Digital Portfolios: Fact or Fashion

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Abstract:

The value of portfolios as an assessment tool is thoroughly researched and their use in education is well documented (Woodward 2000). Research on the introduction of digital portfolios is substantially based on general portfolio research; however, additional specific factors and features need to be considered. One of the inherent dangers with digital portfolios, for example, is that the technological novelty of the product could overshadow the purpose of the portfolio. The danger is that learning to use the technology itself could then subsume the learning opportunities of portfolio construction. While the significance of technology is recognised, a balance must be sought so that the fundamental value of developing a portfolio is maintained. Can digital portfolios add value to existing practices or are they a fashion soon to be forgotten?

This paper discusses the first phase of research, being conducted with undergraduate students, to interrogate not only the products created but also the processes used as they develop their digital portfolios for their initial teacher education degree. Students were offered the opportunity to develop a first draft of their final semester portfolio within the supportive environment of an elective subject. This trial has prompted us as educators to further explore the ways students can be supported as they develop digital portfolios.

Introduction

> *The multimedia portfolio is a multifaceted tool which can be used to fill several different purposes, but the most important is that it promotes learning among both student and teachers. This type of portfolio will be an important asset to school and individual as society heads into the Digital Age*. (Hartnell-Young & Morriss 1999, p. 105)

This quotation summarises the general belief that the availability of a digitally based means of publication presents an opportunity for students and teachers who use portfolios in their learning programs. Since 1991 a paper-based portfolio model has been used throughout the four years of the Bachelor of Education program at the University of Western Sydney(UWS) with the main focus occurring in semesters 1 and 8. These portfolios of teaching practice were developed by the students as a final semester assignment and viva presentation to a panel of their mentoring lecturer, a peer and a representative of the teaching service employing authorities. Even though the option of making a multimedia portfolio had been included within that format no student had considered this option.

The authors of this research decided to investigate the potential of digital portfolios by providing a supportive environment for those students who chose to volunteer to develop a

first draft of their final semester portfolio earlier in the degree program. The first author's experience lay in portfolio development while the second author's expertise lay in the educational uses of multimedia authoring. We decided that the concept of digital portfolios would be introduced to several groups of students who were taking the mid program elective subject *Classroom Computing*. These students were offered the option of learning how to develop a digital portfolio and creating such a project as an assessable task. This opportunity meant that students who took advantage of this offer would have teacher and peer support in developing their portfolios some time before their final semester. The immediate advantage for students was that this process not only alleviated some of the end of program workload pressure but also afforded those involved additional mentoring and skill development.

Information and Communication Technologies (ICTs) facilitate the combination of text, audio, graphic and video based representation of information collectively termed "multimedia". Multimedia engages both visual and auditory channels of communication and when presented using a graphic user interface allows viewers to make selections from the material an author has presented. Although the available authoring software offered new possibilities for the creation of digital portfolios the researchers' view was that the emphasis needed to remain on the learning and assessment opportunities inherent in such projects.

This paper reviews the current literature and reports summatively on a variety of aspects of this implementation of digital portfolios. It includes a description of the context of the student's portfolio development and an analysis of the data collected. This trial led us to better understand the various facets of such an implementation and also demonstrated that by supporting digital portfolios with previous frameworks we could work towards them becoming a fact not a fashion.

The literature

Current literature focuses on the similarities and differences between paper-based and digital portfolios and on the unique learning opportunities they offer. The resulting issues were seen to move, over time, from value lying within the area of digital portfolios as better and alternative storage systems to them being vehicles for their authors to learn technology and to be able to use the multiple skills needed to produce a better product using a variety of authoring tools. Along with these issues the literature puts forward a plethora of definitions and an ever expanding range of computer software designed to specifically support digital portfolio development. The discussion of the digital portfolios deals with the way in which the interactivity that hypermedia supports changes the relationship between authors and audiences of portfolios.

On many occasions throughout the literature the descriptions of the perceived uniqueness of digital portfolios, however, are mirrored in paper-based portfolios. There is recognition that components such as standards or criteria, reflections and artefacts are common to most portfolios (Barrett, 1997; Piper, 2000; Davies & Willis, 2001, Lamson, Thomas, Aldrich and King, 2001). Barrett (2002) and Davies & Willis (2001), however also comment on the introduction of digital portfolios as being part of the tradition of paper-based portfolios and not a separate entity in itself. Much of the literature supports the theory that portfolios in general help develop self-esteem, professional development and good teaching practice (Hartnell-Young & Morris, 1999; Barrett, 2000; Piper, 2000). The issue of ownership is debated, with Piper (2000) arguing that digital portfolio processes increase student ownership of their portfolio whereas Woodward (2000) rationalises that all authors of any type of portfolio should establish ownership.

