Personalising medical education: ePortfolios for workplace-based assessment

Robyn Philip
Flinders University
Australia

Helen Wozniak
University of Queensland
Australia

Shari Bowker
University of Queensland
Australia

Chantal Bailey
University of Queensland
Australia

Alison Green
University of Queensland
Australia

There is much literature on the challenges of designing for and implementing ePortfolios. Issues include technology management and overcoming barriers to acceptance and usability. Yet as higher education practitioners we find ourselves continually stumbling over these issues. Through discussion of a work-in progress case study at a large Australian medical school, we raise some of the design and implementation issues that impacted integration and facilitation of an ePortfolio system. The system was created to support students' personal learning, and evidencing and assessment of clinical competence. Recognising the importance of context, we focus on a Workplace Learning Portfolio (WLP) course, in which an ePortfolio system was adopted to support and deliver workplace-based assessments for students in Years 3 and 4 of a Doctor of Medicine (MD) program. Discussion centres around the promise and reality of concurrently implementing curriculum and technological change with a large cohort of domestic and international students. The complexity of using an ePortfolio system to identify students at risk of academic failure is raised, as is an example of unexpected student engagement with personalised learning.

Keywords: ePortfolios, medicine, workplace-based assessment, personalised learning

Introduction and background

In recent years there has been increased interest in higher education in the use of ePortfolios to demonstrate student competence, showcase student achievement, and aid personal reflection (Coffey & Ashford-Rowe, 2014; Driessen & Tartwijk, 2019; Hallam & Creagh, 2010; Holt et al., 2014). As a space for the curation of digital artefacts evidencing a learner's personal experiences and achievements, ePortfolios (electronic portfolios) may be considered a product (Hallam & Creagh, 2010). As a means for helping learners 'move beyond *what* they have learned to consider *how* they have learned, and to understand the connections inherent in the creative process of learning' they may be considered a process (Hallam & Creagh, 2010, p.181).

In the context of medical education, Driessen and Tartwijk (2019) identify three main goals for the use of portfolios, namely 'monitoring and planning learner development, assessing performance, and stimulating reflection' (p.255). While the 'scope, structure and content' (p.255) of portfolios may differ significantly in medical education, Driessen and Tartwijk maintain they are typically promoted as catalysts for meaningful dialogue between clinicians and learners. Through the process of managing and curating a portfolio, proactively seeking out learning opportunities to document clinical assessments, and reflecting on these experiences, students can be encouraged to become increasingly conscious of their 'personal and professional strengths and weaknesses' (Hallam & Creagh, 2010, 2008, p.179; see also O'Sullivan, Carraccio, & Holmboe, 2018). However, where ePortfolios are assessed, there can be a tension between the goals of accountability and the goals of reflection. Driessen (2017), for example, warns that key stakeholders (students, residents, teachers and scholars) may 'condemn the bureaucracy surrounding portfolio implementation' (p.221).

Assessment requirements in the clinical setting

A requirement of medical education is that students are assessed on their performance of clinical competencies and interactions with clinical teams. This may be in hospital wards, general practice clinics, and a range of clinical practice settings. These workplace-based assessments (WBAs) represent skills essential for internship, and include, for example, taking a patient's medical history, undertaking a physical examination, conducting a procedural skill such as a cannulation, or educating a patient about their medical treatment. In this way students are observed and evaluated by medical experts in real workplace settings, not merely during simulated clinical sessions. At our university an accreditation report and external review of assessment design highlighted the need

for greater consistency across medical disciplines where WBAs were carried out. This included reducing the number of high stakes hurdle assessments, and aligning assessments with a national clinical competency framework that sets out common diagnostic and procedural standards for medical graduates (MDANZ, 2014). Also, internal curriculum reviews confirmed the need to increase opportunities for students to be observed performing clinical skills and receiving feedback on those performances. By moving to a more integrated, whole of program, longitudinal assessment strategy (Schuwirth & Van der Vleuten, 2011) for WBAs, it was expected that students could better demonstrate their achievement, and collect, document and reflect on feedback received throughout their medical program.

