
Electronic Portfolio Use as an Assessment Medium: Pharmacy Students' Perceptions and Experiences

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Abstract

The roles of allied health professionals have expanded beyond traditional duties. Providers of higher education are left to find more effective methods of assessment in order to prepare graduates for these new roles. Emerging literature suggests the use of so-called ePortfolios to facilitate this graduate preparation. Curtin University in Western Australia piloted their ePortfolio system, the iPortfolio, in 2009. This system was integrated into the assessment structure of Pharmaceutical Practice 322, a third year unit in the Bachelor of Pharmacy program. The goal was to improve student learning using the iPortfolio as a medium for feedback and assessment.

A study was conducted using two questionnaire-type instruments to assess students' perceptions of the iPortfolio as an assessment medium, their experience with the iPortfolio system, and whether using the iPortfolio improved the learning of course material. Each instrument collected both quantitative and qualitative data. The results and findings from both instruments were subsequently triangulated to improve the depth of understanding of the research objectives.

From the data collected, it was found that whilst students were initially uncertain or negative about the implementation of the iPortfolio as an assessment medium, after 13 weeks of using the iPortfolio, they were generally enthusiastic about its use in the unit. However, regarding their experience with the iPortfolio system, students indicated that ease-of-use and ability to customise their iPortfolios were issues that needed to be addressed. Regarding the influence of the iPortfolio on learning, students indicated that they felt they were able to learn and retain more of the course material.

Overall, results from this study are promising, and further studies into other applications of the iPortfolio to uncover its full potential are recommended.

Background

Factors such as the ageing population and the increasing burden of chronic diseases have impacted health professionals in recent years, particularly in Western countries [1, 2]. Health professionals, particularly those in the allied health sector, have seen their roles expand beyond traditional duties [3,

4]. Higher education is charged with preparing graduates for these new roles, as well as providing continuing professional development for those established in the health professions [5]. However, there is evidence to suggest that traditional assessment methods, such as examinations based on knowledge recall, may be inadequate for this task of graduate preparation [6-9].

This was the experience in Pharmaceutical Practice 322, a third year unit in the Bachelor of Pharmacy program at Curtin University in Western Australia. This unit focuses on informing students of both present and future professional roles of pharmacists in Australia. As part of the learning outcomes, the unit requires students to demonstrate professionalism, effective communication skills, and an understanding of the factors that influence healthcare delivery by pharmacists [10]. Traditionally, a majority of such learning outcomes were assessed via a single end of semester examination comprising 50% of the total assessment marks. Student feedback and teacher reflection suggested that this was not an optimal way to assess skills required for the changing role of health care practitioners, or to prepare students for ongoing professional development. Literature on teaching and learning and curriculum design has long supported this. Bloom's taxonomy, devised in the mid-twentieth century, categorised tasks into levels of cognitive

demand [11]. Anderson and Krathwohl's revision refines the categories [12]. Both concur that basic recall of information is the lowest level of cognitive demand. Subsequent emphases in pedagogical thought, particularly the literature associated with graduate employability and work-integrated learning, confirms that tasks focused on recall of information rather than its application in authentic professional contexts is unlikely to lead to high level learning outcomes [6-9]. International teaching and learning initiatives across the Western world confirm that a predominant approach to graduate preparation in higher education is to focus on student achievement of higher order thinking skills as well as professional and generic competencies, capabilities and attributes [6, 13-15]. Thus, alternative methods of assessment should be explored in order to adequately prepare graduates for their modern roles.

Emerging literature also confirms that portfolio approaches to assessment, particularly in the electronic mode, present a viable alternative to prepare graduates for professional life [16-19]. Such electronic portfolios are also known as ePortfolios.

