Developing tools to facilitate integrated reflection

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Abstract

Much has been said and documented about the key role that reflection can play in the ongoing development of e-portfolios, particularly e-portfolios utilised for teaching and learning. A review of e-portfolio platforms reveals that a designated space for documenting and collating personal reflections is a typical design feature of both open source and commercial off-the-shelf software. Further investigation of tools within e-portfolio systems for facilitating reflection reveals that, apart from enabling personal journalism through blogs or other writing, scaffolding tools that encourage the actual process of reflection are under-developed. Investigation of a number of prominent e-portfolio projects also reveals that reflection, while presented as critically important, is often viewed as an activity that takes place *after* a learning activity or experience and not intrinsic to it. This paper assumes an alternative, richer conception of reflection: a process integral to a wide range of activities associated with learning, such as inquiry, communication, editing, analysis and evaluation. Such a conception is consistent with the literature associated with 'communities of practice', which is replete with insight into 'learning through doing', and with a 'whole minded' approach to inquiry. Thus, graduates who are 'reflective practitioners' who integrate reflection into their learning will have more to offer a prospective employer than graduates who have adopted an episodic approach to reflection.

So, what kinds of tools might facilitate integrated reflection? This paper outlines a number of possibilities for consideration and development. Such tools do not have to be embedded within e-portfolio systems, although there are benefits in doing so. In order to inform future design of e-portfolio systems this paper presents a faceted model of knowledge creation that depicts an 'ecology of knowing' in which interaction with, and the production of, *learning content* is deepened through the construction of well-formed questions of that content. In particular, questions that are initiated by '*why*' are explored because they are distinguished from the other 'journalist' questions (*who, what, when, where,* and *where*) in that answers to them demand *explanative*, as opposed to *descriptive*, content. They require a *rationale*. Although w*hy* questions do not belong to any one genre and are not simple to classify — responses can contain motivational, conditional, causal, and/or existential content — they do make a difference in the acquisition of understanding. The development of scaffolding that builds on *why*-questioning to enrich learning is the motivation behind the research that has informed this paper.

Keywords: *why-questioning, reflection, question generation, deep learning, scaffolding*

Introduction

The focus of this paper is innovation associated with the design and deployment of e-portfolio systems. The term 'e-portfolio' is used here in its broadest sense of being a collection of digital artefacts and applications that are typically used for profiling an individual, group, or organisation in terms of capability or achievement — though a diversity of other definitions exist (Galatis et al., 2009; Strohmeier, 2010). For well over a decade e-portfolios and systems that support them have been explored and adopted by the education and training sector worldwide, as well as by numerous other stakeholders (ELI, 2001–2006; Love et al., 2004). Such a time span might indicate a maturing of both the tools and associated practices; however, as Hallam et al. (2008–2010) point out in their comprehensive Australian reports, the field is best characterised as 'emergent', particularly in educational settings.

While it is typical that an 'e-portfolio system' is named as an 'e-portfolio' or 'e-portfolio system' as in numerous implementations throughout the Australian higher education sector, some core functions (such as profiling) are also evident in online services that make no mention of the term 'e-portfolio'. Thus, while the primary profiling function is common within teaching and learning contexts that support undergraduates, graduate students, or staff (for example, Queensland University of Technology), it is also common across a diversity of online services such as professional employment social networking services (for example, *LinkedIn*) and systems deployed by professional associations that record continuing professional development of its members (for example, the Australian Computer Society). Within the Australian education and training context a common feature is also representation of an individual's profile in terms of 'employability skills' (Swinburne, 2010; QUT, 2008; Victoria University, 2007; James, Meek et al., 2008; Bowman & Kearns, 2009).

Employability skills have been defined as 'skills required not only to gain employment, but also to progress within an enterprise so as to achieve one's potential and contribute successfully to enterprise strategic directions' (DEST, 2002, p. 3). They are commonly classified according to the following categories: communication; teamwork; problem-solving; initiative and enterprise; planning and organising; skills that contribute; self-management; learning; and, technology. 'Reflection' is not an explicit category in this list but is regarded by some commentators as the implicit core attribute of an effective individual in the contemporary workplace within the literature on 'reflective practitioners' (Schön, 1987; van Manen, 1995; Boud et al., 2005).