The idea of using digital portfolios solely as a tool to learn about technology is explored by Hartnell-Young & Morris, (1999), Barrett (2000) and Piper (2000). This discussion focuses on whether authors are learning *about* technology as they develop their digital portfolios or whether they are learning *through* technology. Hartnell-Young & Morris, emphasise that the technology should support rather than drive portfolio development. They suggest that using and understanding the technology required is integral to the digital development process. It provides the learners with opportunities to increase their skill levels and to enhance their understandings of the technology itself. It also presents the learners with many more options for recording and presenting artefacts that demonstrate their achievements and growth. (Barrett, 1998; Hartnell-Young & Morris, 1999). Hartnell-Young & Morris however, caution that a "multimedia portfolio is not expected to be a graphic designer's dream, the emphasis should be on learning" (1999, p. 28). One of the key ideas that has been derived from research into paper-based portfolios is the understanding that portfolios are learning opportunities (Woodward, 2000). The current research is interested in determining if the same can be said of the digital portfolios and if so what are the qualities of the learning uniquely supported through working in digital media.

Research about digital portfolios has reported a variety of findings. These findings focus on the value and purpose of portfolios themselves as well as the attributes peculiar to the inclusion of technology. Kimeldorf (1997) purported that digital portfolios when compared with paper-based documents provide the audience with greater insight in the achievement and successes of the author due to the variety of data sources that can be included. These sources can be in words, sounds and images, either still or moving, creating wonderful opportunities for learning and for the demonstration of that learning (Hartnell-Young & Morris, 1999).

While the extension of the information types available to aid communication between author and audience is only one characteristic of digital media the ability to facilitate audience choice is equally significant. Nodes of multimedia can be linked to form a conceptual network that can be explored in either a directed way or through the choices and interactions offered to its audience. Such purposefully linked multimedia collections are termed "hypermedia." Portfolios constructed in this way "are linked not in a linear manner but in information webs through which the reader can determine her [sic] own path, allowing for exploration and unplanned and unintended learning outcomes" (Pachler, 2001, pp.23-24). The unique qualities digital portfolios provided through the multimedia connections and links that are can be made to electronic repositories give added depth and understanding to learning through the portfolio process (Young 2002).

A further dimension brought about by the digital construction of portfolios is that of the engagement in learning. Armitage (1998) believes that digital portfolios assist student learning by increasing motivation and allowing publication of their work in ways that result in greater self-confidence. The opportunities for reflection and discussion about the artefacts chosen by portfolio authors also adds to their value as learning support (Norton & Wiberg 1998). Both Niguidula (1997) and Simon & Forgette-Giroux (2000) warn that unless digital portfolios are carefully planned and based on a strong conceptual framework they will become a passing 'fad' or 'just one more gimmick'.

In the current investigation the skills of hypermedia authoring were taught in the context of the use of ICT resources in the learning programs of primary school aged pupils. The authoring skills being taught were intended to demonstrate that "hypermedia construction has been shown to engage intentional learning with children as young as eight" (Jonassen, Peck & Wilson, 1999, p. 102). These skills were transferred to the creation of a digital portfolio using the framework devised for the paper-based model used in the Bachelor of Education undergraduate program and reported in Woodward and Nanlohy (2002).

Research Project

A qualitative research methodology was selected primarily because this project seeks to make sense of the students' personal work processes when constructing digital portfolios and the ways in which this task intersects with the their understanding of themselves and their learning. Nine students from three consecutive cohorts (2001 to 2002) of the Bachelor of Education (Primary) elective subject *Classroom Computing* volunteered to take part in the project. A major component of this subject was the development of skills in using and authoring multimedia and hypermedia for educational purposes. The personal portfolio that the students completed counted as a 50% assessment task. Their development of a digital portfolio was monitored using a number of data sources. These included courseware documentation, tutorial notes and a journal written by the second author who worked as a participant observer while teaching the subject. The portfolios created by the students were analysed using summary statistics and a taxonomy of the interactive elements that can be made by combining features found in the PowerPoint 2000 program (Nanlohy, 2002). Three students also volunteered to be interviewed, *post hoc*, about the learning they experienced as they developed their portfolios.