Curtin University piloted its new ePortfolio system, the iPortfolio, in 2009 [20]. The iPortfolio is an online space designed for students and staff at Curtin University, and like other ePortfolio systems, allow the user to collect, select, reflect, and publish artefacts from their ePortfolio to a target audience [21]. The iPortfolio also enables students and staff to perform a range of self-directed learning tasks including: self-assessment of their achievements of Curtin's graduate attributes and triple-i curriculum; sharing of works-in-progress and getting feedback from peers; and showcasing their achievements within and beyond Curtin (see www.iportfolio.curtin.edu.au) [20]. Curtin aims to provide graduates with access to their iPortfolios for professional development [20].

During the pilot, the opportunity was taken to use the iPortfolio to reconsider the traditional assessment in Pharmaceutical Practice 322 and replace it with a more authentic approach. This was aimed to provide students with the stimulus to initiate a collection of artefacts to demonstrate their learning and achievements that would be applicable in their professional lives, as well more interactive and personal feedback during the process. Instead of having to answer questions on topics such as legislative matters, sociological and environmental factors that impact on health, and patient education for quality use of medicines in a single end of semester examination, [10] students generated a number of artefacts related to such topics, both individually and in groups, and showcased these on their iPortfolios throughout the semester. All artefacts were designed to address the learning outcomes of the unit and included short movie clips of patient counselling role-play exercises to demonstrate professionalism and communication skills, reflective journals on sociology in pharmacy to demonstrate understanding of sociological factors that impact on health, case study reports and a concept map. All were evaluated and assessed with personalised feedback through the iPortfolio.

Despite the well-established use of ePortfolios in various national contexts, particularly in Australian universities[17], few studies have explored the contribution of ePortfolios to learning from the perspective of a tertiary level health science student[17]. This study focussed on the Pharmacy student perceptions and experiences of using the iPortfolio as an assessment medium. More specifically, the research explored (1) students' pre- and post-perceptions of the iPortfolio as an assessment medium; (2) their experience using the iPortfolio and (3) whether using the iPortfolio altered their overall learning experience.

Methodology

A convenience sampling model was adopted and the sample comprised 137 third year pharmacy students enrolled in Pharmaceutical Practice 322. The research design chosen for this study was a mixed method experimental design drawing on both quantitative and qualitative data, and aimed to provide an in-depth understanding of the research objectives[22]. Furthermore, two research instruments, each collecting both quantitative and qualitative data, were used and the data obtained were subsequently triangulated. This attempted to overcome biases [22, 23] from individual instruments and enrich overall quality of the data [22, 23].

Two questionnaire-type research instruments were used in this study: a paper-based and an online questionnaire. These questionnaires were titled: "Pharmaceutical Practice 322: iPortfolio – Student User Survey 2009", and "eVALUate Unit Survey". The design of the User Survey was taken from two questionnaires that were used in past [17] and forthcoming ePortfolio research, and adapted to this project. The eVALUate Unit Survey is Curtin's online student feedback system [24].

The User Survey consisted of four sections:

- *Demographics*
- *Understandings of the iPortfolio*: a series of multiple choice questions, in which the participant was instructed to choose only one option, as well as a series of questions inviting the participant to identify their attitude to certain statements
- *iPortfolio Use*: a five-point Likert response scale ranging from strongly disagree to strongly agree for nine questions and
- *Your Experiences and Perceptions*: a series of questions which invited the participant to report their opinion of iPortfolio as an assessment medium, what aspects they liked, what aspects could be improved, and whether the use of the iPortfolio as an assessment medium has altered their overall learning experience.

The User Survey was distributed to the 137 students enrolled in Pharmaceutical Practice 322 during a lecture time slot towards the end of semester. eVALUate was available to all students enrolled in Pharmaceutical Practice 322 in the last three weeks of the semester, and students were given 6 weeks to respond. For both surveys, voluntary participation was emphasised.

Quantitative Results and Qualitative Findings

The response rate for the User Survey was 86% (118/137). The response rate for eVALUate was 50% (69/137).

