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<td><strong>Author(s)</strong></td>
<td>Thompson Long, Bonnie</td>
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<td><strong>Publication Date</strong></td>
<td>2014-03-03</td>
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Designing Digital Storytelling: Creative Technology for Reflection in Initial Teacher Education

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A thesis submitted March, 2014, to the School of Education, National University of Ireland, Galway, for the degree of Doctor of Philosophy
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## List of Acronyms and Abbreviations

- Center [sic] for Digital Storytelling .............................................. CDS
- Critical Incident ........................................................................ CI
- Design Based Research ......................................................... DBR
- Digital Storytelling ............................................................... DST
- Education Technology ............................................................. Ed Tech
- Information Communication Technologies ......................... ICT
- Initial Teacher Education ....................................................... ITE
- Professional Diploma in Education ......................................... PDE
- Postgraduate Diploma in Education ......................................... PGDE
- Professional Master of Education .......................................... PME
- Windows Movie Maker .......................................................... WMM
Declaration

I declare that the work presented in this thesis is, to the best of my knowledge and belief, original and my own work, except as otherwise acknowledged in the text. The material has not been submitted, either in whole or part, for a degree at this or any other university.

___________________________________
Bonnie Thompson Long
March, 2014
Abstract

Reflection represents a foundational, core developmental activity in teacher professional education. Reflection can, however, prove challenging, and even problematic, particularly for novice, pre-service teachers (Calderhead, 1989; Hatton & Smith, 1995; Korthagen, 2001a; MacLeod & Cowieson, 2001; Moon, 1999).

Narrative and technology potentially afford possibilities to render reflection more engaging and interactive (Barrett, 2005c).

Employing design-based research (DBR) methodology, the research reported in this thesis set out to explore whether and how digital storytelling - as a potential synergy of narrative and technology - could be designed and deployed to enhance reflection in initial teacher education.

Positioned in the context of similar developments and innovations internationally, this research is inspired by, and builds on the extant international research in the field of digital storytelling.

Following a DBR process, the research utilised a theoretically-informed design framework: R-NEST, to explore systematically the development of a digital storytelling intervention with 308 pre-service teachers. The intervention, in three major design cycles, was undertaken on a longitudinal basis, over a period of four years.

The intervention was evaluated using a range of products from the design process, including the pre-service teachers' completed digital stories, their ‘working portfolios’, online discussion boards, a post digital storytelling questionnaire and qualitative feedback. The data derived from these evaluations are the subject of critical analysis, informed by the R-NEST design model.

The contribution of the thesis to the understanding of digital storytelling as a technology-enhanced reflective process for pre-service teachers is significant and threefold.
Firstly, the research establishes systematically the potential of DST as a technology-enhanced reflective process for supporting and augmenting reflection in ITE.

Secondly, through the detailed articulation of a longitudinal and repeatable DBR process, the thesis demonstrates practically how a digital storytelling intervention was designed and developed to enhance reflection in an ITE program.

Thirdly, the thesis contributes to advancing design research, producing a design model: R-NEST, which can be adapted and adopted by other design researchers, educators and education technologists, in designing DST to enhance pre-service teachers' professional practice learning. Although beyond the immediate scope of this thesis, this robust R-NEST design model could be adapted to support the design of technology to enhance professional learning in other disciplines.
Acknowledgements

Firstly, I would like to thank my supervisor, Dr. Tony Hall, for his guidance, support and friendship over the last several years. You were colleague and friend before you became my academic supervisor. Thank you for being able to take on the role of supervisor and provide the guidance and expertise needed, while at the same time continuing to provide the support of a colleague and friend.

I would also like to thank my examiners, external examiner Dr. Charlotte Holland, School of Education Studies, Dublin City University, and internal examiner, Dr. Sharon Flynn, Centre for Excellence in Learning and Teaching (CELT), National University of Ireland, Galway, for an intellectually stimulating viva voce and for their help and guidance in refining the thesis.

Thanks are due to my graduate research committee members for their support with the research process over the last four years: Dr. Kevin Davison, Dr. Fiona Concannon, Dr. Manuela Heinz and Dr. Veronica McCauley. Your willingness to listen to the musings and questions of a fledgling researcher, and the expertise you provided in return, are very much appreciated. Special thanks as well to Dr. Mary Fleming, who was always available to give advice, assistance and support in the research process.

To my dear friend Maria Silke, Ed Tech teammate extraordinaire, thank you for your input and feedback on the digital storytelling implementations, your teaching expertise, and for your faith in my ability to effectively design a DST program for our students. Your friendship and support have given me immeasurable strength and confidence throughout this research process.

A big thank you goes out to the international digital storytelling community, many of whom I have had the pleasure of meeting and befriending through my work with digital storytelling. Darcy Alexandra, Grete Jamissen, Kristin Holte Haug, Alex Henry, Natasha Friedus, Pip Hardy, Daniela Gachago and Fa Jamfries. Your support and constructive feedback at conferences and through email correspondence has deepened my understanding of my own
research into digital storytelling in many ways. And I always look forward to the lively discussions over food and wine at the conference dinners!