The aim of the project was to investigate the digital portfolio development process, the products produced and the learning that occurred in both the students' acquisition of multimedia skills and the development of their curriculum understanding. The research was focused on four issues:

1. to investigate the range of multimedia authoring strategies available to support the development of student portfolios;
2. to develop strategies to increase students' understanding of the potential of ICTs and hypermedia through digital portfolio development;
3. to assess the student learning that occurs during the process of developing a personal digital portfolios;
4. to establish a process for the development of digital student portfolios that make appropriate use of the available technologies and that sustains the current principles employed in developing paper-based portfolios.

The development of the digital portfolios - How were the students supported?

During the elective (*Classroom Computing*) the tutorial support provided to the students who volunteered to be part of this trial was influential in setting the parameters for the portfolios that they created. These students participated in 13 two hour tutorials over a 13 week university semester. Approximately 12 hours were devoted to investigating the role of hypermedia authoring in primary school education and to working on the students' projects. The instructional support provided to the students falls into three main areas. These were a set of standard criteria and theoretical frames to address in the portfolio itself, the use of a studio style of tutorial that emphasised collaborative learning and a theoretical underpinning to the authoring with hypermedia.

The final semester student portfolio used at UWS has as its criteria key elements of the "Desirable Attributes of Beginning Teachers" as described by the NSW Department of Education and Training, the main employing authority. The students must give evidence of their understanding of the criteria and must also reflect on the connection between the evidence, the criteria and the theory. The students involved in the digital portfolio project were asked to address these criteria, even if only in draft form at this stage. In adhering to the portfolio criteria the students found that they had to focus on themselves as teachers while they collected, selected and prepared the texts and evidence they wanted to include in their portfolio. This inward focus and the reflection on the evidence encouraged in the

organisation and style of the tutorials assisted the students to come to see themselves as an important audience for their evolving portfolio.

Of the available authoring programs most students (eight out of nine) chose to use the PowerPoint 2000 program. Discussions revealed that this was mainly because it was available to them in their homes. After formal instruction in how this program could be used to create linked hypermedia the students examined and mapped examples provided by the lecturer. Within a small, supportive, collaborative tutorial group they began to draft and build their hypermedia projects. All students in this subject created a hypermedia teaching resource while the volunteers constructed their portfolios in place of a second, open choice assignment. Lecturer/student evaluation and discussion, informal (verbal) and formal (written) peer review and guided critical self evaluation all served to assist the students to develop their portfolio in a reflective manner. During the tutorial the students worked in pairs or triads consulting with the lecturer who encouraged them to share ideas and to work collaboratively. Support for this approach was documented in the consolidated subject evaluations.

The theoretical underpinning of the instruction given to the students primarily related to the relationship between the authors and audiences of hypermedia texts. The use of hypermedia authoring software offers unique opportunities for students to develop possibilities for audiences to interact with the material provided. A personal portfolio is an autobiographical document written by an individual who needs to speak to a number of audiences. These include prospective employers, university assessors, tutorial leaders, student peers and the authors of the portfolio. While this type of portfolio is primarily addressed to prospective employers the hypermedia projects examined in this study were also assessable tasks within a degree program. As such, students saw the key audience as being the person who would mark that task. Students were also encouraged to view themselves as a prime audience for the portfolio. The project was termed a draft as the final portfolio would be prepared in their last semester. This draft was subject to continuous formative evaluation and a marking rubric was discussed. This scaffolding served to reduce the focus on the marker as audience.

Much effort was spent helping students address the needs of their possible audiences. They did this by creating portfolios that were easily navigable and that invited engagement and exploration while conveying a true impression of their unique worth as teachers. The students developed interactive elements within their projects using the hyperlink and animation features of the program. These elements were designed to attract the audience's attention and to offer choices in the ways the information displayed could be explored.

The analysis of the digital portfolios - What the experience has taught us?

An analysis of the digital portfolios submitted by the nine participants in this trial was carried out to determine what their response had been to the set criteria and to the hypermedia authoring programs they chose to use. The portfolios the students created were analysed in two different ways. Their summary statistics and data structures were tabulated to give measures of their completeness and complexity. Their use of interactive design and engagement of their intended audience was analysed against a taxonomy interactivity within hypermedia projects created with the PowerPoint 2000 program (Nanlohy, 2002). All 125 students working in a core subject of the same degree program had developed this taxonomy from an analysis of similar hypermedia projects submitted.

