A pre-service teacher education initiative to enhance reflection through the development of e-portfolios

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Abstract

The development of electronic portfolios as a tool for student self-reflection in teacher education has the potential to enhance student learning. This study involved three consecutive stages over a period of one year. The initial phase aimed to empower students to map and demonstrate their skills, knowledge and values through the use of electronic portfolios. Phase 2 provided a sub sample of this initial group the opportunity to revisit their portfolio and modify them to reflect the University's outcomes for graduating students. Phase 3 involved the same sub sample working with a group of primary school students to replicate the process they had adopted themselves in order to guide the students to develop their own electronic portfolio. Data were collected through a questionnaire, observations and personal student journals. The key outcomes of this study indicate that the process of building electronic portfolios is a highly valuable exercise in terms of professional development.

Introduction

According to Kimball (2002) the momentum behind the development, implementation and use of portfolios in educational settings is considerable and the tertiary sector is no exception. Portfolios are currently in use at all levels and in many fields with particular success in composition programs and teacher pre-service education. The growing support for portfolios (either paper-based or electronic) is due to the fact that many levels of education see the benefits of their use as pedagogical, learning and professional tools. Kimball (2002, p. 14) identified portfolios as offering direct benefits to students such as an opportunity to explore and solidify the connections between the disparate things they have learned. This approach to learning also gives the student the opportunity to create something tangible, something that seems real, useful and practical. It also creates the opportunity to reflect on the process of learning, therefore cementing cognitive skills that students will hopefully use for the rest of their lives. For educators portfolios offer a methodology that places equal importance upon the process and products of student learning and concrete materials for assessing and demonstrating student learning.

Winsor and Ellefson (1995, p. 3) define the concept of a portfolio as: "A thoughtful, organised and continuous collection of a variety of authentic products that document a professional or student's progress, goals, efforts, attitudes, pedagogical practices, achievements, talents, interests and development over time".

Simmons (1996), and Wolf and Dietz (1998) suggest that the three main functions of portfolios are related to learning, assessment and employment/professional purposes. The first two are more student-oriented, whilst the third is meant to demonstrate professional development containing for example, a resume and artefacts of 'best practice'. The third type of portfolio would also include a personal learning philosophy, letters of recommendation, awards, official documents, curriculum innovations, reflections and personal evaluations. Campbell, Cignetti, Melenyzer, Nettles and Wyman (1997) divide the professional portfolio into two separate forms. The first is the working portfolio, which is described as a collection of artefacts used as evidence of professional competence. The second is a presentation portfolio that is described as a functional and aesthetically appealing display of an individual's work. However, according to Salend (2001) they are organised or prescribed, professional portfolios should be both process and product oriented with a focus on the collaborative and reflective process of the teaching and learning experience.

A sophisticated body of academic research has now refined the concept of the professional portfolio into a functional tool that provides genuine evidence of performance, competence and leadership. It should be suitable for the purposes of summative assessment purposes, as well as providing for continuous growth and reflection in the formative development of both students and professionals alike.

The communication technology aspect of the portfolio concept is clearly an emergent area for investigation and development. Universities in Australia, and indeed internationally are currently developing, trialling and implementing various approaches to electronic portfolios. The rationale is in order to enhance student reflection and learning, and to provide improved evidence of student achievement to external groups such as potential employers, accrediting bodies and governmental accountability mechanisms. Barrett (2000) links the traditional and process oriented portfolio by pointing out that both have evaluation criteria grounded in purpose.

Portfolios are best viewed as flexible tools which can be used in many fields and at many levels. Both reflection and collection ask the author to consider previous work subjectively and objectively. Reflection occurs when the student provides written statements where comments are made regarding not only the artefacts, but the process of their production. Without a clear purpose, there is the risk that the portfolio will degenerate into a scrapbook which is representative of randomly selected 'snapshots' of achievement. Kimball (2002) indicates that there are many purposes behind the creation of a portfolio. These include the need to fulfil the requirements of a program, a class or a profession, the need to demonstrate mastery of a skill and/or body of knowledge, the need to show the development of a project over a period of time and to demonstrate the fulfilment of specified learning outcomes, and to show prospective employers particular abilities and accomplishments.

Kilbane and Milman (2003) conclude that the push for "authentic" assessment can be supported by the implementation of portfolios in education. The goal of authentic assessment is to measure individual performance or achievement in situations or tasks that most closely match the standards and challenges of real life. When portfolios are used as the basis for assessment, progress on real-world tasks can enable the tracking of growth over time and help individuals learn to assess their own progress against standards of quality. Educators are increasingly using portfolios as an alternative form of student assessment because multiple-choice tests and other more traditional forms of assessment are inadequate measures of what students know and can demonstrate.

