

Investigating Digital Storytelling and Portfolios in Teacher Education

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Abstract:

This paper explores connections between digital storytelling and learning portfolios in the context of pre-service teacher education. It examines the potential role of digital stories in supporting the presentational functions and reflective processes inherent in portfolio tasks. Eleven prospective primary teachers participated in this completed study by incorporating their own digital story as an integral part of their learning portfolio. Their digital stories helped the student teachers to present their learning journey in compelling ways and enhanced synthesis and analysis of the learning experiences associated with their portfolio artefacts. The digital stories also became an object of reflection in their own right.

Introduction

In the context of teacher education, portfolios are essentially a device for teacher learning and assessment, documenting professional growth and providing tangible evidence of developing knowledge, dispositions and skills (Campbell et al, 2004). In recent years there has been a growing interest in the use of technology to support portfolio tasks. These electronic portfolios (or 'e-portfolios') provide a flexible way of collecting and presenting information about students' learning experiences, establishing a detailed account of what they have learned, enhanced by software for linking documents and supporting reflections (Bennett, 2007). There is a wide range of purposes for portfolios that drive their structure, contents and format. Hartman (2004) classified them into two broad groups: i) portfolios as a forum for professional learning (or 'learning portfolios') and ii) portfolios to assess a novice's qualification for professional practice. Learning portfolios provide a structure for students to reflect systematically over time on their learning process and develop aptitudes, skills etc. (Zubizaretta, 2004). This project focuses on learning portfolios in the context of pre-service teacher education.

There are many definitions of digital storytelling but in general they combine the tradition of oral storytelling with 21st century multimedia and communications tools. Unlike oral stories, they are permanent and can be disseminated widely—making them accessible for reflection and critique (Davis, 2004). For the purpose of this study, we refer to the form defined by the *Centre for Digital Storytelling* in Berkeley, California (Lambert, 2002). This model integrates existing photographs, music, video (optional) and especially the voice of the narrator into a brief (2-6 min.) piece, typically with a strong emotional content.

This completed study builds on this current interest in digital storytelling and electronic portfolios to investigate the efficacy of pre-service teachers creating their own digital 'story of their learning' to inform their subject-based portfolio. It investigates how students might use this new video genre (Ohler, 2006) to 'fit' into the purpose and structure of a learning portfolio. It focuses on pertinent issues in teacher education, including reflection-on-action (Schon, 1983), learning from experience (Boud & Walker, 1990), authentic assessment and media literacy.

Background

Reflection and Learning

Reflection is an important human activity where people recapture, think and evaluate their experiences (Boud, Keogh & Walker, 1985). In the context of learning, it is a form of response of the learner to experience. Hence, reflective activities help individuals to explore their prior experiences to lead to new understandings. Many theorists, ranging from Dewey and Kolb, to Schon and Habermas, have extensively discussed the notion of reflection in learning. According to Dewey, "We do not learn from experience...we learn from reflecting on

experience” (1933). He also refers to ‘conscious reflective activity’ in learning to describe the process of reflection as deliberate and meaningful and reflective activity that involves the connections between parts of an experience.

This study draws upon Boud, Keogh and Walker’s (1985) model of promoting reflection in learning. This model consists of three inter-related stages to enhance reflective processes after a learning experience: *returning to the learning experience*; *attending to feelings connected to the experience*; and *re-evaluating the experience*. They emphasise the affective aspects of learning and highlight the important relationship between reflection and emotion. Attending to one’s feelings involves not only utilizing positive feelings but also removing obstructing feelings. They suggest learners subsequently re-examine their experience through a process of associating new knowledge with prior knowledge, integrating and linking new ideas into their existing frameworks, ‘testing’ the validity of any new ideas and finally appropriating this new knowledge. In later developments of their model (e.g. Boud & Walker, 1998) they warn against ‘recipe approaches’ to reflection and also consideration of contextual factors that might influence reflective thinking. For example, learners must be able to safely express themselves in a supportive environment. Others have also emphasised the crucial role of emotion in learning and reflection (e.g. Moon, 2004).