A special thank you goes to Joe Lambert, for giving the world digital storytelling in the first place, and for your openness and accessibility both at digital storytelling events and through the Center for Digital Storytelling. To the CDS staff, thank you for your enthusiastic support for educators and their attempts to implement digital storytelling with diverse groups of students. The educators’ workshop I attended at the CDS in the summer of 2010 is still one of the highlights of my digital storytelling research journey.

I want to thank the 308 students who willingly participated in the DST research during the course of this study, and who shared their experiences of the DST process with me. Without your feedback and suggestions, the refinement of the DST process would not have been possible. The digital stories you created have been both captivating and moving, sometimes heart breaking. Thank you for sharing the highs and lows of your initial experiences in the teaching profession with your fellow students and your teachers.

Special thanks go out to my good friend Kate, a fellow ‘mature student’, who has shared with me the trials and tribulations of trying to manage family, work and academic pursuits these last few years. She has recently begun her own PhD journey. Kate, you’ve been there for me every step of the way. I only hope I can provide you with the love, support and friendship you have given me. Thanks sweetie!

To my amazing children, Emmet, Aidan and Katie, you mean everything to me! Thank you for being so understanding when Mom was busy these past few years. I can’t wait to spend some serious quality time with you guys! Emmet, your support at home this summer was amazing, and so very much appreciated. I couldn’t have done this without you!

Finally, to my parents, Don and Phyllis Thompson, thank you. Your lifelong belief in the power of education and continued support for my
academic endeavours has given me the courage to go farther than I ever
dreamed I would.
“The sources of educational science are any portions of ascertained knowledge that enter into the heart, head and hands of educators, and which, by entering in, render the performance of the educational function more enlightened, more humane, more truly educational than it was before” (Dewey, 1929, p. 39).
For Emmet, Aidan and Katie
Chapter 1: Introduction to the Research

Overall, I think this assignment accomplished its aims. It got me to reflect in greater depth about a certain incident, it got me to think about what my beliefs were prior to the event, how I reacted to the incident and how I’ve come to a resolution. It got me to actually relate what I do in the classroom to the theory that we received in the lecture hall. I compared the theoretical best practice to my practice and compared and contrasted and identified where I can improve or change in future (2010-2011 Student 49).

1.1 Chapter introduction

This opening chapter of the thesis describes the background to the research and the rationale for undertaking it. It firstly outlines reflection in teacher education, the importance to the profession of equipping pre-service teachers with the reflective skills they need to reflect on their own practice, both as novice teachers and into their professional careers, and the challenges that teaching student teachers to reflect can entail. The chapter subsequently introduces novel approaches to representations of reflection, including the use of storytelling for reflection, which leads to the consideration of the possibilities afforded by digital storytelling as a technology enhanced learning process for pre-service teachers.

The chapter concludes with a summary of the thesis structure, and how the research narrative is designed to answer the thesis’ principal research question - how can digital storytelling be designed to enhance reflective practice in initial teacher education?

1.2 Reflection in teacher education

The reflective practitioner model has long been seen as the appropriate model for the professional development of teachers (Conway, Murphy, Rath, & Hall, 2009; MacLeod & Cowieson, 2001; Sutherland, 1997; The Teaching Council, 2011b; 2012) It is a mandatory competency component in many teacher education programmes internationally, and constitutes a dominant education paradigm (Collin, Karsenti, & Komis, 2013). Prospective and practicing teachers are encouraged to become “reflective practitioners” (Schön, 1983, 1987), professionals who learn both from experience and about experience. Initial teacher education (ITE) programmes are encouraged to equip pre-service teachers with the reflective
skills they need to reflect on their own practice, both as novice teachers and into their professional careers. “Initial teacher education must not only provide sound basic training in subject-matter knowledge, pedagogy related to subjects, and general pedagogical knowledge; it also needs to develop the skills for reflective practice and research on the job” (Organisation for Economic Co-operation and Development, 2005, p. 95).

Nationally, The Code of Professional Conduct for Teachers in Ireland (The Teaching Council, 2012) expressly calls for teachers to reflect critically on their practice. It states that teachers should “…inform their professional judgement and practice by engaging with, and reflecting on, pupil/student development, learning theory, pedagogy, curriculum development, ethical practice, educational policy and legislation...” (p. 7), as well as “…take personal responsibility for sustaining and improving the quality of their professional practice by…reflecting on and critically evaluating their professional practice, in light of their professional knowledge base...” (p. 8). The Council encourage initial teacher education programmes to provide for “…the meaningful initiation of the development of teachers as reflective, enquiry-oriented, life-long learners” (p. 9). They state it is “…essential to prepare teachers to continually self-evaluate, collaborate and adapt throughout their careers to reflect the changing realities of the classrooms in which they will teach” (p. 9).

1.2.1 Importance of reflective practice

…reflection in the field of education carries the connotation of deliberation, of making choices, of coming to decisions about alternative courses of action (van Manen, 1991, p. 98).