Electronic portfolios (e-portfolios)

The growth of the portfolio as a method of teaching and learning has been influenced by the development of the World Wide Web. The web's graphical nature and ability to support links between digital artefacts has revolutionised how information is located and consumed. Purves, Quattrini and Sullivan (1995) state that the use of the web as a portfolio medium builds on some of the key strengths of portfolio pedagogies; where traditional, paper-based portfolios have concentrated on presenting written work, web technologies allow authors to include graphics, audio and video. This visual capacity provides more options for showing what the authors have accomplished. More importantly, the linking mechanism of the web matches the goal of tightly integrating the elements of a portfolio and adds opportunities to connect the portfolio to the rest of the world. This feature can clearly be utilised as a marketing tool for educational organisations that wish to remain competitive in terms of enhancing the post-association employment opportunities of students.

Kimball (2002) suggests that the web offers additional benefits for students and teachers, such as the ability of these portfolios to showcase student work to a definite audience. Projects that may have appeared to be academic exercises become more real when students know that large numbers of people can see what they have created. It would seem that web-based portfolios (e-portfolios) have a natural position within the increasing use of these technologies in course construction and general programming in education. The expansion of online learning, particularly in the tertiary sector, creates a natural affinity between learning and assessment using this mode. Storage of files is easier due to reduced size, and basic web portfolios that do not contain audio or video can usually be stored on a single floppy disk. Kimball (2002) reports that the growth in electronic web-based portfolios is most clearly seen in the United States, where large-scale initiatives have begun on a variety of levels (classroom, program and campus wide) to encourage or require undergraduate, pre-professional, graduating and graduate students to create electronic portfolios.

> By creating web portfolios, which include not only implicit links by active Hyperlinks between artefacts and reflections, authors in effect synthesise the products of their learning - both for themselves and for their audiences.
>
> (Kimball, 2002, p. xvii)

The study

The study involved three distinct phases over a one-year period (three semesters). The details involved in each phase are presented in the following section.

Phase 1

The major aim of this phase was to empower students involved in the first year Bachelor of Education Program at a Western Australian university to map and demonstrate their developing professional skills, knowledge and values through the use of e-portfolios. The unit chosen in which to embed the e-portfolio approach was titled "Using Computers in the Classroom". This unit is an elective and attracted the current sample (N=30). The unit investigates implementing information and communication technologies (ICT) in the classroom as well as the use of ICT to help develop a tracking system for professional development and reflection. The unit in particular provides opportunities to expand ICT skills with an emphasis on learning in an online world. Throughout the 15-week semester students are expected to attend a two hour face-to-face workshop, as well as participate in ongoing online discussion and activities. The project also aimed to not only enhance student reflection on their individual journey through the course but to provide a solid foundation from which they can continue to reflect and build upon as professionals in the workplace.

Ultimately, a case study approach was adopted, with the case being defined as 30 first year pre-service teachers. Prior to the investigation students completed the *Portfolio project questionnaire* in Semester 2, 2003. The questionnaire comprised nine open-ended items which asked the students to comment on both the potential structure and content of a portfolio approach. Students were also asked to comment on the possibility of constructing an electronic portfolio and to identify the skills, knowledge and values they deemed essential in such an approach. The sample was also asked to contemplate their conceptualisation of their experience with portfolios. The students were then encouraged to investigate the use and purpose of portfolios in education. From these investigations they collaboratively identified the dimensions which best reflected their personal and professional journey through the Bachelor of Education course. Links were made between the sample group and the education and industry requirements which were current at the time through literature and documentation supplied from the Department of Education and Training in Western Australia. Students designed and developed their own working template which was then to be used again in the second semester of 2004. The researchers conducted formative evaluation throughout Semester 2, 2003. This formative evaluation took the form of an analysis of the questionnaire, ongoing anecdotal student notes, a focus group and researcher field notes.

Phase 2

Phase 2 involved a sub-sample of 13 students from the original cohort of 30 in Phase 1. During Semester 2, 2004 these students reviewed their original e-portfolios and modified them to reflect and align with the Department's overarching outcomes for graduating students. This phase involved the students further in the creation and development of the content of each of these specific outcomes, in particular in identifying appropriate artefacts which would reflect these outcomes. These artefacts were customised to accommodate the digital platform being used. Students were able to negotiate their choice of software that was available in the Department of Education. The original template was created by using Microsoft PowerPoint.