Portfolios in Teacher Education

Reflection is a key element of any learning portfolio (Shulman, 1998). Research indicates a positive connection between portfolios and enhanced reflection in both traditional portfolios (e.g. Campbell et al., 2004) and e-portfolios (Wetzel & Strudler, 2006). Furthermore, Hartman (2004) claims that portfolios are most effective when they provide opportunities for prospective teachers to engage in dialogue about the contents of their portfolios (p.392). He found that learning is enhanced when portfolios enable teaching interventions responding to particular portfolio artefacts—enhancing dialogue about pertinent issues (in this case, in Mathematics education).

Some concerns have been raised about portfolios in teacher education. For example, Wieseman (2004) and Wetzel and Strudler (2006) discuss the issues of ‘time, effort and timing’. Portfolios take time and e-portfolios take more time and this extra effort has the potential to adversely affect the depth of students’ reflective thinking. Wetzel and Strudler (2006) also flag the common, problematic student perception of ‘over-use’ of reflections in portfolios: “How much and what type of reflection is necessary without triggering negative reactions?” (p.77). Access to and reliability of technology, limited technical skills and poor attitudes can also be impediments to the portfolio-building process. Finally, Carney (2004) raises the question of conformity versus ‘freedom of design’, questioning the possibility of emerging commercial software and customised portfolio software stifling aspects such as self-expression and reflection skills. This study hopes to contribute to the discussion on some of these problems.

Digital Stories in Teacher Education

Use of digital storytelling has been discussed in other fields but has only recently been reported in higher education, in particular in teacher education (Tendero, 2006). There is a small but growing body of literature illuminating numerous learning benefits of pre-service teachers constructing and sharing their digital stories. A common theme in this literature is the facilitation of reflection on experience (e.g. McDrury & Alterio, 2002). These reports typically draw upon the work of Schon (1983), Boud, Keogh and Walker (1985) and others to explain the potential power of digital storytelling for prospective teachers’ development as reflective practitioners.

Digital storytelling can help develop pre-service teachers’ personal and professional identity. According to Tendero (2006), these tasks “efficiently facilitate efforts to capture classroom moments for pre-service teachers to reflect upon and revise practice, as well as to develop a teaching consciousness” (p.175). A key to these benefits may well be the emotional content emphasised in these tasks. In their project using digital storytelling with pre-service teachers, Latham, Reyes and Qi (2006) emphasised benefits such as providing the ‘opportunity to explore and reflect upon one’s own experiences, organize and prioritise events, and make sense of one’s world’.

Digital Stories Integrated with Portfolio Tasks

By linking the two dynamic processes of digital storytelling and portfolio development to promote deep learning, Barrett makes a case for using digital stories in pedagogy (2004). A number of recent papers have flagged this potential of digital storytelling to become a powerful means for facilitating portfolio development (Finger & Russell, 2005; Keller, 2007). Indeed, Barrett and Carney (2005) outline a number of possible reasons for integrating

the two processes, including enhancement of learner motivation, learner ownership and engagement with the portfolio process, emotional connection and promotion of learner's voice: "A portfolio that is truly a story of learning is owned by the learner, structured by the learner, and told in the learner's own voice—literally and rhetorically" (p.2). This study aims to further explore some of these connections, with a particular focus on supporting reflective processes.

Study Methodology

A qualitative methodology was used to uncover pre-service teachers' and their lecturer's experiences with a learning portfolio task incorporating digital storytelling. This approach enabled a comprehensive and descriptive account of the participants' experiences to emerge (Merriam, 1998). An interpretive approach to data analysis was employed, providing insight into how participants made sense of their teaching and learning experiences (Mason, 1996). This methodology is supported by educational technology theorists such as Neuman (1989) and Salomon, Perkins and Globerson (1991) who have advocated more naturalistic studies that provide appropriate data about relevant social and cognitive processes in order to explore the affordances of innovative technologies.