The following four tables summarises the quantitative results from the User Survey:

Table 1 shows that the majority of participants were aged between 20 to 25 years old (87%), female (65%), had Australian residency (61%), and good information technology (IT) skills (76%). Approximately half (52%) of the participants spoke English as a first language.

Table 1: Participant demographics (n = 118)

		%
Age group	Under 20	8
	20 - 25	87
	26 - 35	3
	Over 35	1
Gender	Male	35
	Female	65
First Language	English	52
	Other	48
Residency	Australian	61
	International	39
IT Skills	Very Good	16
	Good	76
	Poor	9
	Very Poor	0

Table 2 demonstrates that the majority of participants either strongly agreed or agreed with the statements regarding iPortfolio use. In particular, 79% of participants indicated that iPortfolio “Has improved [one’s] understanding of the material taught in this unit” and 90% indicated that iPortfolio “Allows [one] to store examples of...extra-curricular activities relevant to [one’s] future career”.

Table 2: General statements regarding iPortfolio use (n = 118)

	Strongly agree/ agree (%)	Neutral (%)	Strongly disagree/ disagree (%)
Provides a place to store examples of coursework.	99	0	1
Allows me to evaluate and reflect on my learning processes.	81	15	3
Allows me to keep track of learning experiences and be able to reflect on any weak areas.	65	27	8
Allows easy access to all my coursework and assessment items.	84	12	4
Helps me become a more effective and independent learner.	62	29	9
Has improved my understanding of the material taught in this unit.	79	15	6
Allows me to store examples of my extra-curricular activities relevant to my future career.	90	9	1
Helps me organise my work to prepare for future employment.	81	15	3
Has saved me time that I normally invest in studying for exams.	81	11	8

The results in table 3 indicate that whilst a majority of participants (47%) initially responded with either uncertainty, negativity, anxiety or confusion towards the use of iPortfolio as an assessment medium, after 13 weeks of using the iPortfolio, the majority of participants (83%) responded with either enthusiasm or positivism towards iPortfolio as an assessment medium.

Table 4 demonstrates that, of the participants who initially chose uncertain, negative, anxious or confused as a response, the majority of these participants had an improved attitude after 13 weeks of using the iPortfolio. Only 7% of participants who initially selected the enthusiastic or positive option had a worsening change of attitude. Furthermore, the overall change towards a positive attitude was statistically significant ($p < 0.0001$, where a p -value < 0.05 was taken to be a statistically significant association).

Table 3: Attitude(s) towards the use of iPortfolio in Pharmaceutical Practice 322 (n = 118)

	Enthusiastic/ Positive (%)	Neutral (%)	Uncertain/Negative/ Anxious/Confused (%)
Initial	36	17	47
Final	83	12	5

Table 4: Change in attitude towards the use of iPortfolio in Pharmaceutical Practice 322

	Improved (%)	No change (%)	Worse (%)
Overall change (n = 118)	56	41	3
Change from enthusiastic/positive (n = 43)	N/A	93	7
Change from neutral (n = 20)	75	20	5
Change from uncertain/negative/anxious/confused (n = 55)	93	7	N/A

A logistic regression analysis was then conducted to investigate any possible associations between gender, first language, residency, level of IT skills and initial attitude, and a final enthusiastic/positive attitude. However, it was found that there was no apparent association between gender, first language, residency, and level of IT skills with the final attitude. The number of participants not aged between 20 to 25 years old was small (n = 15), showing that the students were fairly homogenous with respect

to age. Hence Age was not included as an independent variable in the regression model. The only statistically significant finding was that an initial enthusiastic/positive attitude appeared to be associated with a final enthusiastic/positive attitude ($p = 0.04$, where a p -value < 0.05 was taken to be a statistically significant association).

Table 5 summarises the quantitative results from the eVALUate survey, and demonstrates that a majority of participants either strongly agreed or agreed with the statements regarding their opinions towards the overall Pharmaceutical Practice 322 unit. In particular, 98% of participants indicated that they were satisfied with the unit overall. Although this result does not directly indicate satisfaction with the iPortfolio as an assessment medium, the qualitative findings suggests this.