While this paper takes a broad perspective on what constitutes an e-portfolio many commentators insist otherwise. In particular, there is a widespread view that 'the essential nature of an e-Portfolio for learning is not as a repository but as a place for reflection' (Batson, 2009). Cambridge (2009) articulates a similar view in emphasising the importance of reflection although within a more 'emergent' framework of supportive technologies and other practices such as planning, synthesising, and collaborating. For Cambridge, the activity of connecting a diversity of artefacts, interactions, and activities is itself a stimulus for reflection (Cambridge, 2009, p. 41). The key point here is that reflection is considered by most advocates to be a key component of e-portfolios within contemporary educational settings (Desmet et al., 2007; JISC, 2008; Hallam et al., 2010). Moreover, a review of

e-portfolio platforms commonly used in educational settings worldwide reveals that a designated space for documenting and collating personal reflections is a typical design feature (Sweat-Guy & Buzzetto-More, 2007).

Integrated reflection

The term 'integrated reflection' used in this paper is informed by the literature on reflective practice, in particular Schön (1987), recent work of Wang (2009) as well as literature on Communities of Practice (Wenger, 1998; Wenger et al., 2002).

Schön has been credited with first using the term 'reflective practice', defining it as 'reflection-in-action' and as practice that involves 'continuous learning' (Schön, 1987, p. 72). Thus, in this conception 'reflection' can be seen as a process integral to a wide range of activities associated with learning — such as inquiry, communication, editing, analysis, synthesis and evaluation — and many more, depending upon context. This idea is consistent with the way that continuous professional development (CPD) and/or work-integrated learning (WIL) are implemented in many workplaces (Patrick et al., 2009). Scaffolding reflection-in-action has also gained attention in the development of online learning for at least a decade (Shannon et al., 2001; Lai & Calandra, 2007; Sporer et al., 2010; Lyons, 2010).

Wang proposes 'an ontological model that specifies a generic organisational structure of eportfolios in the integrated reflection context' (Wang, 2009, p. 449). In this model, reflection features as a dominant ontological category within a structure that includes learning subject, learning objectives, learning objects, assessment instruments, and reflection query. Wang's conception of 'integrated reflection' represents much more than a collection of jottings or journalism after a learning experience and is facilitated by 'active learning' (Wang, 2009).

For both Schön and Wang, reflection is more than reflective journalism, but evidence suggests that within most current implementations of e-portfolio systems this is the extent of reflective practice (Swinburne, 2010; QUT ePS, 2011; Victoria University, 2007). In this paper, integrated reflection indicates a range of cognitive activities beyond the recording of reflections, including discernment, critical thinking, identification of facts and issues, checking, reconciliation, summarisation, synthesis, and pattern recognition, etc. (van Manen, 1995).

Related research

The Australian ePortfolio Project

The Australian ePortfolio Project (AeP), funded by the Australian Learning and Teaching Council, provides an excellent snapshot of recent activity (over a three-year period) within Australia across the Vocational Education and Training (VET) and Higher Education (HE) sectors. It is of interest that the final report documents 'reflection' as a key component of e-portfolio function for the HE sector, while the VET sector is typically more interested in pragmatic outcomes, such as assessment of competencies or employability (Hallam et al., 2009). The authors report the following observation, which is pertinent to the theme of this paper:

> *The research revealed that there continued to be a low level of understanding about the actual impact of ePortfolios on student learning outcomes.*

However, there was considerable interest in the area, and although little formal research had been undertaken, there was a belief, anecdotally at least, that ePortfolios contributed to increased awareness of eLearning technologies and reflective learning, as well as employability skills ... The need for further meaningful research continues to be a priority if the potential of ePortfolios to play a significant role in Australian education, training and employment is to be achieved. (Hallam et al., 2009, p. 36)

JISC ePortfolio Implementation study (UK)

The JISC-funded ePortfolio Implementation (ePI) study (2010–2011), led by the University of Nottingham, in many ways resembles the AeP study, with one of its aims being to inform Higher and Further Education (H/FE) institutions on best (emerging) practice and strategy through identifying 'mature' implementations. The final report is due in mid-2011 although many case studies are already publicly available for review (JISC ePI, 2011). The study has explored large-scale implementations of e-portfolio use in UK H/FE and professional organisations.