This paper reports on one component of a larger project investigating potential roles of digital storytelling in teacher education. This larger project explores many aspects of their use, particularly with respect to suitable pedagogical approaches, student assessment and ethical and intellectual property issues. This paper focuses on one context studied in the larger project: the use of digital stories in an introductory first year teacher education subject for prospective primary teachers. In particular, this paper focuses on the key question:

How can digital stories be used to support a professional learning portfolio task in teacher education?

Participants in this study were eleven volunteer pre-service primary education students and their lecturer (Pam) from the first year of a Bachelor of Education (Primary) program at an Australian university. There was no background technical skill requirement. Indeed, an initial survey of research participants revealed participants had a range of confidence levels with ICT (5 students were relatively confident, 3 less confident and 3 'neutral'); a range of background knowledge of using digital video editing software (5 students had some experience while 6 were inexperienced) and all students had minimal experience with the digital storytelling genre.

Data included student and staff questionnaire responses, student focus groups, observation, and artefact analysis (the students' digital stories and portfolios). The open-ended questionnaire probed pre-service teachers' views about their experiences and responses informed final focus group interviews. There also were several informal interviews with the lecturer. Students were observed throughout the semester at a range of meetings, including the presentation of their digital stories in class and at the showcase to colleagues and staff. Their portfolios, typically comprising their digital story (movie file) and text-based (usually paper) documents, were collected for examination at the end of the project. This data was analysed according to emerging themes across all data sources and across the collective case. Themes were established that were capable of capturing the experiences of the participants.

Procedures

The study took place during semester one, 2008 with students from a core first year BEd subject: *Professional Experience 1: Beginning Teaching*. Weekly seminar activities, discussion of set readings and regular school visits comprised the main learning experiences in the subject. A major assessment task for this subject was the completion of a professional learning portfolio and students were expected to collect artefacts from their on-campus and field-based learning experiences that showed their developing understanding of the main theme: 'What does it mean to me to be a teacher?' Their portfolios had to be presented in five sections based around the Reflection Cycle: select, describe, analyse, appraise, transform (Robbins, 2004). Most students in the subject were not involved in the study and they presented their portfolio as a conventional paper-based portfolio. However, volunteers in this study were invited to create a *digital story* to capture the 'story of their learning' in this subject and incorporate this narrative into their final portfolio—covering at least the 'select' and 'describe' sections (discussed previously). Participants could withdraw from the project at anytime. Pseudonyms are used in this paper to protect their identity.

The pre-service teachers received support on the portfolio construction process during their normal classes. A crucial session occurred mid-way through the semester where they held 'round table' discussions, exchanging

ideas about their portfolios with peers and their lecturer. They also received several opportunities to meet with academic staff to become familiar with the 'digital storytelling' genre and develop their video production skills. Students were pointed to relevant readings and other web-based resources (e.g. *Centre for Digital Storytelling*), and viewed exemplary models from other educators. Participants received feedback on their scripts and eventually showcased their final productions with staff and peers in their own tutorial class and also in a final 'showcase lunch' with other members of staff. Many chose to display their digital story in the project's online gallery (<http://teacherenarratives.wetpaint.com/>) for viewing by pre-service teacher colleagues in the UK.

Findings

Participants used their digital stories to coherently present their portfolio artefacts in a carefully packaged, visually compelling 'story of their learning'. The digital stories facilitated the early stages of the reflection process: *returning to the experience* and *attending to associated emotions* (Boud et al, 1985). Some students were able to integrate deeper analyses of their experiences and appraisal of their learning into their digital story. Their digital stories later became objects of reflection in their own right, informing subsequent re-evaluations and analyses as evidenced in their text-based portfolio documents and showcase discussions. Relevant survey questions also indicated that students' held positive perceptions of their experiences in terms of this whole portfolio process facilitating reflective processes and clarifying their developing teacher identity. All 11 participants either strongly agreed or agreed with the following statement: 'Building my digital story has helped me to reflect on my notions of 'what it means to be a teacher'; and 10 out of 11 participants either strongly agreed or agreed with the statement: 'Building my digital story helped me to develop my identity as a professional teacher.' Furthermore, there was strong agreement that their digital story enhanced the overall quality of their portfolio. All 11 participants either strongly agreed or agreed with the statement: 'My digital story enhanced the overall quality of my whole portfolio'.