The researchers identified a subset in order to mentor them through this process and monitor their development. This involved ongoing weekly meetings throughout the semester and the results were documented as part of the summative evaluation of the project. The major aim of this process was to assist the students in their selection and refinement of artefacts and also their reflection upon their professional development.

Phase 3

Phase 3 involved the same sub-sample as Phase 2 working with a group of primary school students in a metropolitan school to develop their own student e-portfolio. Each university student was allocated a group of 4–5 Year 7 (12 years of age) students to work with on a regular basis over a four-week period. The first three sessions were conducted at the primary school where a great deal of the discussion, planning and artefact collection took place while the last session was held at the University in the computer labs where the Year 7 students were given the opportunity to actually create their e-portfolio.

Findings

This paper reports on the key findings of each phase of the e-portfolio initiative.

Phase 1 — Portfolio project questionnaire

Prior to the students' initial investigation into the use and purpose of portfolios they were asked to complete the *Portfolio project questionnaire* (N=30). The results of the questionnaire revealed that the students differed in their conceptualisations of what a portfolio is and what it aims to achieve. The majority of students believed that it was possible to construct a personal portfolio electronically and that it should reflect personal works achieved over time and individual development. A number of students however (N=12) believed that the portfolio should not only present information but should also allow the reader a deeper insight into the life of its creator. In this way the portfolio becomes a living work in progress which charts the life world of the student and allows a credible view of each student from both an intellectual and philosophical aspect. A small number of students (N=3) identified the potential of the portfolio to teach others regarding specific content. This is an interesting result given the fact that these students are only in their second semester of a four year degree and yet they are already conceptualising the importance of utilising a variety of teaching approaches.

The majority of the sample clearly acknowledged the advantages of e-portfolios when compared to traditional formats. The questionnaire invited students to reflect upon why they thought they were being asked to develop portfolios. The sample indicated a range of responses which included the improvement of their ICT skills, enhancement of future employment opportunities, and a way in which they were able to chart their own progress. Most importantly, the students viewed the construction of the portfolio as a way of increasing their own skills in order to replicate a similar process with their future students in a school setting. When asked what skills, knowledge, attitude or outcomes the sample would like their portfolio to reflect the majority of responses indicated that not only did the portfolio need to appear professional but it was also imperative that it was easy to navigate. The sample once again considered the future application of such an approach with mapping their own students' development. When the sample were asked what evidence they should include in their portfolios their responses were rather immature in that they focussed upon awards, work samples and not reflective practice. This is not surprising given that they are in the first year of their degree course and they have not been exposed to this process or to these products in the past.

Phase 1 — Portfolio dimensions

The definitions of the dimensions of the e-portfolio were devised in a collaborative way throughout the first five weeks of Semester 2, 2003. Students were divided into small groups and were asked to investigate possible dimensions for their e-portfolios through the examination of existing electronic models. This proved to be an iterative process whereby the sample identified elements of good practice which reflected their individual needs as students and potential teachers. Following this process the entire sample regrouped to identify key dimensions which had emerged as a result of their initial investigations. These initial dimensions proved to be generic and included elements such as, an introduction to the e-portfolio process, instruction for user navigation, basic contact information, background (educational and personal), printable copies of curriculum viteas, teaching philosophy, goals (short and long term), and overall experiences to date at university. It was decided that these dimensions were to be used as a base from which students were encouraged to develop and implement a more individualised approach. It is interesting to note that the majority of students chose to structure their e-portfolios using only the generic dimensions (N=20).

The majority of students preferred to implement the generic dimensions and this may be the result of the fact that the sample comprised first year students only and as such they had not had the appropriate time frame in which to develop their own personal teaching and learning philosophy. These students had not yet developed a holistic view of the overall outcomes of their involvement in the course and as such were able only to conceptualise components and not the whole. It was hoped therefore that with the continuing development of the e-portfolio throughout the remaining years of their study that the sample will begin to create links between the components of the course and their own professional development. In addition to this limitation, they also had experienced limited exposure to exemplary models of e-portfolios and this had clearly impacted on their product at the conclusion of 2003.