Table 5: General statements regarding the Pharmaceutical Practice 322 unit (n = 69)

	Strongly agree/ agree (%)	Unable to Judge (%)	Strongly disagree/ disagree (%)
The learning outcomes in this unit are clearly identified.	100	0	0
The learning experiences in this unit help me to achieve the learning outcomes.	96	0	4
The assessment tasks in this unit evaluate my achievement of the learning outcomes.	98	0	1
Feedback on my work in this unit helps me to achieve the learning outcomes.	99	1	0
The workload in this unit is appropriate to the achievement of the learning outcomes.	97	1	1
I am motivated to achieve the learning outcomes in this unit.	98	0	1
I make best use of the learning experiences in this unit.	98	0	1
I think about how I can learn more effectively in this unit.	89	0	10
Overall, I am satisfied with this unit.	98	0	1

The remainder of this section explains the qualitative findings:

From both the User Survey and eVALUate, it was found that many participants expressed an initial reticence to the implementation of iPortfolio as an assessment medium. However, many responses indicated that this initial attitude changed within the 13 weeks of using the iPortfolio. For example:

Initially I was extremely negative about straying away from the usual exams and tests but as I began to complete assessments and compile the iPortfolio my negative attitude changed. I believe the iPortfolio enables students to express themselves as people rather than as students who just spit memorised lecture content out. (User Survey)

Another example: "i [sic] was initially really skeptical about iPortfolio but after actually starting it, i [sic] found it to be a good assessment medium". (eVALUate)

A number of participants also found that the iPortfolio facilitates improved learning and retention of information compared to traditional assessments. For example:

I really think that doing assessments this way helps me retain the actual information better than doing an exam. During exams, students often just memorise the content and then forget it straight after. Doing these iPortfolio assessments allows students to take the time to think about what needs to be written and as a result, improves information retention. (User Survey)

Another example: "allows us to develop a better understanding of what the lectures are really about". (eVALUate)

Some other common findings regarding the iPortfolio as an assessment medium include participants liking the freedom to express themselves, liking the personal feedback and having more motivation to learn

the material taught. Many participants also appeared to like the idea of using iPortfolio as an assessment medium compared to traditional assessments. For example:

I like it! It's not only a good way to express ourselves personally and individually about relevant issues, but it also replaces sitting an exam where we are supposed to cram our information and our feelings into a 2 hour session, which I don't find effective in this regard. (User Survey)

Another participant responded that iPortfolio was "Better than memorising and writing heaps and getting stressed out in exams".

When asked about their experiences with the iPortfolio system, some comments suggested that iPortfolio needed to be more user-friendly. One participant from the User Survey suggested to "make [iPortfolio] easier to use". A number of participants also suggested that they would like to have more control over customising their iPortfolio. A suggestion made by a participant from eVALUate: "More personalization [sic] tools on iPortfolio would be nice, such as a dedicated image uploader, font colour etc".

One other common finding regarding the iPortfolio system was that participants appeared to like the ability to store and access their work via the iPortfolio.

Discussion

The iPortfolio, whilst still in its infancy, appears to be a viable facilitator for assessments. Regarding students' pre- and post-perceptions of the iPortfolio as an assessment medium, the quantitative results indicated a statistically significant change towards an enthusiastic/positive impression after the 13 weeks of implementation of the iPortfolio as an assessment medium. This improved attitude appeared to be consistent across groups defined by: gender, first language, residency and level of IT skills. It was also supported by the qualitative findings in which some participants indicated that their initial uncertainties were allayed after commencing the use of the iPortfolio and completing the authentic assessments. This degree of acceptance suggests that minimal changes to the use of iPortfolio as an assessment medium are required. However, an investigation into how iPortfolio could be better introduced should be conducted in order to improve students' pre-perceptions.