The Digital Stories became a Vehicle for Students to Coherently Present and Justify their Artefacts, Facilitating Recollection and Synthesis of Experiences

Students carefully selected a range of artefacts that were significant to them for their digital stories. These included items from their personal lives (e.g. scanned letters, family photos) relating to the theme of the task ('What it means to be a teacher'), materials from their school visits (e.g. scanned children's work with annotations, reflective notes, feedback sheets, photographs and video from the classroom, audio recordings of interviews) and other university subjects (e.g. notes, drawings). There was general agreement that the personal nature of many of these artefacts – especially images and video captured by the author (rather than from an external source such as *Flickr*) – created an enhanced sense of ownership and authenticity in the final product. For example, Pat mentioned in her interview: "It helped me to visualise my thoughts and ideas and therefore made them somehow more real to me." Likewise for Alice: "Personally I cried when making my story because everything put together, the story, photos and music made the story realistic and dramatic." This extra sense of realism seemed to be a factor in students' ability to 'revisit' their experiences as evoked in their artefacts. "My analysis also came alive through images with which I could connect with." (Mary, survey) Indeed, many students claimed their photographs acted as visual cues when recording their narration. Bianca discussed this issue in their interview. They used visuals first as stimulus for their script, including images of their students' artworks. "[Images of] Artefacts are so personal ... They help you formulate a narrative." (Bianca, interview)

Student teachers were mindful of moulding their artefacts into a fluent, coherent digital story. They wanted to interweave their experiences into a 'whole story of their learning' rather than simply present their artefacts as separate, unrelated segments. For example, Sara mentioned in her survey: "It helped as it was a story – easier to put it all into the flow of a narrative rather than just filling sections of an assignment." Katie also used the notion of a 'journey', describing each of her artefacts as a 'step' in her journey. Although many students reported that 'squeezing' their digital story into 4-6 minutes was a challenging aspect of their portfolio task, they believed the 'economy of detail' required to fit the digital storytelling genre encouraged them to more carefully select suitable artefacts and also be succinct in their descriptions and justifications. Lily mentioned this in her survey: "Building my digital story helped me delve into the value of my artefacts and discuss what's important." Similarly, Pat mentioned: "It helped me to carefully select artefacts that were specifically related to the question because of the time limits. I think I thought a lot more about my artefacts because of the format of a 'narrative'." (Pat, survey)

Hence, the stories facilitated recollection of important events, succinct descriptions of the rich texture of the experiences, synthesis of these learning experiences and justification for inclusion of artefacts in their portfolios.

Students used New Media to create a Compelling Personal Account of their Learning Journey

Students creatively used a range of images, audio and video recordings, often with clever editing techniques, to communicate their digital stories. The ‘personal touch’ engendered by this media allowed students to express their personality and developing identity in creative ways, making their portfolios compelling records of their learning journey. Indeed, in response to the survey question: ‘Building my digital story helped me to clearly articulate my developing identity as a professional teacher’, 9 out of 11 participants either strongly agreed or agreed.

The range of media used by students often enhanced the sense of voice in their portfolios (literally and rhetorically). Students appreciated the opportunity to use their own voice as a key element in their digital stories. Pat said: “The ability of the digital story to give the creator a personal voice was definitely a big part of communicating my developing identity [in my portfolio].” Jane made a similar comment in her interview, stressing the purposeful use of her voice expression and tone:

“How we say something is just as important as what we say, our voices help create the atmosphere, the tone of our voices helps reinforce the message and also emphasises certain parts that we want to get noticed and things we perceive to be important.” (Jane, interview)

