, Timmons, and Siddle (1997) reporting that combining the two purposes of assessment and learning can be problematic as there can be conflicts between level of prescription necessary for accreditation / assessment and the autonomy required for individual learning and self discovery. Cooper and Love (2001) also identify that inequity of access and skill level can have a significant and potentially adverse affect on assessment quality.

Battacharya (2001) cautions that in order for the process of action-reflection to be inbuilt in the formation of a digital portfolio, it must be organised in a deliberate and explicit programme of sequenced activities that lie at the core of the teacher education programme (Challis, 2005). Cooper & Love (2001) also contend that 'obtaining the enhanced outcomes possible using on-line portfolio-based assessment depends on a review of courses' pedagogical and assessment foundations and on teachers' assessment decisions being consistent with underlying pedagogical principles'.

Strudler and Wetzel (2005a; , 2005b) reported that none of the programmes in the six 'mature' e-portfolio users in their study featured moderation of assessment of portfolios by faculty evaluators, and training of evaluators was barely evident. They reported inconsistencies in assessment and identified the need for training and support of evaluators as one of the next steps identified by the universities.

Implications

The characteristics of e-portfolios offer an innovative and dynamic medium for recording and organising evidence/artifacts, and a powerful reflective tool to demonstrate growth over a period of time, with the potential to provide a foundation for long-term authentic professional development and lifelong learning beginning with the student teacher.

The ways in which e-portfolios are used within teacher education vary considerably, with different emphases placed on aspects of assessment, presentation and professional learning. The extent to which processes such as metacognition, self regulation, critical reflection and collaboration take place within e-portfolio use is very much dependant on the way the portfolio is adopted and integrated into a programme of learning. In order that the processes of critical reflection and collaborative discussion are authentically integrated into e-portfolio use, the e-portfolio should be carefully planned in alignment with teacher education programme philosophies, conceptual frameworks and learning outcomes.

For those mandated implementations of e-portfolios, issues of equity of access and skills level need to be addressed. Barrett (1999) suggests that a simplistic approach to digital portfolio implementation is most beneficial, matching the level of technical skill required to that of the students and staff: 'the value added of creating an electronic portfolio should exceed the efforts expended, and the faculty members should approach their use of technology conservatively'.

If it is the intention that beginning teachers will continue to develop their portfolio for their own professional development, it follows that the most appropriate tools to use would be those that are accessible to them when they embark on their careers. Another aspect which would impact on the usability of e-portfolios for lifelong learning would be the ownership, interoperability and transferability of the portfolio. The type of application used, therefore has to be considered very carefully with these factors in mind.

If careful consideration is given to the planning, implementation and assessment of the e- portfolio, it can provide a dynamic and engaging environment which will facilitate powerful learning and reflection as well as showcase achievements, and growing capabilities in using technology to support lifelong professional development.

Finally, there is a proliferation of literature on the use of e-portfolios in pre-service teacher education which focus on the types of applications used, and their use within the context of 'assessment and showcase / presentation' tools. There is much less on the use and effectiveness of the 'learning e-portfolio' to support metacognition, represent new knowledge and scaffold individual and

collaborative reflection on practice. The potential of e-portfolios, therefore, to support lifelong professional learning is still being explored and, according to the literature available, is largely unrealised.

Part 2: Implementation of an e-portfolio

Background

For the past four years, the School of Primary and Secondary Teacher Education at Victoria University Wellington (VUW) has implemented an e-portfolio within the Bachelor of Teaching (BTeach) conjoint degree. The portfolio implementation process has been amended this year in consultation with BTeach course coordinators and in response to student evaluations and the external BTeach monitor's report (Mutch 2006). The development of the e-portfolio process reflects many of the aspects outlined in the previous section of this paper.