Although participants were not invited to answer questions on their experiences with the iPortfolio system in the quantitative section of eVALUate, the qualitative section of eVALUate invited participants to comment on what aspects of the Pharmaceutical Practice 322 unit could be improved. Similarly, only limited questions were asked regarding the matter in the quantitative section of the User Survey (table 2), whilst the qualitative section of the User Survey asked participants to comment on the aspects of the iPortfolio that they liked and what they thought could be improved. Findings indicated that the iPortfolio required improvements to its usability and customisability. Such findings are valuable to the iPortfolio team as it will allow for future improvements to the iPortfolio system.

From the limited quantitative data that were obtained from the User Survey (table 2) with respect to students' experiences with iPortfolio, it was also found that a majority of participants agreed that the iPortfolio allowed them to store and easily access their work, both curricular and extra-curricular. This was again supported in the qualitative findings.

Some of the quantitative results helped to address the third research question: whether using the iPortfolio altered students' overall learning experiences. The quantitative results from the User Survey (table 2) indicated that a majority of participants thought that iPortfolio had "helped [them] become a more effective and independent learner" as well as "improv[ed their] understanding of the material taught." These findings were supported by the quantitative results from eVALUate (table 5) as a majority of participants strongly agreed/agreed that: "The learning experiences in this unit help me to achieve the learning outcomes", "I make best use of the learning experiences in this unit", "I think about how I can learn more effectively in this unit" and "Overall, I am satisfied with this unit".

Furthermore, the qualitative findings from both the questionnaires supported these quantitative results as well as providing more depth into students' views. Participants believed that they have learnt and retained more information, and liked that they were able to freely express themselves in their assessments. Participants were also found to like the iPortfolio concept compared to traditional assessment methods. This further suggests the viability of the iPortfolio as an assessment medium.

Interestingly, a majority of participants acknowledged the ability of the iPortfolio to store information relevant to their future careers in the quantitative section (table 2). However, none of the participants expressed their understanding of the importance of this feature in the qualitative sections. This feature of the iPortfolio is especially important for pharmacy in Western Australia as current Pharmaceutical Council requirements for registration as a pharmacist include a portfolio that demonstrates various professional competencies [25]. Artefacts such as the patient counselling movie clip could be used to demonstrate competence in communication and the standard of a graduate's professionalism. Furthermore, as Curtin intends to allow graduates access to the iPortfolio for professional development, it is a recommendation that further studies be conducted to assess the viability of using the iPortfolio for continuing professional development. The findings will be useful for determining the capacity of the iPortfolio to integrate tertiary education, subsequent employment and continued professional development. Hence, not only can the iPortfolio potentially aid in preparing graduates for their new roles but also sustaining the quality of professionals in the current healthcare workforce.

Conclusion

Although further studies into other applications of the iPortfolio such as its use to facilitate continuing professional development are yet to be conducted, the results and findings from this study are generally very positive, and demonstrate the potential capabilities of the iPortfolio as a facilitator for assessments.

