Embedding e-Portfolios for effective lifelong learning: a case study

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1 Abstract

Lifelong learning is a 'keystone' of educational policies (Faure, 1972) where the emphasis on learning shifts from teacher to learner. Higher Education (HE) institutions should be committed to developing lifelong learning, that is promoting learning that is flexible, diverse and relevant at different times, and in different places, and is pursued throughout life. Therefore the HE sector needs to develop effective strategies to encourage engagement in meaningful learning for diverse student populations. The use of e-portfolios, as a 'purposeful aggregation of digital items' (Sutherland & Powell, 2007), can meet the needs of the student community by encouraging reflection, the recording of experiences and achievements, and personal development planning (PDP). The use of e-portfolios also promotes inclusivity in learning as it provides students with the opportunity to articulate their aspirations and take the first steps along the pathway of lifelong learning. However, ensuring the uptake of opportunities within their learning is more complex than the students simply having access to the software. Therefore it is argued here that crucial to the effective uptake and engagement of the e-portfolio is embedding it purposefully within the curriculum. In order to investigate effective implementation of e-portfolios an explanatory case study on their use was carried out, initially focusing on 3 groups of students engaged in work-based learning and professional practice. The 3 groups had e-Portfolios embedded and assessed at different levels. Group 1 did not have the e-Portfolio embedded into their curriculum nor was the e-Portfolio assessed. Group 2 had the e-Portfolio embedded into the curriculum and formatively assessed. Group 3 also had the e-Portfolio embedded into the curriculum and were summatively assessed. Results suggest that the use of e-Portfolios needs to be integral to curriculum design in modules rather than used as an additional tool. In addition to this more user engagement was found in group 2 where the e-Portfolio was formatively assessed only. The implications of this case study are further discussed in terms of curriculum development.

Keywords: lifelong learning; e-Portfolio; e-Learning; curriculum design; summative assessment; formative assessment.

2 Introduction

Lifelong learning is not a contemporary addition to pedagogy. Here the term describes learning that extends throughout the life of an individual as opposed to learning that is once and for all and usually occurs in childhood (Field, 2006). The concept can be traced back to ancient history and comparatively more recently to the 17th Century through the writings of Czech educator John Amos Comenius (Knapper & Cropley, 2000). It is, however, the past two decades that have provided more favourable conditions for lifelong learning to develop. Prior to this lifelong learning repeatedly became a victim of circumstance.

In post World War One Britain it was the Adult Education Committee of the Ministry of Reconstruction who advised that 'Adult education must not be regarded as a luxury for a few exceptional persons… but… an inseparable aspect of citizenship, and therefore should be both universal and lifelong' (Adult Education Committee of the Ministry of Reconstruction, 1919, p.5 cited in Field, 2001). However, both the economic and social climate following World War One prevented such suggestions on adult education from developing any further (Field, 2001). Specifically, the post World War One recession that started around 1918 served to shift attention away from liberal education ideals such as those laid out by the Adult Education Committee. Focus didn't come back to lifelong learning until after the Second World War when the social and political climate of the 1960s provided a more suitable growth bed. Following this, what many see as a critical step forward in the emergence of lifelong learning, Faure's Learning to Be (1972) report set out the main principles of lifelong learning viewing it as a key model for guiding future education policy (Field, 2001; Knapper & Croppley, 2000). Although Faure's report was significant, there were few pragmatic outcomes that emerged as a result. This was partly due to a lack of influencing powers that intergovernmental and other comparable agencies dealing with lifelong learning had on governmental

education policies and partly because again, similar to the post world war one era, the unstable economic climate of the 1970s did not support lifelong learning to take hold at that time.

It was not until the 1990s that renewed and this time sustained enthusiasm for lifelong learning returned (Field, 2001). This was in part facilitated by intergovernmental agencies having achieved more influencing power and in part by the European Year of Life Long Learning in 1996. These together helped to ensure that lifelong learning became a much more common feature of political nomenclature (Field, 2001). In addition to this, now more than ever the cultural values of society seem most suited for lifelong learning to prosper. Specifically, our individualistic and autonomous value system places the responsibility of learning onto the learner themselves. As lifelong learning is a product of shifting the learning from the teacher to the learner the present cultural climate corresponds well.