Indeed, one student included singing at the start of her story! There was a common view that using their own voice combined with other media made the story more personal. For example, Gina and Lee expressed these opinions:

“I feel that the process of building a digital story helped me immensely to portray my identity by being able to incorporate my own style of music, pictures and general feel on a topic that I feel strongly about ... you could let the piece speak for itself; the pictures and the music helped to express my views about teaching.” (Gina, survey)

“It helped as it allowed me to voice my opinion as to what I hope to achieve and how I want to be perceived from my students, as a teacher, in a personal way. It was much easier to use speech, rather than writing, as it is a personal question (what it means to me to be a teacher) requiring a personal touch.” (Lee, survey)

Some students used multiple voices: supplementing their own voice with others’ voices. Four students used actors’ voices (e.g. voice of a child in Bianca’s story) while Cath changed her voice during the story to enact one of the characters (her father) in her story. Other ‘voices’ came from excerpts from interviews that students conducted during their school visit. For example, Tim presented and then analysed a carefully chosen (audio) excerpt from a recorded interview (his artefact) with his supervising teacher from practicum. Students also took advantage of recordings and sound effects to add to the authenticity of the story. For example, Bianca and Paul used the sound of children’s laughter as background to key sections in their story.

More competent students ventured into using video snippets in their story. Tim made a video-based introduction of himself for the start of his story. Others simply recorded and used their own video segments to add a sense of realism and highlight key moments in the story. For example, Bianca used some video footage from her dance studio where she teaches. For example, towards the end of her story she showed a clip of her students dancing, combined powerfully with her powerful narration and a slow increase in the volume of her music. The net effect was a compelling climax to her story. Paul also used video footage of students at his school playing in the schoolyard to convey a rich context for his story, while Julie used footage from her actual school classroom. Some used video effects. For example, Bianca used the effect of ‘page turning’ as a transition effect to create the effect of telling a story.

After viewing and discussing exemplar digital stories in support sessions, participants were aware of concepts such as ‘flow’ and ‘rhythm’ and ‘tone’ and strived to achieve these qualities to make their stories more compelling: “... It gives you a chance to think about effects, such as pauses in dramatic moments and music to reflect the mood of the story.” (Alex, interview) Helen agreed: “We are able to create tensions by adding blank screens or having pauses in the music, which ultimately creates a more thrilling suspense, this along with voice and pictures only add to the suspense rather than simply reading.” (Helen, interview)

Pam, their lecturer, was also impressed with the students' ability to use new media to communicate their story in a powerful and personal way:

"The power of communicating audio-visually was apparent in the session ... students were able to select images and music, and use their voice, to effectively convey a personal response. They had to consider selection of artefacts suited to this medium and those who selected images thoughtfully could convey a great deal of information/infer connections more powerfully than perhaps could be achieved through a written form." (Pam, lecturer interview)

Students used new media in a range of other ways. Some of these are apparent in examples discussed in subsequent sub-sections.

The Digital Stories Were A Catalyst For Students To Attend To And Communicate Emotions in their Portfolios

Closely aligned to the enhanced personal nature of these accounts were strong emotions communicated through the student teachers' stories. New media (own photos, carefully selected music to set the tone etc.) helped to evoke these emotions and helped students to attend to emotions associated with their artefacts – a key step in the reflection process (Boud et al., 1985). For example, Tara stressed the importance of the emotional aspects of their stories and how this facilitated their analyses:

"The digital story enabled me to put emotion and a personal touch on explaining and exploring why I want to become a teacher ... it enabled me to think on a deeper level about why I was including certain photos, music and text." (Tara, survey)

For some students, this was a cathartic process, allowing them to confront obstructive feelings (Boud et al, 1985). For example, Cath and Gina revisited adverse elements of their own school experiences. Gina explained:

"Unfortunately my schooling experiences were not the best, and so reflecting upon this brought up some not-so-nice emotions. I think that is important to reflect on teaching and learning regardless of whether you have good or bad experiences as this helps you to remember who you are and why you're doing what you're doing." (Gina, survey)