Zeichner and Liston (Zeichner & Liston, 1996), state that John Dewey was one of the first educational theorists in the United States to view teachers as reflective practitioners. Dewey (1933) holds that reflection

…emancipates us from merely impulsive and merely routine activity…It enables us to act in deliberate and intentional fashion to attain future objects or to come into command of what is now distant and lacking. By putting the consequences of different ways and lines of action before the mind, it enables us to know what we are about when we act. It converts action that is merely appetitive, blind, and impulsive into intelligent action (Dewey, 1933, p. 17).
Reflection and reflective practice are centrally important in professions such as teaching, nursing and social work, ostensibly because the subject matter of these professions is “…interpretive and not rooted in fact to the same extent that scientific disciplines are. The methods used in nursing and teaching, for example, involve review, interpretation and reconstruction of ideas and reflection is involved in these processes” (Moon, 1999, p. 55).

1.2.2 What is reflective practice?

Reflective practice emphasizes the use of reflection in professional or other complex activities as a means of coping with situations that are ill-structured and/or unpredictable (Moon, 2004, p. 80).

As will presently be discussed in Chapter 2, the term reflective practice was first coined by Donald Schön (1983; 1987). A significant amount of literature on the topic has been written since then, and one of the first things most writers on the topic state is the difficulty of defining reflective practice due to the many and varied definitions of the term itself, as well as the varying ways it is implemented in practice (Brookfield, 1995; Calderhead, 1989; Moon, 1999).

Schön (1987) sees reflective practice as a “…dialogue of thinking and doing through which I become…more skilful…” (p. 31). Kinsella (2009) describes Schön’s view of reflective practice as “…a critical assessment of one’s own behaviour as a means towards developing one’s own abilities in the workplace, and as a dialectical process in which thought and action are integrally linked” (p. 7).

Based on Kinsella’s (2009) definition, this thesis understands reflective practice to be the capacity of teachers to assess critically their own behaviour as a means towards developing their abilities in practice, and as a dialectical process in which thought and action are integrally linked.

1.2.3 Teachers as reflective practitioners

If a teacher never questions the goals and the values that guide his or her work, the context in which he or she teaches, or never examines his or her assumptions, then it is our belief that this individual is not engaged in reflective teaching (Zeichner & Liston, 1996, p. 1).
Teaching is a complex and highly skilled activity which requires classroom teachers to exercise judgement in deciding how to act (Pollard, 2008). Reflecting on practice allows teachers to understand what is happening in their classrooms, to improve their practice in some way, and to enlighten and empower themselves to make wise and principled decisions (Ghaye & Ghaye, 1998). Prospective and practicing teachers need to reflect on their practices in order to understand the goals and values that guide their work, the context in which they teach, and to examine their own assumptions about teaching (Zeichner & Liston, 1996). This can lead to teachers who are more than just ‘technicians’ (Zeichner & Liston, 1996, p. 3) but who meet and respond to problems holistically, with intuition, emotion and passion (Dewey, 1933).

1.2.4 Teaching student teachers to reflect

Some arguments in favour of teaching student professionals to reflect are the early formation of the habit of reflecting on practice, the development of the ability of students to be critical of their experiences of training, and the improvement of their use of reflection-in-action (Moon, 1999). There are some who query the inculcation of reflective practice in students, warning that as students, they do not yet have the body of knowledge and experience necessary for professional reflection (Hatton & Smith, 1995; Moon, 1999). However, Hatton and Smith point out that “…reflection is unlikely to develop as a professional perspective in today’s busy and demanding world of teachers’ work, and techniques fostering a reflective approach need to be provided during initial preparation” (1995, p. 38).

Korthagen and Wubbels (2001b) feel that it is important to promote the use of reflection in teacher education in these times of seemingly rapid social, technological and scientific changes as, “…it is impossible to prepare prospective teachers for each and every type of situation they may be confronted with during their careers…” (2001b, p. 47). They feel student teachers should develop an attitude of willingness to learn from their experiences in changing circumstances. “If teachers acquire this attitude and also the necessary skills to learn from their own experiences by means of
reflection, they possess a so-called growth competence: the ability to continue to develop when the preparation program is over” (2001b, p. 47). In this way, teacher preparation programmes can develop both a starting competence in student teachers, by teaching them the technical skills necessary for teaching, but also a growth competence, so they can continue to use reflection to learn from their experiences as teachers.

1.2.5 The challenges of reflective practice in teacher education

There are several challenges to the use of reflection and reflective practice in teacher education. These include: differing definitions of the term(s) used (Hatton & Smith, 1995; Korthagen, 2001b; Moon, 1999); the ideological goals of the teacher education programme in respect of the use of reflection (Calderhead, 1989; Hatton & Smith, 1995; Korthagen & Wubbels, 2001b); lack of depth in student representations of reflection (Calderhead, 1989; MacLeod & Cowieson, 2001; Moon, 1999; 2004); and barriers to reflection, such as cultural attitudes towards reflection, interdisciplinary issues, lack of motivation or misconceptions of the goals of the reflective activity set for the students (Moon, 1999).