It is not just the existing value system that aligns successfully with lifelong learning. Today's modern world is moving in a time of fast scientific and technological change. Previously change in this area has been gradual and relatively unvaried across a person's working life (Knapper & Croppley, 2000). Lifelong learning can be seen as both a reaction to, and a coping mechanism for, this more rapid moving climate. Further to this, Knapper and Croppley (2000) have identified some key roles that universities should play in easing the effects of such rapid change, two of which are particularly relevant here. Firstly in terms of demographic changes. The current 'graying' population in western nations require universities to respond by encouraging and making provision for increasing 'non-traditional' learners. Leading on from this universities should place more emphasis on appealing to those groups that aren't well represented, for example those from low socioeconomic backgrounds or those with a disability. Secondly, the concept of literacy is changing, it is becoming increasingly more information based. This means favoured skills within the workforce are now becoming increasingly aligned with the concept of a 'knowledge economy' (Neice & Murray, 1997, p. 156 cited in Knapper and Croppley, 2000). That is, workforce skills are focused on information technology where knowledge is the tool rather than in previous eras where skills were more frequently based on manufacturing. Taking these points together it is essential that universities provide a flexible learning arena through creating a learning culture that attracts non-traditional students. Providing these non-traditional students with a skill set that aligns with a knowledge economy and information literacy is critical as this is likely to be one of their most widely applied skill sets. One potential method of aiding and achieving greater information literacy is through e-Portfolios.

e-Portfolio use in higher education programmes began to emerge in the mid-1990s (Lorenzo & Ittleson, 2005). They have been defined in a number of different ways, however, these definitions mostly come together by describing e-Portfolios as a collection or aggregation of digital items that presents information about and show understanding of the chosen topic of the e-Portfolio (Sutherland and Powell, 2007). Essentially e-Portfolios are much like the conventional idea of, for example, an artist's portfolio in terms of a collection of items, just an electronic version.

There are several types of e-Portfolio. Greenberg (2004) has grouped them as structured e-Portfolios, learning e-Portfolios and showcase e-Portfolios according to the nature of their development and organisation. Showcase e-Portfolios are created following completion of the work, structured e-Portfolios have a predetermined framework and learning e-Portfolios develop as the work/study itself does.

e-Portfolios are widely considered to add value to the learning experience in a number of different ways. From a user or student perspective e-Portfolios encourage reflection and critical thinking (Kimbal, 2005). This offers an opportunity for students to achieve a deeper understanding of their learning styles and the progress they are making. e-Portfolios also provide a means of presenting work in a more varied manner than a transcript alone will allow (Harper *et al*., 2007). In addition it is argued here that as well as the more immediate benefits found from using e-Portfolios it is in longer term gains where the use of e-Portfolios have greatest effect. For example the collection of items can be rearranged to support a new direction of career, the items can also be used to demonstrate the requirements of a professional accreditation, and to encourage personal and continual professional development. e-Portfolios can also be used as a primary means of communication with fellow students and mentors following completion of a course. It is argued here however, that to allow these longer term benefits to come about the way e-Portfolios are presented in the curriculum is critical.

Opinion on this topic appears to be mixed however, with some who view summative assessment as forming an important part of e-Portfolio uptake (Heinrich *et al,* 2007) whereas others feel that even an optional or non-assessed e-Portfolio will be utilized by students (JISC, 2008). This has been investigated by Harper *et al.* (2007) who used a variety of methods to introduce e-Portfolios to the student population. Following this investigation Harper *et al.* (2007) made recommendations for e-Portfolios to be well integrated into the curriculum to help ensure their successful uptake. In addition to this it has been suggested that for work-based learners proper embedding of e-Portfolio use into the curriculum allows the technology to become a valuable tool (Ellaway, 2007). To further consider these suggestions this study will look at the effect of integrating e-Portfolios at different levels within the curriculum on their usage. That is, this study will investigate whether user engagement will be enhanced (specifically the features within the e-Portfolio will be used a greater number of times) by those whose e-Portfolio use was embedded into the curriculum more so than those who were offered the e-Portfolio as a fully self directed tool.