For Paul, this involved confronting the insecurities experienced by a mid-career change to primary teaching. He addressed these feelings at the start of his story, through the power of his voice (and 'on screen' text), by posing a series of probing questions (extracted from his diary): "What kind of teacher will I be? Will I be patient enough? How will I cope with disciplining and controlling a class?" In a similar way, Pat exposed her fears at the start of her movie focusing on her feelings during her first day on practicum. She also posed a series of astute questions (extracted from her diary) before reflecting on them: "How will I do this? How does one learn to become a teacher? How does one learn to be patient? How does one learn to be analytical? inspirational? Creative? Ethical? ..."

The Digital Stories Initiated Students' Re-evaluation of their Experiences

The digital stories provided an opportunity for students to re-examine their experiences as depicted in their artefacts; a chance to find "shape, pattern and meaning in what has been produced" (Boud, 2001, p13). The depth of these re-evaluations varied between Boud, Keogh and Walker's (1985) 'association' and 'integration' stages (or Moon's (2002) level 3 'making meaning' and level 4 'working with meaning'). Deeper analyses and 'transformative statements' were evident in the students' supplementary text-based documents that drew upon their digital stories.

Again, the enhanced level of ownership and emotional investment seemed to be a key influence on this reflective process. For example, Rebecca K mentioned: "I was able to analyse my artefacts to almost a deeper level, because I cared so much more about what they were going into." Indeed, the whole experience had an impact on Cath: "Building my digital story has helped a great deal it made me dig deep to realise my true reason for choosing teaching." One example of this deeper analysis from Cath's digital story was when she showed an artefact from another subject at university: a creative 'self-portrait' drawing (see 02:30 mark [of Cath's video](#)). She went on to 'pull apart' this experience before concluding: "This experience was a moment of clarity for me!" Similarly, Pat reflected on a particular section of her interview with children from her practicum school and centred on their

responses to the question ‘what makes a perfect teacher?’ After analysing the experience, she went on to reflect: “Their answers helped me explain the idea of a perfect teacher and what that means to me. A great teacher is ... There is a lot more to learn than I thought”. These statements, in the context of their story, indicated a certain level of ‘meaning-making’ from these experiences.

In response to the survey statement: ‘Building my digital story helped me to thoughtfully analyse my e-portfolio artefacts’, 10 out of 11 participants either strongly agreed or agreed. Some of the more interesting ‘deeper reflections’ occurred when students placed the spotlight on their own reflective notes from their school visits. For example, Keiko reflected on an extract from her diary to talk about her developing notion of teacher identity (see 02:16 mark [of Keiko’s video](#)). She used a clever ‘echo’ technique with her voice recording to depict her ‘diary voice’. After reading the diary excerpt, she reflected: “To me, these words [from her diary] indicate that teaching is about evolving ... it’s an ever-changing experience that involves growth as a teacher and person”.

For many though, their digital story became an object of reflection in its own right. Most students used supplementary text-based documents to discuss relevant literature and further analyse their evolving understanding of ‘what it means to be a teacher’, in light of their artefacts. In this way, their digital stories became a ‘lens to look through’, sharpening their further meta-analyses and appraisals. For example, Keiko cited exact sections of her video-based story throughout her text-based document, expanding on main points and discussing literature in more detail. Indeed, most students used their digital story in their portfolio in this way—to present and justify their artefacts and use it to initiate some level of re-examination of experiences. They then used supplementary text-based documents for a more detailed analysis informed by relevant literature. However, students who attempted to use their digital story as the whole portfolio—including detailed synthesis of subject readings—generally finished with a disjointed and somewhat less compelling digital story.

The Digital Stories Became An Object for Showcasing and a Focus for Further Dialogue

Participants’ completed digital stories were used as stimulus for further conversations in their normal classes, a showcase lunch for research participants and also in an online gallery. These ‘publishing’ opportunities effectively created further opportunities for reflective dialogue.