Measures of the portfolio statistics and structures included;

- Project size as measured by memory usage, number of screens and linked files,

- Levels of complexity as represented by internal and external file structures, menu levels within the main portfolio file and the use of interactivity,
- Navigation systems used including contents screens, linear and layered links between screens,
- Non-navigation linking patterns and timed animations intended to create interactivity.

The students' responses to the task of creating an interactive portfolio can be summarised as conservative but comprehensive and individualistic. All but one of the students strictly addressed the required criteria and instead emphasised individuality and creativity of content. All but that same student used the hyperlink feature of the PowerPoint program to create a portfolio that had a hierarchical structure that worked on at least three levels. It was also apparent that there was a development along these three dimensions across the three cohorts of students who participated. These differences suggest that the increasingly numerous set of student examples and the developing expertise of the lecturer in supporting portfolio development in this medium has had a significant effect on the projects produced.

The students' response to the task of creating a portfolio was conservative in the sense that they made limited use of the interactivity offered by the authoring programs. In particular, the first cohort tended to replicate the look and feel of paper-based portfolios and not to make great use of the interactive possibilities. Although paper-based portfolios had been their main model for this project they had all developed hypermedia teaching resources that exhibited a greater use of interactivity. The students from the latter elective cohort used more innovative methods to display images of the evidence on which they drew and had created more attractive visual interfaces.

The portfolios were comprehensive in that they nearly all went beyond the draft stage. Most students attempted to hand in a project that was as complete as possible. They usually layered their projects with an introduction and a main content page linked to the seven sections suggested by the portfolio. Each of these sections were then developed to a greater or lesser degree through the use of statements and supporting evidence usually represented as text and graphics. Three of the students chose to contain all their information within one large PowerPoint file, each with between 34 and 53 screens. One chose to divide her large project into a set of PowerPoint files, one for each of the requested sections. The other used a combination of a large central file with many additional files linked to provide access to evidence represented in a range of digital file types.

The projects were also complex. One student made a project that contained 53 linked screens and 35 supporting files. This project was, in fact, so large and complex that it exhausted the PowerPoint program's capacity to store hyperlinking information and would not work reliably. The student who used linked Word files also achieved a large collection but she found that as the viewers of her portfolio explored the hyperlinks many files were open at the same time and that this caused some confusion.

The projects were very individual. Even though those students who belonged to the same elective cohort worked collaboratively and used the same model projects to work from there was remarkable diversity in the portfolios they made. These differences were seen in screen design, presentation of information and the use navigation structures and external files. While some of the students in the earlier cohort replicated paper-based designs others tried to make innovative use of the features available within the program they were using. An example is a student's use of cascading images of evidence to present a sequence of teaching documents to the viewer. Often they used animation, occasionally sound but never video. The student's attempts at creating interactivity combined with the reflection and introspection that the task encouraged contributed to the creation of unique portfolios. It

could be argued that this personalisation is an indication of their consideration of themselves as an audience for the project.

The analysis of the interviews - What were the benefits for student learning?

Three students volunteered to be interviewed about their participation in the trial, their beliefs about portfolio development and the learning they experienced. The second author interviewed the students individually. A semi structured interview methodology was used that allowed him to raise the set of questions listed below but also facilitated the exploration of issues raised by the students. Sample questions were:

- What stages (processes) did you 'go through' in order to develop your portfolio?
- What is unique or special about using ICT in this way
- What guidelines did you use to define the nature of the final product?
- How well do you think the final product represents you as a teacher?
- How would you improve the process?
- What did you learn about yourself and your understanding of teaching?

One of the important issues that became very evident during the interviews was the quality of the learning that occurred during the construction of the portfolio. The development of digital portfolios refined the students thinking and constantly challenged their beliefs and their learning. Most of the introspection arose from reference to the criteria that the students were asked to address and this process was common to both paper-based and digital portfolios. However the challenge of having to present their ideas in a digital portfolio influenced the decisions they made about how to represent themselves to an audience. The flexibility of the presentation methods and the opportunities to embed interactive elements into their portfolio led the students to explore new ways of representing themselves. The unique opportunities that the digital portfolios offered the students lay in this freedom of choice and the flexibility of the authoring tools used.