3 Methods
3.1 Design
To investigate whether user engagement will be enhanced by embedding e-Portfolio use into the curriculum an explanatory case study was conducted (Yin, 2003). This method of case study was deemed suitable as the data from the case study was to be interpreted and, alternative and fitting explanations provided for it (Yin, 1981). In addition, this experimental design was chosen as it enabled cause-effect relationships set out by the hypothesis to be explored. It also allowed for the un-manipulated set of circumstances, described below, to be investigated.

3.2 Procedures
The focus of this case study was 3 cohorts of students all of which had the e-Portfolio embedded and assessed at different levels within the curriculum of their course. No aspect of the curriculum for these groups was manipulated in any way for the purposes of this study. The different levels of embedding and assessment were decided on by course tutors prior to the inception of this case study. The 3 cohorts formed groups 1-3. Group 1 (n 12) had the lowest level of embedding and assessment. At this lowest level the e-Portfolio users had full access to, and training on the e-Portfolio however uptake was self-directed with the e-Portfolio neither forming a summative or formative assessment. Group 2 (n 21) like group 1 had full access and training on the e-Portfolio, however, the e-Portfolio was embedded into the curriculum and was formatively assessed. Group 3 (n 15) also had full access and training on the e-Portfolio and the e-Portfolio, like group 2, was embedded into the curriculum, however, was summatively assessed.

Data mining was used to obtain data on how user engagement was enhanced through embedding the e-Portfolio into the curriculum. Data mining refers to the extraction of data from pre-existing databases. For the purposes of this investigation the process was applied to extract information on how the frequently 'assets' within the e-Portfolio were used.

An asset is any item that is created within or uploaded to the institutional e-Portfolio system. Ten different assets were considered by this study. These assets are action plan, blog, activity, experience, file, proforma, profile, thought, CV and webfolio. Each asset takes the user through a series of steps enabling them to record aspects of their learning. For a full description of each asset type see table 1.

Table 1: A description of the different asset types used in this study.

Asset Type	Description
Action plan	'…allow you to create plans designed to help you achieve a particular outcome or goal.'
Blog	'…is a chronological online diary tool.'
Activity	'…allows you to record any event or experience.'
Experience	'…allows you to record any event or experience which is significant to you'.
File	an external uploaded file e.g. a word document.
Proforma	allows forms to be created by someone supporting the users development and are filled in by users. For example a proforma maybe created by a tutor asking a user how they feel about different aspects of their progress.
Profile	'…are self-evaluation questionnaires that allow [users] to audit [their] current knowledge, skills and abilities'.

Thought	'…can be used to record journal entries, structured reflections, significant incidents, ideas or notes.'
CV	'…allows you to create a CV by drawing upon information you have already entered' into the ePortfolio.
Webfolio	is '…an evidence-based website that is used to present stories about [the user] or stories about [their] learning.'

The data used in this study was gathered from the usage statistics database on the institutional e-Portfolio. Usage statistics were collected on the type and number of files used on the e-Portfolio. Data was mined on the usage of 48 e-Portfolio accounts for the purposes this study.