References

- [1] Hill JW, Powell P. (2009). *The national healthcare crisis: Is eHealth a key solution?* Business Horizons. **52**(3):265-277.
- [2] National Health Workforce Taskforce. (2009). *National Health Workforce Taskforce: Health Workforce in Australia and Factors for Current Shortages*. [http://www.nhwt.gov.au/documents/NHWT/The %20health%20workforce%20in%20Australia%20and%20factors%20influencing%20current %20shortages.pdf](http://www.nhwt.gov.au/documents/NHWT/The%20health%20workforce%20in%20Australia%20and%20factors%20influencing%20current%20shortages.pdf) [Accessed April 2010].
- [3] Gidman WK, Hassell K, Day J, Payne K. (2007). *The impact of increasing workloads and role expansion on female community pharmacists in the United Kingdom*. Research in Social and Administrative Pharmacy. **3**(3):285-302.
- [4] Harris D, Chaboyer W. (2002). *The expanded role of the critical care nurse: a review of the current position*. Australian Critical Care. **15**(4):133-137.
- [5] Childs S, Blenkinsopp E, Hall A, Walton G. (2005). *Effective e-learning for health professionals and students—barriers and their solutions. A systematic review of the literature - findings from the HeXL project*. Health Information and Libraries Journal. **22**(2):20-32.
- [6] Hager PJ, Holland S, editors. (2006). *Graduate Attributes, Learning and Employability*. Dordrecht, Springer.
- [7] Knight PT, Yorke M. (2006). *Employability: Judging and communicating achievements - Learning and Employability Series 1*. York, Higher Education Academy.
- [8] Little B. (2006). *Employability and work-based learning - Learning and Employability Series 1*. York, Higher Education Academy.
- [9] Tomlinson M. (2008). *The degree is not enough: students' perceptions of the role of higher education credentials for graduate work and employability*. British Journal of Sociology of Education. **29**(1):49-61.
- [10] Kinsella M. (2009). *Pharmaceutical Practice 322: Unit Outline*. Perth, Curtin University of Technology.
- [11] Bloom BS, editor. (1956). *Taxonomy of educational objectives: The classification of educational goals. Book 1: Cognitive domain*. London, Longman.
- [12] Anderson LW, Krathwohl DR, editors. (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York, Longman.
- [13] Precision Consultancy. (2007). *Graduate employability skills: Business, Industry and Higher Education Collaboration Council*. Melbourne, Commonwealth of Australia.

- [14] Villa A, González J, Auzmendi E, Beza-nilla M, Laka J. (2008). *Competences in the teaching and learning process*. In: González J, Wagenaar R, editors. *Universities' contribution to the Bologna Process*. 2nd ed. Spain, Tuning Project.
- [15] Yorke M, Knight PT. (2006). *Embedding employability into the curriculum - Learning and Employability Series 1*. York, Higher Education Academy.
- [16] Hallam G, Harper W, McAllister L. (2007). Evaluation and Assessment Conference. In: *The journey to work: the impact of the ePortfolio on student learning*. Brisbane.
- [17] Hallam G, Harper W, McCowan C, Hauville K, McAllister L, Creagh T. (2008). *ePortfolio use by University students in Australia: Informing excellence in policy and practice: Australian ePortfolio Project*. Brisbane, Australian Learning & Teaching Council.
- [18] Jafari A, Kaufman C, Idea Group Inc. (2006). *Handbook of research on ePortfolios*. Hershey PA, Idea Group Reference.
- [19] Stefani L, Mason R, Pegler C. (2007). *The educational potential of e-portfolios: supporting personal development and reflective learning*. London, Routledge.
- [20] Oliver B, von Kinsky BR, Jones S, Ferns S, Tucker B. (2009). *Curtin's iPortfolio: facilitating student achievement of graduate attributes within and beyond the formal curriculum*. *Learning Communities: International Journal of Learning in Social Context*. (2):4-15.
- [21] *About ePortfolios*. (2007). Ithaca College, New York State University; 2007. <http://www.ithaca.edu/its/ePortfolio> [Accessed May 2010].
- [22] Creswell JW. (2008). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*. 3rd ed. New Jersey, Pearson Education Inc.
- [23] Bazeley P. (2002). 1st International Conference - Qualitative Research in Marketing and Management. In: *Issues in Mixing Qualitative and Quantitative Approaches to Research*. Vienna, University of Economics and Business Administration.
- [24] Oliver B, Tucker B, Gupta R, Yeo S. (2008). *eVALUate: Developing and validating an instrument which gathers students' perceptions of what helped and hindered their achievement of learning outcomes*. *Assessment and Evaluation in Higher Education*. **33**(6):619-630.
- [25] The Council of the Pharmaceutical Society of Western Australia. (2008). *Annual Report*. Perth, The Pharmaceutical Council of Western Australia.