Consequently, a year-long workplace learning portfolio (WLP) course was introduced. An ePortfolio system, as product and process, was expected to contribute to a longitudinal assessment strategy in the following ways, by: (1) helping make visible student learning in the clinical workplace over the life of a student's medical program; (2) encouraging personalised learning, by expecting students to assume responsibility for their own learning and seek out opportunities for practice, feedback and assessment in the clinical environment; (3) encouraging more feedback from assessors; (4) creating opportunities for, and capturing, students' reflections – contributing to professional growth; and (5) taking the pressure off individual assessments, instead focusing on a collected body of achievements, i.e. facilitating longitudinal assessment. Also, it was anticipated that a paper-based logbook to capture clinical activities used previously in different courses (subjects or modules) could be replaced with a new ePortfolio system to integrate WBAs into the one course. Hence ePortfolios were expected to provide pedagogical and technological support for change, encouraging a holistic and meaningful approach to WBAs.

Technology to support learning and teaching

Underpinning learning and teaching needs and curriculum change there was a need for a reliable and effective ePortfolio platform. We were mindful of earlier research that warned of barriers to successful implementation brought about by conflicts between pedagogical goals and technological issues (Holt et al., 2014; Mason, Langendyk, & Wang, 2014). Prior to our plans for introduction of new WBAs, the central university elearning centre undertook broad stakeholder consultation, selecting Chalk and Wire (https://www.campuslabs.com/chalk-and-wire/) as the enterprise-wide ePortfolio tool. It was seen as a sustainable solution that could support a range of learning and assessment needs, and replace bespoke systems in use around the university (UQ, 2015). Following usability testing, piloting and evaluation, the system was adopted by the central elearning centre. The elearning centre provided technical and educational design support, and the Faculty of Medicine provided additional local support for staff and students, and conducted its own usability and use case scenario testing with staff and students. In 2017 WBAs using the ePortfolio system were introduced in two Year 3 courses (student numbers N = 385). Additional ePortfolio WBA templates were then created and populated with rubrics, details of placement, assessment processes (tick-the-box grading options and qualitative feedback boxes), and spaces for student reflection. Access to Chalk and Wire was successfully enabled via single sign-on through the course website on Blackboard (https://aus.blackboard.com/index.html). Full deployment of the scaled-up system was achieved in 2019 in the WLP course with a large and diverse student cohort (N = 931; domestic students 58%; international students 42%). In addition, students were assessed by over 2000 external practising clinicians at clinical placements across urban, rural and international clinical schools.

ePortfolio records were collected by students, either by uploading their observed assessment records or initiating an electronic request to their supervising clinician to complete an end of clinical placement assessment. A set number of clinical encounters were required for assessment over the two-semester length WLP course. The WBAs were not graded, students were required only to complete a specific number and meet competency levels for some clinical procedures, with students encouraged to reflect on their performance. Reflection was only mandated if a clinical task was not completed to a satisfactory level or if a student was identified as being at risk of not meeting overall requirements. In this case, students were also required to create a learning plan for their future development and achievement of clinical competence. Overall, the ePortfolio system was designed to accommodate significant variation in the clinical experiences of a large cohort of students, widely distributed across numerous clinical units, and including students in our partner program in the USA.

Issues of implementation

Table 1 provides a summary of a selection of key issues evident during the first iteration of the ePortfolio system and WLP courses. It identifies expectations regarding learning and teaching processes, technological and workflow issues, stakeholder engagement, and a selection of consequent challenges, outcomes and implications (see Table 1). Evidence for the table was collected from faculty planning documents, written student and clinician feedback, and analysis of data in the ePortfolio system. The team business analyst systematically reviewed data

collected from the system and, using methods of constant comparison, the authors distilled themes and issues from the data set. While there is insufficient room to discuss at length all the issues raised here, two are addressed: a technical problem identifying students at risk of failing the WLP course, and an unexpected outcome indicating positive evidence of stakeholder engagement.