4 Results

As the data was not normally distributed a non parametric statistical test was required. Therefore a Kruskal-Wallis one-way ANOVA was performed on the 3 groups to test whether the assets within the e-Portfolio were used a greater number of times compared to those whose e-Portfolio use was embedded into the curriculum than those who were offered the e-Portfolio as a fully self directed tool. The Kruskal-Wallis test was also used as the statistic it produces takes into account the slight differences in numbers between the 3 groups. As expected there were statistically significant differences between the three groups' usage of the assets (see table 3). For action plans (χ^2=25, df=1, p<0.001), blogs ($\chi^2$40=, df=1, p<0.001), files (χ^2=202, df=1, p<0.001), thoughts (χ^2=77, df=1, p<0.001), CVs ($\chi^2$48=, df=1, p<0.001) and webfolios ($\chi^2$55=, df=1, p<0.001). For the activity, experience, proforma and profile assets at least one frequency count from at least one group was 0. This meant statistical analysis could not be carried out on these values (see table 2 for the raw data).

Table 2: Raw data from usage statistics (no. of times the 'asset' was used) mined from the institutional ePortfolio

	No of times the asset was used		
Asset Type	**Group 1**	**Group 2**	**Group 3**
Action Plan	1	24	1
Blog	2	22	17
Activity	0	3	6
Experience	6	103	0
File	13	121	69
Proforma	2	27	0
Profile	0	2	0
Thought	2	28	48
CV	12	21	16
Webfolio	3	52	1

At this level the Kruskal-Wallis one-way ANOVA served as an omnibus test that established the presence of differences between the 3 groups but not the direction. In view of this further post-hoc analysis was required to extract the nature of these differences. Therefore, further Kruskal-Wallis tests were carried out to look for differences between group 1 and 2, group 1 and 3 and group 2 and 3 across the different types of assets. This analysis is detailed below and in table 4.

Table 3: Values from the Kruskal-Wallis test: Chi-squared statistic (χ^2), degrees of freedom and p values obtained from analysis of the number of times all 3 groups used the assets.

	Kruskal-Wallis Values		
Asset Type	χ^2	**df**	**p value**
Action Plan	25	1	<0.001
Blog	40	1	<0.001
Activity	**		
Experience	**		
File	202	1	<0.001
Proforma	**		
Profile	**		
Thought	77	1	<0.001
CV	48	1	<0.001
Webfolio	55	1	<0.001

**not analysed as least one frequency count from at least one group was 0.

Action Plan: The action plan was used significantly more by group 2 than by group 1 (χ^2=24, df=1, p<0.001). It was also used significantly more by group 2 than group 3 (χ^2= 24, df=1, p<0.001) but there was no significant difference between group 1 and group 3.

Blog: The blog was used significantly more by group 2 than by group 1 (χ^2= 23, df=1, p<0.001). It was also used significantly more by group 2 than group 3 (χ^2= 38, df=1, p<0.001). Group 3 used the blog significantly more than group 1 (χ^2= 18, df=1, p<0.001).

Activity: The activity asset was only used by group 2. As the frequency counts for groups 1 and 3 was 0 statistical tests could not be carried out.

Experience: The experience asset was used significantly more by group 2 than group 1 (χ^2= 108, df=1, p<0.001). Group 3 did not use the experience asset so not further analysis could be carried out.

File: The file asset was used by all 3 groups. The file asset was used significantly more by group 2 than group 1 (χ^2= 133, df=1, p<0.001). It was also used significantly more by group 3 than group 1 (χ^2= 81, df=1, p<0.001). Group 2 used the file asset significantly more than group 3 (χ^2= 189, df=1, p<0.001).

Proforma: The proforma asset was only used by groups 1 and 2. Group 2 used the asset significantly more than group 1 (χ^2= 28, df=1, p<0.001).

Profile: The profile asset was only used by group 2. As the frequency counts for groups 1 and 3 was 0 statistical tests could not be carried out.

Thought: The thought asset was used significantly more by group 2 than group 1 (χ^2= 29, df=1, p<0.001). It was also used significantly more by group 3 than group 2 (χ^2= 75, df=1, p<0.001). Group 3 also used the asset more than group 1 (χ^2= 49, df=1, p<0.001).

CV: The CV asset was used by all 3 groups. The CV asset was used significantly more by group 2 than group 1 (χ^2=32, df=1, p<0.001). Group 2 also used the CV asset significantly more than group 3 (χ^2= 36, df=1, p<0.001). Group 3 used the CV asset significantly more than group 1 (χ^2=27, df=1, p<0.001).