The focus of this study was informed by earlier research into e-portfolio implementation in the UK in which a number of 'threshold concepts' were evident (Meyer & Land, 2003; Joyes et al., 2010). In reporting on this earlier research Joyes et al. (2010) found that:

e-portfolio implementation is particularly complex in part due to the number of stakeholders involved, the contexts in which e-portfolios can be applied and the number of purposes they can have.

This finding suggests that the diversity of implementation reveals significantly more 'emergence' in the field than 'maturity'. Joyes et al., also found:

This research suggests that there are threshold concepts ... related to e-portfolio implementation that are associated with misconceptions and hence represent barriers to implementation ... Once the threshold has been passed through a new and irreversible perspective is attained. This perhaps explains why those new to their implementation fail to comprehend the extensive guidance available. This threshold concepts perspective on e-portfolio implementation provides a means of identifying effective e-portfolio implementation. (Joyes et al., 2010, p. 1)

However, in reviewing the case-studies and earlier reports, it is revealing that while 'reflection' is understood to be an important activity in e-portfolio use, Joyes et al. (2010) do not identify it as one of these threshold concepts. This is despite the fact that reflection is listed as one of seven core activities in e-portfolio usage: information capture, information retrieval, planning, reflection, feedback, collaboration, presentation. Instead, the authors define five threshold concepts 'which assume a mature understanding of e-portfolio use' — without actually making explicit what a 'mature understanding' actually is. The five threshold concepts identified (Joyes et al., 2010, p. 3) are:

- *Purpose is aligned to context to maximise benefits*
- *Learning activity is designed to suit the purpose*
- *Processes are supported technologically and pedagogically*
- *Ownership is student centred*
- *Transformation (disruption) is planned for*

The authors then develop a maturity framework in the form of a two-dimensional table based on these five threshold concepts mapped against the context of implementation (from localised to extra-curricular use). While straightforward in conception this framework is also simplistic in that the authors suggest that 'completion of all cells in a particular column would represent maturity'. It is not clear whether a binary entry (yes/no) or a narrative entry is required. But if reflection is assumed to be a core process then this framework implies that implementations that support it are already adequate, or that variation in support does not impact any measure of maturity. If not, then the approach to identifying 'institutional maturity' of implementation is not a sufficient measure. As a managerial perspective it may seem like a robust approach but it is based upon assumption or detail not made explicit in the paper.

Questioning and learning

Asking questions is an important foundation to the learning process (Dewey, 1966; Schank & Cleary, 1995). The Inquiry Project at the University of Illinois, a project focused on the advocacy of inquiry-based learning, takes an even stronger stance, using as its motto: 'learning begins with questions'. While learning can clearly take place without questioning — for example, through repetition and memorisation — it is through questioning that reflection, discourse, and knowledge construction take place. Thus, socio-cultural philosophers of education such as Freire and Faundez (1989) have argued for the need for a 'pedagogy of asking questions' that gives emphasis to the questioning process as something valuable in itself, where the 'answer' may not even be relevant:

> *Thinking about questions that may not always or immediately arrive to an answer are the roots of change*   *(Freire & Faundez, 1989, p. 37)*

More recently, Thomas and Seely Brown (2011) identify the emergence of a 'new culture of learning' as a consequence of innovation with ICT and make the argument:

> *We propose reversing the order of things. What if, for example, questions were more important than answers? What if the key to learning were not the application of techniques but their invention? What if students were asking questions about things that really mattered to them?*
>
> *(Thomas & Seely Brown, 2011, p. 81)*