Table 1: Expectations, challenges and outcomes of the ePortfolio implementation

Expected functionality & 'designed for' processes	Challenges and Outcomes
Learning and teaching processes	
A space for students to collect, view, share, manage and evidence clinical practice. A tool for formative and summative assessment and reflection.	Partially achieved. In semester 1 2019 a total of 13,744 WBAs were captured in the ePortfolio system. However, students needed further training to be able to confidently complete formative and summative assessment processes.
Educational design: ePortfolios well integrated into the curriculum – embedded as a whole of course approach, with mandated requirements.	Adopted by most disciplines, although some disciplines defaulted to a mixture of legacy assessment processes in addition to the new ePortfolio processes and product.
Timely entry of assessments into online space making visible growing competence over time.	Assessments captured, but frequent misunderstandings of submission process, or process performed incorrectly.
Opportunities for reflection: voluntary entries encouraged, but if student did not achieve clinical competence, mandatory entries and an action plan for remediation required.	Reflections were added, but the extent to which this promoted further student actions to improve clinical performance is unclear (further evaluation required). More mentoring required to deepen student responses and overcome workload issues.
Stakeholder engagement and mentoring	
Mentoring and training: Information sessions for staff and students, guidebooks, online tips, and ongoing support.	Training and mentoring well received, but busy clinicians external to university still struggled with the new technology alongside curriculum change, as did students.
Student to manage personal learning process – their responsibility to request assessment from clinician, and manage technology.	Students reported confidence issues approaching clinicians for assessment while on placement, and workload issues around double handling of data.
Unexpected process request: A positive outcome.	Students requested extra online space to upload non-mandated records. Evidence of proactive management of own learning.
Technical and workflow issues	
Ease of use, with mobile access to support documentation of assessments in any clinical setting, and allowing for timely clinician feedback.	Interface not optimised for mobile devices. Novice users (staff and students) needed much support to navigate the interface. Resource intense workarounds implemented, including paper-based logbook system in tandem with online system, and some manual data management.
Removal of need for paper-based assessment forms for clinical assessments. Supervisors previously signed hardcopy assessments and students did not always receive feedback on their performance.	Paper-based logbook required due to technical limitations of ePortfolio system. Students transcribed logbook entries into online system. Consequence – time-consuming double handling of information, risk of error, and manual checking.
Interoperability between university services – single sign-on with Blackboard learning management system, student information system and student placement system.	Interoperability with Blackboard achieved. However, delays transferring data from student information system meant delayed reporting of student withdrawals in ePortfolio system. Linkage with clinical placement system identified as being required.
Reporting functions – mapping from ePortfolios to course curriculum outcomes, and identification of students at risk.	Reporting functions trialled successfully during pilot but in practice, at scale, capacity issues experienced, and functions limited. Time-consuming manual calculations required and some data could not be extracted accurately (system limitation).
Notifications system to alert clinicians of assessment requests and when assessments needed grading.	Email alert not always recognised by clinicians as coming from the Faculty of Medicine ePortfolio system, so prompt assessment of student tasks did not always ensue. Manual alerts required to supplement system.

Expected functionality & 'designed for' processes	Challenges and Outcomes
Sustainability and portability of content – ability to export and evidence clinical practice after the course.	PDF files as a record of clinical competence could be exported.

Technology and workflow issues: Identifying students at risk

Implementation of ePorfolios at scale is a known issue (Posey et al., 2015), and even the best designed pilot testing may not alert managers and users to potential problems. This was evident in our project. As well as issues navigating the interface, increased workload because of the dual paper/online system, failure to recognise system email alerts to clinicians requesting grading of assessments, one of the key technical issues that interfered with reporting and workflows was identification of students at risk in the WLP course (i.e. failure due to non-completion of WBA requirements). It was hoped that the ePortfolio system would provide valuable and timely learning analytics about students at risk, and while we could determine who had not met the minimum course requirements at the mid-year portfolio review (N = 93, 10%), the extracted data needed further detailed analysis. The result was that from the system reports alone we were unable to differentiate between students at risk from non-completion of submission (due to user or system error), versus students at risk due to academic under-performance (not able to achieve their assessment requirements, or not clinically competent to the required level). Manual analysis was required to identify the students who were *not* struggling academically (N = 52; 5.5%), but who had technical issues uploading results correctly from their logbooks to the ePortfolio system. This was further complicated if students delayed uploading their WBAs (N = 3535 in the last two weeks prior to the deadline), so technical errors could not be remedied prior to reporting of student results.