In one example this choice was illustrated by the selection of authoring program. As mentioned previously most students used Microsoft PowerPoint but one student chose to use Microsoft Word. This student did this so she could explore the possibilities of using the hyperlink function that is common to all of the programs within the Microsoft Office suite. She had already explored the use of PowerPoint to create hypermedia that she could use in her future classroom and wanted to extend her skills beyond this program. In the event she found that Word was cumbersome and inhibiting for this purpose but the risk taking represented by her choice illustrated the sort of learning opportunities this project made available to students. Those students who used PowerPoint found that it gave them the ability to layer their portfolios and that this gave an added dimension that was not available in paper-based portfolios. Students saw the depth of the layering and the interactivity it afforded as positive outcomes.

Two further issues arose during the interviews: the individual level of technology knowledge and skills needed including how these impinged on the final product and the level of engagement of the student author in the process. A variety of skills were needed to make full use of the technology available and to integrate this knowledge into a meaningful document. Many of these skills had been introduced throughout the four year course and more were explored during the elective but it was perceived that still more needed to be learned by the individual students as they worked their way through the process. The elective at least gave the students a forum for discussion and a place to learn these skills and to put them into practice. The ability of the students to engage in the process at a critical, in depth level producing a thoughtful, perceptive document that reflected their learning and the philosophy was seen as important at both the process and the product level. The very different nature of

all the portfolios completed points to the individualisation and personal representation this depth of engagement makes possible.

The timing of the elective in relation to the whole course was seen as crucial in that it allowed the students to work through a number of issues prior to their final year. Two students discussed the advantages that this timing gave them. They felt they were more prepared for the subject in the next semester than others in their group who had not worked on their portfolio at that stage. The subject, Integrated Studies, challenged their thinking and perspectives to the extent that it changed their understandings about themselves as prospective teachers. One student commented that these changes and challenges meant that while the portfolio she had developed during her elective now needed to be altered the thinking it had provoked helped her to address the issues raised by Integrated Studies. She believed that her philosophy stood firm and she was confident that her work on the portfolio allowed her to better understand such issues as social justice and equity and how these issues would affect her teaching and learning processes.

At this final stage in their course the students were interviewed by the public employment agencies intended to target and place students well before graduation. These interviews were seen by the students as critical and usually caused a deal of angst. The three students interviewed emphasised that the development of their digital portfolios prior to this event not only supported their thinking but also helped them in organising their ideas and teaching processes in a way that greatly assisted them in the interview process.

Two students thought that the actual process of developing the digital portfolio could have been more consultative. The students felt that they would have benefited from additional constructive feedback about the content of their portfolios as they tried to align the evidence placed within the portfolio with the set criteria. While much of this content is developed in the final semester in which this task is completed, the problem needs to be addressed for students who choose to develop their portfolio earlier in the course. In summary the students were quite vocal about the benefits of portfolios but more specifically of digital portfolio in that as one student put it

> *"Doing this portfolio taught me more about technology, more about myself and above all more about who I want to be; who I am now and who I will be in 10 years time".*

Findings

The results of this trial and the emanating research have indeed indicated that the students benefited in two main ways. There was conclusive evidence that digital portfolios were worthwhile learning experiences. This learning was at both a personal and technological level. These results were contingent on the development of a supportive learning community and a well-formed framework on which to base both the product and the process. The improvements displayed in the work of the later cohort supported the suggestion that better communication of the student authors' ideas was possible when more of the available interactivity was designed into the portfolios. There was, however, a need for the students to follow through on their reflections within the portfolios, as they were somewhat shallow and unconnected to the theory and literature.

Further Research

The research to date (Woodward & Sinclair, 2001) shows that students viewed paper-based portfolios, developed during their Bachelor of Education degree at University of Western Sydney, as a positive and exciting learning experience. With a well-established process in

place, the expansion of the current principles of learning through portfolio development to the digital medium was seen as a purposeful evolution of existing practice. In implementing this innovation, steps were taken to ensure that valued learning processes were preserved and that students were supported in their investigation of the opportunities afforded by the use of digital media.

Now that these students are involved in their concluding semester we need to re-interview them to establish any changes they had to make as they polished the final product to ensure the initial principles were, in fact, developed. We need also to interview the lecturers who mentored students with either digital or paper-based portfolios to ascertain the differences in the support needed or given to the respective students. Interviews of students and document analysis of their paper-based portfolios have also been arranged. We found that students were successful in adapting the digital technologies to their portfolio development and that new learning opportunities were created as a result but further research needs to take place so the issue of the 'look' of the product does not overshadow the purpose of the portfolio resulting in the learning opportunities being be subsumed by the technology itself. .