Webfolio: Again the webfolio asset was used by all 3 groups. The webfolio asset was used significantly more by group 2 than group 1 (χ^2=54, df=1, p<0.001). Group 2 also used the webfolio asset significantly more than group 3 (χ^2=52, df=1, p<0.001). However there were no significant differences in the amount that group 3 and 1 used the webfolio asset.

Table 4: Comparisons between no. of times an asset has been used between Group 1 vs. Group 2, Group 1 vs. Group 3 and Group 2 vs. Group 3.

Asset Type	Group 1 vs. Group 2			Group 1 vs. Group 3			Group 2 vs. Group 3		
	χ^2	df	p value	χ^2	df	p value	χ^2	df	p value
Action Plan	24	1	<0.001	0	1	<0.001	24	1	<0.001
Blog	23	1	<0.001	18	1	<0.001	38	1	<0.001
Activity	**			**			**		
Experience	108	1	<0.001	**			**		
File	133	1	<0.001	81	1	<0.001	189	1	<0.001
Proforma	28	1	<0.001	**			**		
Profile	**			**			**		
Thought	29	1	<0.001	49	1	<0.001	75	1	<0.001
CV	32	1	<0.001	27	1	<0.001	36	1	<0.001
Webfolio	54	1	<0.001	3	1	0.83(ns)	52	1	<0.001

**not analysed as least one frequency count from at least one group was 0.

5 Discussion

Analysis suggests that group 2 (those students for whom the e-Portfolio was embedded but only used as formative assessment) were using the e-Portfolio in a richer and more diverse manner. It appears that the students in group 2 were using the e-Portfolio autonomously and in addition to that required for formative assessment as part of the course. This is shown to be statistically significant (see table 4) in all aspects of the e-Portfolio use. It is notable that the total use and variety of assets created were higher (see table 2) than that of group 3 where the e-Portfolio was embedded and summatively assessed. These results suggest that although the e-Portfolio 'can be personalised and provide a tool for personalised learning' (Hartnell-Young *et al.,* 2006) it must be made meaningful to learners with clear links to learning in their subject (Cotterill *et al.,* 2005; Halstead *et al.,* 2005) and encourage students' motivation to use it; particularly in the initial stages of its introduction. Heinrich *et al.* (2007) recognise that student motivation is always an issue and suggest that students are more likely to focus their effort into 'tasks that provide immediate reward via marks counting towards grades' (p. 656). It is clear that those students in group 3 completed all tasks set as summative assessment, but that there was little further engagement with the portfolio. However, the results from group 3 suggest that when the e-Portfolio is used in a more flexible and less structured manner the students may be more inclined to feel that the tool is their own learning environment, rather than as part of formal assessment, and this is contrary to the observation by Heinrich *et al.* (2007) that students put less effort into their portfolios if no marks are provided.

Some studies, such as that at the University of Nottingham (JISC, 2008) have suggested the students will engage with an e-Portfolio even if it is optional and not assessed. The Nottingham study found that all students on the postgraduate certificate in Teaching English for Academic Purposes distance learning pathway engaged in reflection on their learning during the course. However, this was not experienced at the institution with group 1 work-based learning students where the e-Portfolio was simply introduced as an autonomous learning tool for students working a distance from the university. Although an introduction, outlining the benefits of developing their own learning space, and training were provided, the students displayed limited, if any, interaction with the e-Portfolio.

In none of the groups was there any open sharing of assets, suggesting that this is viewed as a personal learning space unlike the VLE, and there was only limited private sharing of assets by group 3 and none by group 1. However, group 2 users were more inclined to share assets with their peers and their tutor who was enthusiastic advocate and user of the portfolio.