The problem with at risk students became a mixture of system design issues, and users' inability to navigate the system. This affected our ability to report accurately, and alert staff and students when risks presented. Around 4% of all students who met all WLP course requirements (and were not identified as being at risk) also had difficulty with technical aspects of the ePortfolio – with ePortfolio entries containing submission errors. Manual manipulation of this critical exported data became a resource issue, as did personal support and mentoring of stakeholders. These issues affected the actual and perceived sustainability of the intervention. Clinicians now expected additional data about students at risk, for example, as an affordance of the new system, and were frustrated when it was delayed. Nonetheless, requests by clinicians for additional data about students at risk indicated a raised level of staff awareness about how data could be used to better support student learning.

Stakeholder engagement: students personalising and managing their learning

Perceptions about ease of use, usefulness and surrounding pedagogical and technical support all affect users' acceptance of innovation, and their willingness to engage meaningfully with curriculum change (Posey et al., 2015). This was evident in our project. While anecdotal evidence from emails and an internal student report on the efficacy of the system suggested that students struggled with the workload of a dual paper-based/online system, and overcoming issues of confidence approaching their clinical supervisors for assessment and feedback during placement, there was evidence of the success of the new WLP course to support personalised learning. This came from an unexpected student request. Students asked for a space to store evidence of additional, non-mandated procedural skills that they had completed while on clinical placement (evidence provided via emails to staff, and posts to the course discussion board). Consequently, an additional space was provided in the ePortfolio system to accommodate this need, and 402 student entries were made over the semester. This allowed students to make their learning more visible, acted as a formative learning support, represented a record of achievement, and indicated self-management of learning.

Conclusion

Once again we stress the substantial impact of technological issues on ePortfolio implementation. Poor integration and limited functionality disrupt best laid plans, and demand workarounds and additional resources. Further, to engage students and teaching staff, the interface must be intuitive, seamlessly interoperable with other student systems, and provide the required reporting functions. All of this is critical where student assessment is at stake. In addition to technological barriers, as the literature, our experience, and this project confirm, we cannot overlook the impact of mentoring and user support (see also Driessen & Tartwijk, 2019), feedback – which has a key role in promoting successful uptake of ePortfolios (see Bleasel et al., 2016), and effective educational design of the system and curriculum (see Hallam & Creagh, 2010).

Introducing curriculum change (WBAs) and a new ePortfolio system in tandem was, as expected, a complex and challenging task (see also Driessen & Tartwijk, 2019; Mason et al., 2014). To overcome similar challenges, we recommend that design and implementation of ePortfolios be conceptualised as an ecological venture. This means viewing these activities as iterative and evolutionary, where underestimation of the impact of even one element risks poor outcomes for the whole project. To enable this, we maintain the value of sensitive and respectful dialogue and collaboration with stakeholders (Burge, 2007), acknowledging the differing perspectives brought to the project. We cannot plan for or anticipate all outcomes of curriculum and technological change. However, as Burge (2007) points out, while institutional planning is not always rational, and often political, we can lead and maintain momentum of the change process. This can be achieved by, for example, showcasing project successes, and explaining successes to learners and colleagues. It also makes sense to have a safety net – no matter how low-tech: ours was the humble paper-based logbook.

Following this first review, modifications to the WLP course are underway. They include adjustments to reporting functions and rubrics, and simplification of submission and workflow processes to reduce double handling of paper and online records. We have recommended ongoing dialogue with the vendor to accommodate on-the-fly, just-in-time modifications during implementation. In addition, a new central advisory group is being established to investigate pedagogical needs across all faculties, recognising that one ePortfolio platform at the university may be insufficient. With regard to future research, we plan further investigation into the efficacy and impact of ePortfolios in the context of workplace-based assessment, and the differing goals and perceptions of teaching staff (clinicians) and students in this context.

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