As most students had completed a conventional (text-based) portfolio (ie. not including a digital story), they were very enthusiastic to see sample digital stories in their final class of the semester. Their lecturer, Pam, decided to use a few digital stories as stimulus for members of the class to reflect on their own learning journeys during the semester and their exploration of ‘what it means to be a teacher’. After the authors introduced the films to the class, Pam showed the films before mediating a class discussion. Pam recalled this session in her interview: “I think that from listening to the students’ comments during the ‘celebration’ sharing session, the students found that creating the digital story really enhanced their reflection on the question of what it means to them to be a teacher.”

Participants also presented their digital stories to their peers and several Faculty staff at a showcase lunch. They also were encouraged to publish their digital stories on a public website for an intended international audience. This seemed to be motivating for the students and certainly provided a range of opportunities for students to extend reflective dialogue with both staff and peers. Students enjoyed presenting their stories in these sessions and indeed, were aware of a potential audience early in the semester:

“The best aspect was getting to show friends and family what I have been doing at uni, how much I have grown and what it means to me to be a teacher ... Through digital story form as it was much easier to express myself and find out who I am and then portray it to the world.” Cath (survey)

Indeed, it raises the question of audience and their potential influence on students’ artefact selection and how they weave their story of learning. Pam was also curious about the effect of audience and believed that the participants in the study had a different audience in mind than the students completing the conventional portfolio:

“It has made me wonder, however, who they saw as the audience for the task—was it their lecturer, their peers or the community of beginning teachers who might view their digital story online? Or was it a personal creation, with little thought for the audience? I think that the audience was more significant if students chose the digital story than for those completing the conventional assignment, where their lecturer marking the assignment was more clearly the intended audience. I think that this may have impacted upon how they communicated/shaped their identity through their digital story as well.” (Pam, lecturer interview)

Discussion

The findings highlight the efficacy of pre-service teachers using digital stories to support their learning portfolios. Students appreciated being able to use new media to confidently and creatively describe and justify the selection of their artefacts, synthesise their experiences and in some cases thoughtfully analyse their artefacts and re-evaluate experiences. A strong sense of ownership and the personal nature of artefacts heightened emotional responses. In this sense, the digital stories strengthened connections between students' experiences as depicted in their artefacts and reflective activity inherent in the portfolio. The positive findings relating to support of student teachers' reflective processes in one sense are not surprising, given the wealth of positive reports surrounding both portfolios and more recently, digital storytelling in teacher education. However, the findings contribute to the discussion about how digital stories might 'fit' into the learning portfolio process. The most effective portfolios were specific about their artefacts but were able to weave them together, with a sprinkling of their own life histories, to tell a story of their learning about teaching. They avoided too many generalised statements about teaching or making it look like an 'advertisement' for teaching. This was also the impression of the lecturer: "I think that the more effective digital stories explored the personal journey, and responded more personally to the question, rather than providing global generalisations about teaching." (Pam, lecturer interview)

Findings indicate that digital stories can help address the problem of reflection being perceived by students as 'over-used' in portfolios (Wetzel & Strudler, 2006). Students can use new media to initiate reflective processes in compelling ways and the concise nature of digital stories means that reflections are typically succinct and certainly not repetitive. Furthermore, the digital story itself becomes an interesting object of reflection for further detailed analyses and appraisals. Indeed, this study found that trying to combine detailed syntheses of literature themes in the actual digital story made it disjointed and incoherent. Supplementary text-based or separate electronic documents are recommended, drawing upon artefacts and experiences with links to specific parts of the digital story. A suggested future research direction is to investigate the affordances of 'deep tagging' of video and other media (Johnson, Levine & Smith, 2008) and annotated video and how these capabilities might assist portfolio authors making explicit, seamless links from their supplementary portfolio documents to exact points and specific frames of their digital stories.