e-Portfolio tool

During trimester 1, 2007, VUW conducted a pilot case study with first year students on a newly developed e-portfolio tool. Mahara (<http://www.mahara.org/>) is a fully featured open source electronic portfolio, which was developed in 2006 by the New Zealand e-Portfolio Project funded by the NZ Tertiary Education Commission's e-learning Collaborative Development Fund. The project involved a number of New Zealand Universities and Polytechnics including Victoria University of Wellington (VUW). Mahara is a web-based e-portfolio, designed essentially as a learning portfolio which is owned by the user; includes collaborative and communication tools and supports lifelong learning and development. Mahara was designed with accessibility, ownership, interoperability and transferability in mind, facilitating the adoption of Mahara as a lifelong learning tool. The design allows for uploading of multimedia files which can be incorporated as artefacts in any number of blogs or views and shared with other individuals or communities. The communications tools support Laurillard's 'conversational framework' (2002) and provide a global environment for collaboration and peer/self assessment which promote self-regulation and support the notion of sustainable assessment as outlined by Boud (2000). The design of Mahara, therefore, maximises the potential for the e-portfolio to be used to support authentic learning, assessment and professional development and reflect the multidimensional nature of student teachers'/teachers' learning and practice.

Rationale/purpose

The purpose of the e-portfolio process in the BTeach is to assist students to advance their learning and improve their teaching through:

- collecting and using evidence to critically reflect on their learning and teaching,
- collaborating with peers and their Professional Development Mentor (PDM) to critically evaluate their progress in learning and teaching,
- critically analysing their practice in relation to theory and research,
- self directed learning by systematically setting and reviewing personal professional goals.

This purpose is designed to reflect the aspects of learning such as metacognition, critical reflection and collaboration, incorporating goal-setting and self and peer assessment as discussed previously. It is also designed to support students in giving, and responding to, peer and mentor feedback. The conceptual framework for the BTeach degree currently incorporates the BTeach graduate profile and the New Zealand Teaching Council's Graduating Standards for Beginning Teachers (New Zealand Teachers Council, 2007). The student e-portfolio is closely aligned with the graduate profile, as are all other BTeach courses and assessments. All course assessments and terms tasks are therefore relevant to the students' development of their portfolio and add to the value of the portfolio as a formative assessment tool. Burke (1996) writes that the value of a student portfolio lies in its use with other assessment development.

In order to ensure the alignment with the underlying pedagogical principles of the degree, and that the purpose of the e-portfolio is shared by faculty; the process is being developed through ongoing consultation with BTeach associate directors and course coordinators and is explicitly linked to the BTeach programme learning outcomes and the graduate profile.

Pedagogy and process

The degree is made up of curriculum studies (CUST) and professional studies (TEAP) courses. The student e-portfolio is developed and maintained throughout the programme from trimester one in the first full year of the degree, and is a terms requirement of the TEAP courses. Students are not graded on their portfolio entries; however, if the terms requirements are not fulfilled, the students do not pass the associated TEAP course. For the final TEAP course in year four, following the final teaching experience, elements of the portfolio are selected by the student to be incorporated in a presentation portfolio which is graded as a summative course assessment.

In order to promote collaborative discussion and the notion of self and peer assessment, the entire cohort of students was split into groups of 7-9 students, and each group was allocated a member of faculty as their Professional Development Mentor (PDM). Each PDM group was created as a Mahara community with the PDMs assigned as tutors. Students are required to identify one aspect of their progress as a focus for reflection each trimester and relate it to one of the relevant course/programme learning outcomes. In meetings and/or online interactions with their PDM and/or their peers, they are required to share their artefact and reflection; give and respond to feedback; reflect on learning and set professional goal/s for the following trimester. Students are provided with a template using Smyth's (1992) reflection model: describe; inform; confront; reconstruct. In addition; reflective journal summaries, similar to those used by Woodward (1998), are incorporated in the student reflections. The summaries are designed to help students reflect on their learning through collaboration with peers and mentors. The students are required to make two statements about what they have learned or experienced with their peer group or mentor; articulate what they perceive as their strengths; articulate any concerns, and identify next steps in response to feedback from peers and/or mentor. Boud (2000, p. 158) cites the work of Sadler with regard to response to feedback : 'The only way to tell if learning results from feedback is for students to make some kind of response to complete the feedback loop'. The portfolio entries are discussed by the students and formatively assessed by PDMs each trimester. Peer assessment is scaffolded by providing specific criteria for formative assessment and evaluation of peers' portfolio entries.