Phase 2 — Portfolio dimension

The following year (Semester 2, 2004) in a special project unit the students (N=13) from the original technology unit in Phase 1 formed an ongoing focus group where data in the form of observation, field notes and work samples were collected throughout the semester. In this unit the students were asked to re-examine their e-portfolio and determine whether they could continue to build upon their e-portfolio in order to reflect their professional development over the course. The data revealed that the general consensus was that the dimensions were far too general and they were inappropriate measures or did not truly reflect their actual professional or personal development over time. They simply reflected 'snapshots' of their skills and accomplishments without containing any real depth. The students also acknowledged that their initial designs lacked personality and did not reflect their individual characteristics and as one student commented "the portfolios are a great advertisement for Microsoft templates". These reflections from the students were instrumental in the restructure of the design and development of their e-portfolios.

The final decisions from the students were that their e-portfolio would:

- Contain dimensions which reflected the graduating outcomes/attributes for students in the Department of Education.
- Provide a range of artefacts which ranged from text, graphics, sound and video.
- Include justifications and reflections which support and personalise each artefact as well as link to the outcome itself.
- Design and create their personalised template.

Once the e-portfolios were re-developed further written feedback was provided to the students and once again modifications were made. The following (Figure 1) is a visual example of the finished product:
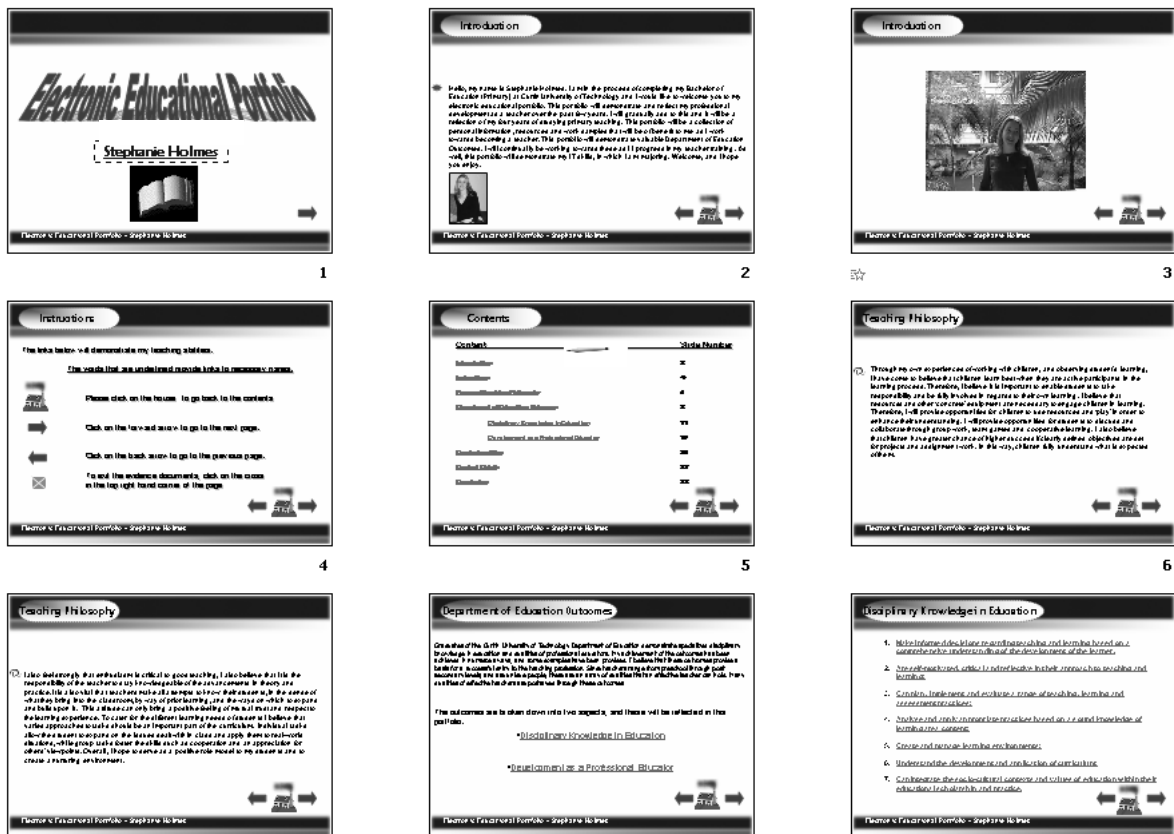

Figure 1: Student example

Phase 3 — Classroom implementation

Phase 3 began in the second half of Semester 2, 2004. As indicated earlier the university students worked closely with their group to develop their own individual e-portfolios. The university students began by modelling their own e-portfolio and then discussed with their group the type of e-portfolio they would like to create. This modelling appeared to be invaluable as it enabled the Year 7 students to actually conceptualise what their own e-portfolio would look like. With the exception of two groups most of the students decided to create individual e-portfolios which included their favourite pieces of work. During this time the university students kept journals to reflect their thoughts and the process they adopted when working with their group. Most of these journals also contained valuable anecdotal notes on each of their group members. The following is an example of one of the anecdotal notes:

> Karen was a great help when it came down to the actual writing mechanisms of the portfolio. She had some wonderful ideas when it came to arranging the text and backgrounds of the portfolio. It was great how she always made sure that everyone else agreed and always asked others for their opinion. Karen finished most of her power point slides early, and straight away got into arranging the layout of other people's slides and was a great help in transferring everyone's work into one presentation. Stacey and Karen worked well together in adding the 'extras' to the portfolio such as the title, contents, instructions and conclusion slides. It was great to notice Karen taking charge in the final stages of the portfolio construction, during the students visit to the university. Karen organised the group to gather around one computer and go through each slide, to make final modifications.
>
> (University Student S, Journal p. 5, November 2004)

The university students had worked with students during their field experience prior to this project however all of the students commented on the value of the regular weekly meetings and the clear objective and focus of the meetings. The journals revealed that they had all gained a great deal of skills and knowledge from the experience. The following are some excerpts from the university students' journals regarding what they gained as well as what their students gained.

The university students:

> I personally believe that the Portfolio Project would be by far one of the greatest units I have done in my two years studying Primary Education. The very 'hands-on' approach of this unit was a great way for me to gain valuable skills of actually relating to the children (a main goal of our profession), as well as improving my technology skills and sharing these with others. … I have come to the realization that computers and importantly electronic portfolios are a wonderful teaching strategy. They allow flexibility and encourage students to demonstrate originality and creativity.
>
> (University Student S, Journal p. 19, November 2004)

> I loved getting into the classroom and getting that hands on experience as well as testing my own ability. They say you understand something when you are able to teach it to someone else. The students I had in my group knew quite a lot about computers and power point though I enjoyed the process of a structured plan for them. Helping them work together and use their ideas to create a design and then guide the process through to production was I think invaluable. … I feel that I increased my technology knowledge through having/wanting to complete this project.
>
> (University student P, Journal p. 7, November 2004)

The Year 7 students:

> The students' learnt how to use power point and also produce a piece of work differently to what they would normally do. They got the experience of the technology process without really knowing it. They had to design, evaluate, create and assess. It was fun and they got to use their creativity to create something for them to show everyone else. Normally their portfolios are a file that they take home to show the parents, bringing home a CD is a whole different thing and their parents could see how they have adapted technology to produce a piece of work to show off other pieces of work. It also shows that they are critical thinkers in that they had to choose what did and did not go into their electronic portfolio. The also had to justify why they chose this work and why they enjoyed the lesson. They experienced all different types of technology, digital cameras, scanners, design and also how to work as a group. I believe the experience that the students received from this project was so important in today's learning for it was fun, exciting and they saw a final product that was theirs.
>
> (University student H, Journal p. 17, November 2004).

> The students gained further information on the use of computers such as hyper-linking and information presentation. Students also were able to experience more group work which is important for their communication skills. I also think that the students would have enjoyed their visit to Curtin. Not only did they get to work on their portfolios but they also increased their knowledge of University and hopefully have a good memory of their experience which may help them focusing on their futures.
>
> (University student N, Journal p. 6, November 2004)

Conclusion

Piper (1999) asserts that the process of portfolio development should be undertaken slowly with an aim to seek linkages for stakeholders and to be realistic with designs and expectations of the portfolio. She recommends that authors use available models relevant to their design and use, and that ownership of the project needs to be instilled. Timelines need to be clearly established for implementation and the portfolio should also be flexible enough to allow for improvement and growth as it evolves. The results of this study indicate that the approach used enabled the students to achieve a sense of ownership not only in the end product but in the process itself. The sample agreed that there was value in participating in the portfolio project, and many believed that their experiences enabled them to develop insights into their own life worlds and those of their fellow students. It is acknowledged that the students (N=30) who were involved in Phase 1 of this initiative were relatively inexperienced in developing such a product, however the opportunity to revisit the design and dimensions of the e-portfolio by the sub-sample (N=13) in Phase 2 was seen as invaluable. It is envisaged that their engagement with this process will continue throughout their four year degree.