It would seem at this stage that the implications for digital portfolio development using the format discussed in this paper support Niguidana (1997) and Simon and Forgette-Giroux (2000) in that without a given framework and careful planning digital portfolios will be just a 'fad' or a 'gimmick'. This research demonstrates that digital portfolios inevitably will become a fact not just a fashion.

References

Armitage, C. (`1998). The benefits of pause for thought. *The Australian* (Newspaper) December 16, 1998, 16.

Barrett, H. (2000). *Electronic Teaching Portfolios : Multimedia Skills + Portfolio Development = Powerful Professional Development*. AACE SITE2000. San Diego, California (February, 2000). accessed on 30/6/02 from http://transition.alaska.edu/www/portfolios/site2000.html

Barrett, H. (1997). *Collaborative planning for electronic portfolios: Asking strategic questions*. In the proceedings of the National Educational Computing Conference, Seattle, Washington.

Davies, M., & Willis, E. (2001) Through the looking glass...preservice professional portfolios. *The Teacher Educator*. Vol 37 No 1 p. 7- 31.

Hartnell-Young, E. & Morris, M. (1999). *Digital Professional Portfolios for Change*. Australia: Hawker Brownlow Education.

International Society for Technology in Education (ISTE). (1995). The Road Ahead - Assessment: Information Technologies in the K-12 Curriculum. accessed on 30/6/02 from http://www.iste.org/research/roadahead/assess.html#portfolios

Jonassen, D. H., Peck, K.L. & Wilson, B.G., (1999). Learning with Technology - A Constructivist Perspective, Upper Saddle River, NJ: Prentice-Hall.Kimeldorf, M (1997). Portfolio Power: The new way to showcase all your job skills and experience. Princeton, New Jersey: Peterson's Publishing Group.

Lankes, A., (2000). Electronic Portfolios: A New idea in Assessment. ERIC Digest. accessed on 30/6/02 fromhttp://www.ed.gov/ERIC_Digests/ed390377.htm

Lamson, S., Thomas, K., Aldrich, J,. & King, A. (2001). Assessing preservice Candidates' web-based electronic portfolios. Paper presented at Association of Teacher Educators Portland August 5 -8.

Nanlohy, P. (2002). *Towards a taxonomy of interactivity within hypermedia texts created with PowerPoint 2000,* Unpublished Courseware documentation, B.Ed. program, University of Western Sydney.

Niguidula, D. (1997). Picturing Performance with Digital Portfolios. *Educational Leadership*. Vol 55 No 3. p. 26-29

Norton, P. & Wiberg, K. (1998). *Teaching with Technology*, Orlando: Harcourt Brace.

Pachler, N. (2001). Connecting school and pupil: To what end? In Leask, M. (Ed.). *Issues in teaching and using ICT*. London: Routledge Falmer

Piper, C. (1999). Electronic Portfolios in Teacher Education. Internet published D.Ed Thesis. accessed on 30/6/02 fromhttp://www.chapman.edu/soe/faculty/EPWeb/toc.html

Piper, C. (2000). *Electronic Portfolios in Teacher Education Reading Methods Courses*. AACE SITE2000. San Diego, California (February, 2000). accessed on 30/6/02 from

http://www.chapman.edu/soe/faculty/piper/aera.htm

Simon, R. & Forgette-Giroux, R. (2000). Impact of a content selection framework on portfolio assessment at the classroom level. *Assessment in Education*Vol 7 No 1 p. 83-101.

Woodward, H. (2000). Portfolios: Narratives for learning. *Journal of In-Service Education* Vol 26 No 2 p. 329 -347.

Woodward, H. & Sinclair, C. (2001). Portfolio Assessment: A student perspective. Paper presented at *International Seminar of Teacher Education*. Kuwait, February 12-17.

Woodward, H. & Nanlohy, P. (2002). Digital Portfolios in Preservice Teacher Education. Paper presented at International Assessment in Education Association conference Hong Kong September 1 -6.

Young, J. (2002). 'E-portfolios' could give students a new sense of their accomplishments. *The Chronicle of Higher Education.* Vol 48 Issue 26 p. 31- 35.