Early feedback from students indicated that, although some students found the portfolio process very valuable, others perceived it as 'tokenistic' and an 'add on' (Lamont, 2006). Possibly due to the lack of references to the portfolio in other courses, many students perceived the portfolio as low priority. Although the structure of the portfolio reflects the BTeach conceptual framework and graduate profile; the links and purpose were not made explicit enough for the students, and the portfolio was not established as an integral part of the course. As a result, the process has been reviewed to include portfolio workshops within some CUST and TEAP courses in order to make the links and purpose explicit and scaffold skills of feedback and critical reflection on learning. The workshops include implementation of Smyth's (1992) reflection model to scaffold students in critical reflection and analysis and providing constructive feedback. Subsequent TEAP and CUST courses throughout the programme will provide opportunities for students to share their portfolio entries with their peers and receive constructive feedback from peers and mentors. It is the intention that this will help students to make explicit links throughout the BTeach programme and provide a more 'dynamic and engaging environment which will facilitate powerful learning and reflection' as referred to earlier in this paper (p4). This is in line with Riedinger's (2006) suggestions for scaffolding critical reflection of personal professional development.

In its current form, there are no assessment criteria for the portfolio. The learning outcomes and structure for reflection serve more to give the portfolio definition and boundaries, as enunciated by Broadfoot, cited by Woodward (1998). The process is monitored and recorded by PDMs, therefore the task is duly completed and recorded as a 'pass', but neither process nor outcomes are summatively assessed. This practice of treating an element of assessment as a 'prerequisite' is one approach to peer assessment as offered by Boud, Cohen and Sampson (1999).

Evaluations

The students are currently in their second trimester of using Mahara. Case study evaluations were completed at the end of the first trimester. Forty-three out of forty-seven students completed the evaluation. Some of the results are shown in Table 1.

Table 1

Question	Percentage of 'Yes' responses
1. Did you find the e-portfolio a useful strategy for	
i. reflecting on your learning?	51
ii. goal-setting?	33
2. Did you find your PDM meeting and online feedback a useful strategy for	
i. reflecting on your learning?	42
ii. goal-setting?	19
3. Did you find peer collaboration and online feedback a useful strategy for	
i. reflecting on your learning?	72
ii. goal-setting?	35

Negative respondents made comments on the following themes:

- PDM feedback was not timely,
- technical difficulties and user unfamiliarity with the software,
- goal-setting was not related to learning outcomes ; not enough guidance given,
- only one meeting with PDM at beginning of trimester,
- some peer feedback was outwith the e-portfolio application.

Commentary on findings

Since the first trimester was the pilot case study for Mahara, students and staff were trialling the first version of the software; therefore there were some technical difficulties and usability issues. The timing of the case study report also meant that the submission of portfolio entries was at a time in the course when other assignments were due. Although goal-setting was included in the portfolio template; it was not required to be related to the rest of the portfolio entry. At this point in the course, there was some scaffolding on reflection and feedback, but none on goal-setting and responding to feedback. These aspects are scheduled to be scaffolded in future BTeach courses.

Further research and development

Future developments will include moderation meetings each trimester for the PDMs from each cohort of students. It is the intention to examine a range of portfolio entries to identify to what extent the students are engaging in the key components of metacognition, critical reflection and collaboration (Klenowski, Askew, & Carnell, 2006). As the students progress through the BTeach programme, sessions are scheduled to allow time for PDM student groups to meet and collaboratively evaluate progress. There are also times scheduled for PDMs to meet with their groups to monitor and evaluate progress.

Further research is required to investigate the full system of e-portfolio implementation and the impact of the following on learning:

- organisational, academic and resourcing constraints,
- scaffolding of reflection, feedback and goal-setting,
- scaffolding of peer/self assessment strategies,
- mentor consistency, support and training,
- faculty and student perceptions of e-portfolio pedagogy and process.

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