Consistent with this approach, Mason (2008) presents a model for sense-making in which 'primitive' questions (*who, what, when, where, why, how,* and *if*) are used as a framework for representing and understanding the interplay between community, content, and context during learning and knowing. In this paper, questions instigated by *why* are highlighted as an important consideration in the design of ICT tools — for the reason that most tools that currently facilitate the discovery and reuse of digital content privilege what Verberne (2010) refers to as 'factoid' questions (*who, what, when,* and *where*). This is despite the proliferation of ICT innovation and emergence of Web 2.0 social software as a dominant paradigm of web engagement. Elsewhere, Mason (2009) argues that the key characteristic of *why*-questions, as opposed to the factoid questions, is that responses to them require *explanatory* as opposed to *descriptive* content (Mason, 2009, p. 42). This is a key point for this current paper because it is through constructing explanatory

content (and giving consideration to *why*-questioning), that reflection is deepened beyond a consideration of factual material. This then begs the question: to what extent are current implementations of e-portfolio systems designed to promote and/or support *why*-questioning? Anecdotally, the answer would appear to be very little beyond the provision of question templates that derive from frameworks to facilitate a journal entry *following* a learning experience. The STARL-P Framework (Situation, Task, Action, Result/Reflection, and Learning/Planning) is representative of this approach (QUT ePS, 2011).

21st Century skills

The assessment and teaching of 21st Century Skills project argues that 'learning to collaborate with others and connect through technology are essential skills in a knowledge-based economy' (ATC21S, 2011). Implicitly, such a statement underscores the importance Web 2.0 social software. But investigating this project further is important because it also identifies critical thinking as an essential skill at the same level as ICT literacy and problem solving. However, in the government-sponsored literature in Australia on employability skills problem solving is a category in which the supporting documentation rarely even mentions critical thinking. While there is an extensive academic discourse around critical thinking and pedagogy (Burbules & Berk, 1999; Casey & Bruce, 2011) it is not unreasonable to understand critical thinking to be an important facet to reflection and reflective practice. Of course, there exists variation in emphasis across workplaces — for example, a news reporter would normally be required to critically appraise information sources more than an employee in a fast food outlet. It will be interesting to monitor when or whether the literature on 'employability skills' aligns over time to this more recent research on essential skills.

Another frontier for ICT tool development?

Following the foregoing discussion a number of opportunities would appear to exist for the development of ICT tools that support integrated reflection in the context of e-portfolio development. Such tools could be designed as embedded within e-portfolio systems or as standalone services that could be utilised by such systems. For example:

- Tools that facilitate the construction of questions from a body of content.

- Tools that extend the discovery and processing of factual information to facilitate the discovery and production of explanatory content — in short, tools that support *why*-questioning.

- Tools that stimulate the construction of rational argument.

- Prompting tools that suggest patterns, dependencies, or other relationships between discrete chunks of content.

- Interface design that explicitly supports the navigation of e-portfolio content via a questioning methodology.

Within the broader fields of e-learning and intelligent tutoring, a number of these tools already exist that could be customised for e-portfolio use. For example, tools to support reflection-in-action have already been developed (Shannon et al., 2001). Within the field of intelligent tutoring systems, significant research and

development is underway on automated Question Generation (Rus & Lester, 2009; Graesser et al., 2008) and dedicated software such as *Rationale* is specifically designed to enhance student abilities in forming rational arguments and identifying fallacies or weakly formed arguments (Rationale, 2011).

Conclusions

e-portfolios and e-portfolio systems can be conceived of in a number of ways. This paper has assumed a broad conception in which the boundaries that *contain* the e-portfolio are not defined solely by application software. In the same way that Learning Management Systems have had to evolve beyond the *containment* of learning activities to the *connection* of relevant learning activities the reflective activity that is currently promoted within e-portfolio systems will need to evolve from a *contained* toward an *integrated* approach. While the process of integration rests largely with the integrator there would appear to be opportunities to build tools that might facilitate this process.

If recent work conducted by projects such as the Assessment and Teaching of 21st Century Skills are to be validated then it is likely that graduates who are 'reflective practitioners' who integrate reflection into their learning and problem-solving will have more to offer a prospective employer than graduates who have been trained to adopt an episodic approach to reflection.

This paper has identified that ICT tools that support integrated reflection in the implementation of e-portfolio systems is currently under-developed. It has been the purpose of this paper and the intent of future work within PhD research currently underway at Queensland University of Technology to elaborate further on such tools might facilitate scaffolding opportunities arising from ICT innovation that supports *why*-questioning.

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Biography

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