1.2.5.1 Lack of student understanding

Jay and Johnson (2002) discuss the difficulties students can have in understanding the concept of reflection itself, noting that reflection is a complex concept to define and to teach. They feel that the complexity of the concept of reflection can be difficult to articulate in a way that helps pre-service teachers learn the skill of reflecting, and argue that it can be hard to find the balance between “…being so specific in describing the process of reflection that it becomes constrained and systematised…” (p. 74) and explaining it in a way that novices can understand what is expected of them.

1.2.5.2 Lack of student engagement in the reflective process

Other difficulties lie in the students’ lack of engagement in the process of reflection, due to various reasons such as cultural barriers to the idea of reflection, or interdisciplinary issues; some educational backgrounds do not use representations of reflection (i.e. Science) so reflection may be difficult
for students from some subjects whose discourses do not require reflective activity ‘on paper’ (Moon, 1999).

Calderhead (1989) proposes a number of reasons for student teachers’ inability to reflect on their practice, such as:

- Absorption in the skills of teaching to the point that they have little time to reflect on how the lesson is actually going;

- High levels of ‘ego involvement’ - a reluctance to be “…self-critical and dwell on their weaknesses at a time when their confidence may well be under threat” (p. 46).

- A lack of analytical skills to examine their own practice (such as a lack of a language for talking about teaching, not understanding comments supervisors make on their performance, or a lack of knowledge of a repertoire of alternative teaching approaches.)

Student orientations to a reflective way of learning can also be a barrier. Korthagen (1985) identified two distinctive student orientations during research on a Mathematics programme in the Netherlands. He found that students differed in their appreciation of a reflective way of learning (Korthagen & Wubbels, 2001a). These orientations were identified as internally oriented, which the researchers used to describe the reflective students, and externally oriented, which they used to describe the non-reflective students. Internally oriented students wanted to use their own knowledge and values to structure problems and experiences themselves. Externally oriented student teachers asked “…for guidelines and structuring from outside (e.g., from the teacher educators)” (Korthagen & Wubbels, 2001a, p. 97). Korthagen and Wubbels (2001a) warn that “One danger in a teacher education programme based on the goal of promoting reflection is that it is most beneficial to those who are already fairly reflective (internally oriented)…” (p. 99).
1.2.5.3 Lack of depth in representations of reflection

One of the often cited difficulties with getting students to reflect is the lack of depth of reflection seen in student teachers’ representations of their reflections, through writing or other means (Calderhead, 1989; MacLeod & Cowieson, 2001; Moon, 1999; 2004). Deep reflection is often difficult for most pre-service teachers (Lathem, Reyes, & Qi, 2006), and can be seen by them as a compulsory element that has to be tackled to satisfy course requirements, instead of something that leads to empowerment and engagement in their own development (MacLeod & Cowieson, 2001).

1.3 Alternative approaches to representations of reflection

Most reflective assignments required of student teachers are written assignments (Moon, 1999). However, this might not be the best way for students to evidence their reflection (Kajder & Parkes, 2012).

1.3.1 Storytelling and reflection

“Our motivation for telling stories is to wrest meaning from experiences” (Barrett, 2005c, p. 21).

Storytelling can be used to enhance reflection (McDrury & Alterio, 2002; Moon, 2004; Moon & Fowler, 2008; Schön, 1988). Schön argues that

… storytelling is the mode of description best suited to transformation in new situations of action…. Stories are products of reflection, but we do not usually hold onto them long enough to make them objects of reflection in their own right…. When we get into the habit of recording our stories, we can look at them again, attending to the meanings we have built into them and attending, as well, to our strategies of narrative description (Schön, 1988, p. 29).

Barrett (2005c) states that stories “…are a fundamental method of personal growth through reflection, which is preparation for the future, and deliberation of past considerations” (p. 21, emphasis in original). She suggests the use of strategies that help the learner tell the story of their own learning. She states that, “With the addition of multimedia technologies, these stories can be captured, in either audio or video formats” (p. 21). Some of the multimedia technologies she suggests are “…blogs, reflective journals, online discussions, self-report surveys and digital storytelling” (p. 22).
1.3.2 Technology as a writing tool

Digital technologies provide an increasing range of resources for meaning-making and as such change what it means to ‘read’ and ‘write’ in a culture (Futurelab, 2010, p. 14).

Electronic reflection is relatively commonplace in teacher education programmes (Shoffner, 2009). Most programmes that use technology for reflection use it as a ‘writing tool’. Research in this area has included the use of email as a format for reflective journals with pre-service teachers (Spalding & Wilson, 2002), and the use of different technology tools for use with pre-service teachers for a reflective journal assignment: individual weblogs (blogs), personal webpages, direct email to the professor, and electronic submission of a Microsoft Word document via email (Shoffner, 2009). Others have used various forms of electronic media to support student teachers’ reflective writing: electronic journaling and electronic concept mapping (Germann, Young-Soo, & Patton, 2001) computer conferencing (Harrington & Hathaway, 1994) online reflective prompts (Koszalka, Grabowski, & McCarthy, 2003), computer-based scaffolds for journal writing (Lai & Calandra, 2010), and electronic portfolios, online discussions, and videotaping teaching (Romano & Schwartz, 2005).