The great value of the portfolio is in self-reflection. Hackney (1999) concludes that the creation of a portfolio should take into account the highly individualised nature of the process with the emphasis on how one examines oneself, what value is placed on artefacts and their representation of work completed, and what rationale is used to support the artefact as a reflection of personal growth. As the results indicated, a number of the students involved in Phase 1 extended and personalised the e-portfolio dimensions; however, Phase 2 enabled the subset to engage in closer self examination. The catalyst appeared to be the revised structure of the e-portfolio, which provided much clearer and more defined boundaries to work within. The close examination of their e-portfolios as well as their peers' e-portfolios enabled the students to concur with Hackney (1999) regarding the value and importance of self-reflection. They commented that it was through self reflection that each e-portfolio came to life and mirrored the individual's personality and traits. This resulted in a greater commitment from the students to include self-reflections of their personal and professional growth as well as clear justifications linking their artefact to the specific outcome or attribute. During Phase 2 of the project the students were introduced to Ash's (2000) model (Figure 2), which proved to be an effective process to follow to help students critically reflect upon their choice of artefact.
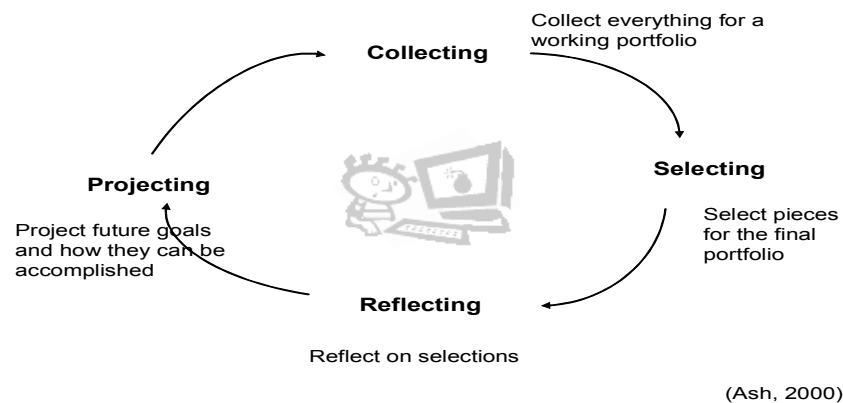
Figure 2: A useful process when developing e-portfolios

Hackney (1999) emphasises that the process should not be oversimplified but must demonstrate the variety, range and depth of student achievement. The process should be collaborative and communication at all phases of development between every participant is crucial. The ongoing nature of the portfolio project will assist the students to increase their interpersonal skills as they work collaboratively over the next two years to complete their own personal portfolio and to mentor fellow students through the process.

In summary, the students in the sub-sample who participated in all phases indicated that their involvement in this initiative enabled them to understand the development of electronic portfolios in particular the need for the task to be open ended, authentic, with high levels of ownership and flexibility, time to prepare, reflect and ongoing access to exemplars. Student feedback also focused upon the need for reliable technical equipment and access to technical support. The students in the sub sample found that the opportunity to revisit their earlier portfolio proved to be an invaluable experience, allowing them to reflect upon their personal and professional development over time.

As Kimball (2002) suggests, e-portfolios provide students with an excellent opportunity to not only enhance and reflect upon their own development throughout a program but they enable individuals to showcase their work to a definite audience. The administration of the primary school involved with Phase 3 of this study are keen to further develop the partnership between the school and the University and have signalled their interest in future participation on a larger scale. The result of this partnership has been two fold. Firstly, for the school, the portfolio project has assisted to add value and build ICT capacity beyond their own capabilities, and secondly, the process has assisted the university students to further reflect on their own development and to reinforce their own learning.

This strongly supports what Kimball (2002) is implying when he posited that projects that may have appeared to be academic exercises become more real when students know that large numbers of people can see what they have created. It would seem that e-portfolios have a natural position within the increasing use of technology in course construction and general programming in education. The major findings resulting from this initiative are therefore commensurate with current national and international approaches to the integration of technology in education.

Future directions

One of the initial aims of this initiative was to eventually embed the systematic use of e-portfolios within the entire Bachelor of Education program. The new Bachelor of Education program has currently been restructured to accommodate outcomes based education and has recently been approved by the University and industry partners. The new program will be implemented in Semester 1, 2005 and has e-portfolios embedded in one of the first semester, first year core units. Student e-portfolios support the philosophical rationale for outcomes education in that they encourage and allow students to reflect upon and make judgements about learning and professional development. From the Department's point of view, this will provide a valid accountability process in that it allows the lecturers throughout the four-year course to chart student development against the graduate attributes/outcomes.

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