With regard the potential for lifelong learning this study would appear to suggest, concurring with a similar suggestion by Ellaway (2007), that the e-Portfolio is an important tool if embedded carefully in vocational and professional work-based learning courses. The e-Portfolio can facilitate transitions between different life roles, and the use of portfolios on work-based learning courses seeks to enhance this potential for students both in their studies and in the work place. Cambridge (2008) exemplifies the advantages that e-Portfolios can provide in negotiating transitions in the case of a student teacher where using a portfolio was used to promote independent and reflexive learning, then as a teacher she continued to use the portfolio to evidence her CPD and also to provide a showcase portfolio for future career opportunities. Lopez-Fernandez and Rodriguez-Illera (2009) state that 'the main advantage of the e-Portfolio is to indirectly promote students' self-management of their learning'. However, this study indicates that if the e-Portfolio is incorporated into the curriculum with scaffolded yet flexible tasks it can directly, rather than indirectly, promote autonomous learning in work-based learners and this in turn can increase potential for integration into lifelong learning.

However, the authors would caution, in concurrence with other authors (Halstead *et al.,* 2005; Hartnell-Young *et al.*, 2006; JISC, 2008), that the usefulness of developing e-Portfolios in lifelong learning is limited if access to the portfolio assets is restricted at the end of a university programme of study. The portfolio needs to be accessible in the longer term and not dependent on the student/university relationship. Therefore the authors would suggest that the selection of the e-Portfolio platform is significant if lifelong learning is to be encouraged in this type of learning environment.

The analysis of data indicates that group 2 have been using the e-Portfolio in a richer and more meaningful manner. By incorporating the ongoing use of the e-Portfolio in modules the likelihood of the e-Portfolio becoming incorporated into the lifelong learning of these students should be enhanced. Where the e-portfolio was used to build on the learning outcomes of modules and provided structured opportunities for students to record their thoughts it appeared to motivate students to participate further in reflective practice. Those students in group 2 and 3 appear to have been particularly effective with students moving from reflective practice to more reflexive practice (Giddens, 1990; Giddens 1991). That is, they began to submit and share thoughts and comments that were not a required element of the modules. It appears in this case study that learning has developed in line with practice and experience rather than simply concentrated on subject content.

Further studies involving the incorporation of e-Portfolios in work-based learning courses, both the case study recorded in this paper and other courses across the institution, is ongoing (Yeats & Wheeler, *in prep.*). In addition the role of practitioners in promoting and encouraging the use of e-Portfolios by students is currently being explored. Further investigations that align with these research directions is strongly recommended, especially in different institutional settings so that a breadth of data on successful e-Portfolio uptake is available.

6 Limitations
Although the current study shows that those students in group 2 were using the e-Portfolio in a richer and more diverse way than other groups, these results should be taken with some caution. Firstly, the 3 sample groups were relatively small in number. However as this was a data mining study, data was collected retrospectively and thus group numbers were fixed. In view of this future replications of this study should seek to access a larger sample to data mine from. In addition, the study may have benefitted from formal control groups. For example, groups that used paper-based portfolios in the 3 ways that participants used e-Portfolios in this study. The method of data mining itself has associated limitations especially regarding how meaningful the data is. This limitation could have been resolved somewhat if focus groups were included as part of the experimental design. Such group sessions could have been utilised to explore users experiences, for example, why users were engaging in particular

ways with e-Portfolios and how they felt e-Portfolio use in the current curriculum would effect their long term use of e-Portfolios as lifelong learners.

7 Conclusion

This study indicates that the e-Portfolio is of limited value if it simply regarded as an additional 'bolt-on' tool for a module or programme of study. However, structural embedding of reflective and autonomous learning through an e-Portfolio can promote and encourage lifelong learning practice, especially if its use encompasses flexibility and student ownership of the learning experience.

It is apparent from this study that the design of curriculum is critical for the successful implementation of e-Portfolios. Our research, in agreement with a number of UK case studies (JISC, 2008), concludes that sound pedagogic principles are of primary importance when incorporating any technology into student learning and for the development of lifelong learning.

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