Some teacher educators have investigated the use of multimodal methods to support student teacher’s reflective writing. Kajder and Parkes (2012) investigated the use of Web 2.0 technologies, such as blogs and ‘vlogs’ (video logs), for their student teachers’ reflective writing assignments. They felt that web-based tools such as blogs and vlogs could provide a multimodal writing environment that would allow the writer to convey and discover “…meaning through print text paired with video, image, sound, and other expressive modes” (p. 229). They hold that teacher education programmes should prepare teacher candidates “…not only to work within the dominant media forms present in today’s schools (largely print-centric), but also to integrate, use, and critically consider digital tools which are multimodal” (Kajder & Parkes, 2012, p. 230). They found that the blog lent itself more to “…written, revised, and largely hyperlinked…” entries that led to more surface level reflection, whereas the vlog entries tended toward


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“conversational, stream of consciousness” entries that led to more pedagogical reflection (p. 243).

1.3.3 Digital Storytelling: novel possibilities for reflective practice and technology in education?

Another form of multimodal digital tool that could be used to enhance pre-service teachers’ reflection on practice, by taking them beyond the print-centric written reflection common in pre-service teacher education (Kajder & Parkes, 2012) is digital storytelling (Barrett, 2005a). Providing students with an alternative means of reflecting on practice which includes the use of multimedia elements in addition to written reflection, could lead to a deeper engagement in the process of reflection, and therefore, result in a deeper representation of reflection.

Digital storytelling is being used in education to enhance reflection (Barrett, 2006), build literacy skills (Banaszewski, 2005) and promote 21st century skills (Jakes, 2007). It has been suggested that creating a digital story can enhance teachers’ reflection on practice (Kearney, 2009), improve their technology skills, and increase their technology self-efficacy (Heo, 2009).

1.3.4 What is a digital story?

Digital Storytelling is the modern expression of the ancient art of storytelling. Digital stories derive their power by weaving images, music, narrative and voice together, thereby giving deep dimension and vivid color to characters, situations, experiences, and insights (Leslie Rule, Digital Storytelling Association, cited in Barrett, 2005a, p. 1).

A digital story is a short, 3-5 minute video, produced by someone who is not a media professional, and is usually constructed as a thought piece on a personal experience (Matthews-DeNatale, 2008). The creation of the digital story includes incorporating multimedia components such as still images, music, video and a narration, which is usually the author’s own voice (Dogan & Robin, 2008). While the digital story is created using digital technologies, the story itself is the most important element in the digital storytelling process (Lambert, 2009; Matthews-DeNatale, 2008).

Screen shots and the voiceover from sections of a digital story, taken from the pilot project of this study, have been provided in Table 1.1 below. In the
example, one of the research participants tells the story of what she has learned over the course of her year as a student teacher. While this example does not portray the full effect of the digital story, which includes the voiceover recorded in the author’s own voice, transitions between images, effects on some images, and a musical background, it can give the reader an idea of the format of a digital story, especially the use of still images and text in the story. The full digital story lasts just over three minutes. (This story, in its digital format, as well as several other digital stories created by the research participants over the three years of this study, is available on a DVD included at the end of this thesis.)

Table 1.1: Example digital story, “My Educational Journey”

<table>
<thead>
<tr>
<th>Beginning of the story:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My Educational Journey</td>
<td>2. I have learned so much on the PGDE this year. Here is my story so far.</td>
</tr>
<tr>
<td>3. Teaching has always been a dream of mine.</td>
<td>4. Lasting impressions left on me by teachers who inspired me…</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Middle:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>14. During my teaching practice,</td>
<td>15. I experienced a variety of emotions.</td>
</tr>
<tr>
<td>16. Gradually, I started to feel as though teaching was not for me!</td>
<td>17. It did not seem so enchanting now…</td>
</tr>
</tbody>
</table>
11

(2009-2010 Student 1, digital story script, used with permission)

1.3.5 The ‘Center for Digital Storytelling’ model

Definitions of digital storytelling abound in the literature and on the Internet, where the use of digital tools to communicate some sort of story is labelled ‘digital storytelling’. This study, however, is based on the type of digital storytelling designed and promoted by the Center for Digital Storytelling (CDS) in Berkeley, California. Over the years, the CDS has developed guidelines for the production of digital stories. Their website, (www.storycenter.org) and books (Lambert, 2009; 2010) have proved an invaluable resource for educators attempting to implement digital storytelling in their classrooms. The CDS process for creating digital stories will be explained in detail in Chapter 3.