The digital stories in this study became " 'things to think with', constructed objects which foster dialogue and discussion" (Freidus & Hlubinka, 2002, p.24) There were opportunities for peer critique (Jenkins and Lonsdale, 2007) and student-lecturer dialogue. These discussions involved both formative feedback (e.g. on the script and pilot versions of digital stories) and summative feedback (e.g. the showcase day). They often emphasised the fundamental importance of the 'teacher as listener' role (Russell, 2005) in reflective dialogue. Like any teaching role, expertise is needed in mediating these experiences, as depicted by Pam's expert level of questioning and prompting in the final class sessions. An exciting development here is the use of online galleries and 'digital story' communities (e.g. see Ugoretz & Theilheimer, 2006) to promote reflective online interactions. McKillop (2005) discusses interesting extensions and 'ways forward' here. Firstly, the notion of 'responding' to a digital story in story mode: "responding to stories with a similar story is a most common way to respond" (p.6). Indeed, this is easily facilitated in video-based galleries such as *YouTube*, where people can make video-based 'responses' to published videos. Secondly, he suggests students making a final 'what I learnt' overall response where they think about what they have learned from the initial story *and* from responses to it. This could easily be done in online galleries using facilities such as the Discussion forum in *WetPaint*. Students need to take ownership of this type of gallery to empower them and provide them with a collective voice (McKillop, 2005) Further research is needed to investigate fruitful links between digital stories, portfolios and reflective online dialogue in these web-based communities. For group portfolios, these galleries might contain a sense of 'metastory'—a story of the collected stories (of the group) with connected emerging themes.

The problems of time and skill level required for these types of tasks (e.g. Hartman, 2004) needs attention. Although participants in this study received plenty of technical support, 5 out of the 11 students still found the whole process technically challenging (as ascertained from their survey) and many talked about the time-consuming nature of the task. Such problems will hopefully diminish over time as new media software and portfolio development software becomes easier to use. Meanwhile, further strategies for mentoring and supporting students need development.

The study indirectly speaks to the debate on finding a balance between conformity and freedom of design in portfolios (Carney, 2004). While many universities go down the path of 'templates' and specific commercial portfolio software, the inclusion of digital stories requires a more emancipative approach to e-portfolio design. If digital stories are to become an integral part of portfolios, they need to remain 'open-ended' and free from software

constraints. Indeed, the software used in this study to make the digital stories (*iMovie* and *Windows Movie Maker*) is either free or relatively cheap and accessible to teachers after graduation (unlike some portfolio software). Investigations into group portfolios should also explore the use of collaborative online editing software such as *Jumpcut*.

Although assessment issues did not emerge as a major theme from the data relevant to this paper, it must be mentioned that some students were challenged at times between meeting the assignment criteria and producing a creative digital story. For example, Paul found it hard “to manage the dual goal of artistic reflection and inclusion of course requirements”. However, he concluded, “It can be done to a large degree with a fair amount of thought and creativity.” Catering for and encouraging creativity in these tasks needs further exploration. Furthermore, there is a well-documented tension between assessment and reflection (e.g. discussed by Boud (2001) in relation to journals) and this tension extends to portfolio assessment. For example, students will usually be interested in portraying themselves in the best light possible and may disguise weaknesses (hardly encouraging open and honest reflections). A related issue is the issue of audience. The perceived audience will influence students’ choice of artefacts and to some extent, that seemed to be the case with students in this study who wanted to publish their digital stories in the web-based gallery. To what extent does this notion of audience shape and direct the students’ choice and quality of analysis of artefacts? Does this type of issue affect students immersed in a digital culture who are already comfortable publishing personal content in ‘web 2’ spaces? Should students make two portfolios: one confidential and one censored and shaped for a more ‘public’ audience? Further investigations are needed to explore solutions to these important issues.

Conclusion

Research into pre-service teachers’ use of digital stories integrated with portfolio tasks is a crucial but underdeveloped area of research into teacher learning. This study informs the ongoing discussion on portfolios in teacher education by exploring fruitful links between new media and portfolio processes. Incorporating digital storytelling into learning portfolios can facilitate a new capacity for student teacher reflection, innovation and professional empowerment.

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