1.4 Biographical motivation

The professional interests and development of this researcher have had a significant impact on how and why this study was undertaken. Originally a Maths, Science and Technology middle school teacher in southern California in the early 1990s, the researcher was inspired as a young teacher by the constructivist and learner centred teaching philosophies and methods encouraged in her school district. She later became a technology mentor teacher and eventually the head of the Maths and Science department in her school, where she was responsible for training new teachers in her department. In the late 1990s, she moved to Ireland with her Irish spouse and young family.
Chapter 1: Introduction to the Research

The researcher has been an educational technologist in the School of Education, formerly Department of Education, NUI Galway, since September, 2000. In addition to her main role as an education technologist, over the years, her responsibilities on the programme have grown to include the roles of teaching practice supervisor, microteaching tutor and reflective practice tutor. During her experiences as a reflective practice tutor, where support was provided to small groups of students to facilitate their understanding of reflective practice, she became interested in students’ reactions to the reflective assignments. She experienced first-hand students’ reluctance to engage in reflection, as described by MacLeod and Cowieson (2001) above. During reflective practice tutorials over the years, several students expressed the feeling that this ‘reflection thing’ was just one more assignment heaped upon them during the course, and something that they felt they had to ‘get done.’ During one reflective practice tutorial toward the end of the 2008-2009 academic year, one student slammed his hand down on the table and stated loudly, if a little in jest, “If you ask me to reflect on one more thing this year, I’m going to scream!” Coupled with her role as an education technologist, the researcher began to wonder if there could not be a more engaging way to encourage students to reflect on their practice. Furthermore, the question arose for the researcher, ‘could educational technology help with this engagement?’

While researching the possible implementation of a digital portfolio for the educational technology (Ed Tech) module within NUI Galway’s Postgraduate Diploma in Education (now Professional Diploma in Education), initial teacher education programme several years ago, the researcher came across Helen Barrett’s website and articles on digital portfolios (See Barrett, 2005a; 2005b; 2005c; 2006). Within these, Barrett advocated digital storytelling as a way to enhance reflection for students as part of their digital portfolios. This sparked the researcher’s interest in the possibility of using digital storytelling to enhance and promote student reflection, while at the same time providing students with technology skills that they would be able to incorporate into their teaching practice. This in turn led to initial plans to develop a digital storytelling unit within the
education technology module, underpinned and informed by a detailed, systematic doctoral study of the design of DST for reflection in initial teacher education.

1.5 Research questions

This research addresses four interrelated research questions: one principal question and three subsidiary, or supporting questions. The overall goal or primary question is: how can digital storytelling be designed to enhance reflective practice in initial teacher education?

The first ancillary question, which helps to answer this primary question, has two parts: (a) does digital storytelling create new, engaging and creative possibilities for pre-service teachers to reflect on practice? And (b) if so: what are these new, engaging and creative possibilities? Secondly, the thesis endeavours to determine the characteristics of a successful digital storytelling design for the enhancement of reflection on practice. Finally, the thesis aims to clarify and identify the design informants and resources, which need to be consulted in order to create an effective technology-enhanced reflective process based on digital storytelling.

1.6 Research narrative

The structure of the thesis narrative is designed to represent how the research evolved over the course of four years. This first chapter outlines the research rationale, including the research questions, and the biographical motivation of the researcher. As the principal focus of the research was to explore how technology, specifically digital storytelling (DST) might be designed and deployed to enhance pre-service teachers’ reflective capabilities, chapter two examines in detail the provenance and development of the concept 'reflection'; and the emergence of reflection as a key developmental activity in teacher education. Importantly, this second chapter helps to define the parameters and scope of the research, particularly through identifying elements of reflection that the designed DST intervention would need to support.
Chapter 3, the review of literature, investigates the extant, relevant research in the area; this is done through a comprehensive and thorough examination of what other educators and researchers have found in designing computing to enhance pre-service teachers’ reflection. The review of literature also helps to provide ideas for what a successful computer-augmented intervention might entail, and also for the methodological approach one might adopt, in order to design successfully digital storytelling to enhance the reflective capacity of novice teachers.

Following on from, and informed by the methodological requirements identified through the review of literature, and the conceptual consideration of reflection in Chapter 2, Chapter 4 describes the methodological approach adopted in this research. The paradigm that is used, design-based research (DBR) aims: "to bring together practice and theory in creating effective design solutions while also advancing scientific knowledge in relation to the design of interactive educational artefacts and environments (Barab & Squire, 2004)” (Hall, 2004, p. 8).

As will be presently discussed in Chapter 4, while DBR emphasises educational/learning design through prototyping and experimentation, theory is a crucial foundation of the paradigm. Furthermore, what is paramount in DBR is a reflexive relationship between practice and theory. DBR aims to achieve this reciprocal dynamic between practice and theory through the iterative implementation and evaluation of an emergent, prototype design model, which is informed and inspired by theory while concurrently instantiated and trialled in practice.

Consequently, having outlined the rationale for DBR as the research methodology in Chapter 4, Chapter 5 articulates the theoretical framework and design themes that guided the thesis’ empirical, iterative implementation work. Chapter 5 also introduces the prototype design model: R-NEST, which would frame and inform the cyclical and iterative design, evaluation and development of the DST intervention. As will be discussed, R-NEST encompassed five main design concerns or themes: reflection, narrative, engagement, sociality and technology. R-
NEST was predicated on a synthesis of the issues emerging from the conceptual analysis of reflection, undertaken in Chapter 2; the comprehensive review of the extant research literature, outlined in Chapter 3; and the exposition of relevant educational concepts and theory, in Chapter 5.

Chapters 6, 7 and 8 describe the practical implementation of the research, and the design process that was undertaken to develop iteratively and systematically, DST to enhance pre-service teachers' reflection on their practice learning. As outlined in Chapters 6, 7 and 8, the three iterative implementation cycles provided both a context for analysing, and also helped to illustrate how DST could be designed to enhance novice teachers’ capacity for critical reflection.

It is important to note that the practical aspects of this thesis were part of the teaching and learning within initially the Postgraduate Diploma in Education (PGDE), now the Professional Diploma in Education (PDE), which is a graduate (consecutive) professionalization programme for teachers at post-primary level in Ireland.

From September 2014, the PDE will be a master level programme, the Professional Master of Education (PME) and reflection looks like it will become an even more important constituent of this new, re-conceptualised and reconstituted, two-year, full-time professional master degree (School of Education NUI Galway, 2012).

In Appendix 1, a brief description of the PGDE/PDE programme designs and structures are provided in order to clarify the relationship between the PGDE/PDE teacher education programmes and the work presented in this thesis. Appendix 2 outlines the proposed aims and structure of the PME for 2014-2016.

The focus of this research was whether and how DST could be designed to enhance reflection in initial teacher education. Chapter 9 describes the findings of the research. This section of the thesis summarises how the R-NEST prototype design model, which directly informed the process of
creating the computer-supported reflective process, contributed to the enhancement of the pre-service teachers’ capacity for reflection on their practice learning.

The articulation of a rigorous design process, culminating in the conclusions summarised in Chapter 9, is a principal contribution of this research. It helps to corroborate, and establish the robustness of R-NEST, and its formative impact – over the three design cycles – on the design of DST to enhance reflection in initial teacher education. Prior to the iterative development of R-NEST, there existed no adaptable and adoptable design model, which design researchers and educational technologists could use to assist them in systematically developing technology to enhance pre-service teachers’ reflection on their practice learning. In fact, as will be presently discussed in the literature review (Chapter 3), only very limited systematic design research had previously been undertaken in relation to technology for reflection in initial teacher education.

Having outlined how the research questions have been answered through the thesis, and iterative development of the R-NEST design model, Chapter 9 concludes the monograph with recommendations for future research. The overall, general structure and development of the research narrative are illustrated overleaf in Figure 1.1.
1.6.1 Ethical considerations

The data required for this research were obtained through working with the researcher’s own students in the Post Graduate Diploma in Education and Professional Diploma in Education initial teacher education programmes. Permission has been given by the Head of the School in relation to carrying out this research project. Methods of data collection included: online questionnaires, online discussion boards, a researcher’s journal, analytic assessment rubrics to analyse digital stories produced by the students, and the students’ digital storytelling working portfolios.

As a researcher participant, the researcher is aware of her close ties to the students involved in this study, and due care has been taken to ensure the students and their work were treated ethically throughout the research process. Data protection protocols and research ethics regarding informed consent, disclosure and confidentiality, as outlined by the BERA (British Educational Research Association) Revised Ethical Guidelines for Educational Research (2004), were followed. Further explanation of the protocols complied with can be found in Chapter 4, methodology.
1.7 Chapter summary

This chapter has described the background to the research and the rationale for undertaking it. It has briefly outlined reflection in teacher education and the importance of equipping pre-service teachers with the reflective skills they need to reflect on their own practice. In addition, the chapter has introduced the challenges that teacher educators can encounter in endeavouring to teach student teachers to reflect critically on their practice learning. Alternative approaches to representations of reflection, including the possible use of digital storytelling as a technology-enhanced learning process for pre-service teachers, were proposed. The chapter concludes with a summary of the thesis structure, and how the research narrative is designed to answer the thesis’ principal research question - how can digital storytelling be designed to enhance reflective practice in initial teacher education?

Supporting and enhancing reflection in teacher education are the principal goals of this research. Therefore, before we look at the process of digital storytelling and how this was implemented with pre-service teachers, the next chapter will look in detail at what reflection in education entails. Chapter 2 details the provenance and development of the concept and practice of reflection in education. The chapter identifies and synthesises the work of key theorists, principally Dewey, Schön, Moon and Kolb. The chapter defines the concept of reflection for the thesis research. It furthermore helps to identify specific aspects and criteria of reflection that will inform the R-NEST prototype design model and implementation of DST as a technology-enhanced reflective process in initial teacher education.
Chapter 2: Reflection in Teacher Education

2.1 Chapter introduction

A significant amount of the literature on reflection in teacher education is based on the ideas of John Dewey (1910, 1933, 1916) and Donald A. Schön (1983, 1987, 1991) (Calderhead, 1989; Collin et al., 2013; Valli, 1997) as well as from the field of experiential learning (Boud, Keogh, & Walker, 1985a; Kolb, 1984). A key contemporary researcher in the field of reflective practice, Jenny Moon (1999, 2004), has influenced significantly the design of activities used for teaching reflective writing and reflective practice in higher education and experiential learning.

In this chapter, the ideas of the theorists named above, who have shaped the ideas of reflection and reflective practice in teaching, will be outlined. The major models of reflection created by these theorists, and others, in their efforts to describe and analyse the ‘process’ we go through when reflecting, will be presented.

2.2 John Dewey

John Dewey’s theories of reflection and the reflective process are at the heart of reflective teaching (Hatton & Smith, 1995). His writings on the topic, found mainly in How We Think (Dewey, 1910), Democracy and Education (Dewey, 1916), and the revised version/later editions of How We Think (Dewey, 1933), are strongly evident in the roots of subsequent theories of reflection. Dewey’s main contributions to the theories of reflection have to do with his ideas on the reflective process, reflection in community and the attitudes necessary for reflective thinking.

2.2.1 The reflective process

Dewey’s theories on the reflective process are based on his adherence to, and belief in the importance of, the scientific method. He felt that the methods of science, of reflective inquiry, were invaluable in education.

“Without initiation into the scientific spirit one is not in possession of the best tools which humanity has so far devised for effectively directed reflection” (Dewey, 1916, p. 189). Dewey felt it was the responsibility of
schools and teachers to teach students to think reflectively and that thinking in this manner was “…an acquired art…not spontaneous; learned, not native” (1916, p. 189).

Over several years, Dewey developed his ideas on reflection and the reflective process. He first discussed what he felt were the steps of the reflective process in *How We Think* (Dewey, 1910). He later refined these ideas in *Democracy and Education* (Dewey, 1916), and articulated them most fully in the 1933 version of *How We Think* (Rodgers, 2002). The following account of Dewey’s reflective process is derived, unless otherwise stated, from the 1933 version of *How We Think*.

For Dewey, the most important aspects of reflective thinking are, “…(1) a state of doubt, hesitation, perplexity, mental difficulty in which thinking originates, and (2) an act of searching, hunting, inquiring, to find material that will resolve the doubt, settle and dispose of the perplexity” (Dewey, 1933, p. 12). He further breaks the reflective process down into several phases.

Dewey states that the reflective process always begins with an experience; something that confuses, perplexes or troubles us. While going through our daily lives we experience many things, most of which do not cause a state of doubt. As long as we do not have to deal with a dilemma, there is no need for reflection. But when faced with a problem or dilemma, we have to stop and think. We have to search out possible solutions to the problem.

Initially, there is a spontaneous interpretation of the experience. Suggestions as to how to solve the problem present themselves, or ‘jump’ into our mind. Dewey feels that for most people, suspending judgement and intellectual searching are uncomfortable, and most of us want to end these feelings as soon as possible, so we are apt to accept one of the first solutions to the problem that jump into our heads. Dewey warns though, that stopping the thought process here, and not being sufficiently critical about the ideas that occur, could lead to inappropriate actions. He states that it is at this point in the process where “…the difference between reflective thought and bad thinking…” can occur (Dewey, 1933, p. 16).
The next phase of Dewey’s reflective process is intellectualizing the problem; naming exactly what the problem is that needs to be solved. Before this, one’s understanding of the problem has been vague and tentative. Now it is located and defined. Emotions and underlying motives connected to the initial experience can be scrutinised. Once this has been done, the formation of a hypothesis regarding the solution of the problem is possible. The person grappling with the problem does not discount other possible solutions to the problem that have occurred to him, but proceeds to expand on one hypothesis, albeit tentatively. Facts and data are collected, other sources are consulted.

This is followed by the next phase, that of reasoning through the tentative solutions to the problem. This phase is governed by the previous knowledge and prior experience that the person already has, as well as other information available to him. The reasoning phase also shows that if the idea is adopted, certain consequences will follow.

Dewey’s concluding phase is the testing of the hypothesis by overt action. It is at this point that the reasoned through hypothesis is acted upon in order to verify it. Up to this point, the conclusion has been hypothetical. If upon testing the hypothesis, the experimental results agree with the theoretical, then a conclusion can be reached. Sometimes, the hypothesis is disproved instead of verified. This can be seen as a positive outcome, however, in that the thinker can learn from failure just as much as from success (Dewey, 1933).

Dewey says that the phases do not necessarily follow each other in a set order, nor does the testing of the hypothesis need to be final. The outcome of the test can lead to new suggestions and observations, which can start the process all over again.

Dewey feels that one of the benefits of thinking reflectively in real life ‘practical’ situations is that it gives us the opportunity to slow down and think things through before acting. In real life situations, we do not know what the actual consequence of our actions will be, and these consequences might not be reversible. He states that
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…a thoughtful person treats his overt deeds as experimental so far as possible; that is to say, while he cannot call them back and must stand their consequence, he gives alert attention to what they teach him about his conduct as well as to the non-intellectual consequences. (Dewey, 1933, pp. 115-116)

2.2.2 Reflection in community

Dewey did not see reflective thought as being a purely individual pursuit, and emphasised the idea that discussing one’s thoughts with others could lead to further understanding of the strengths and weaknesses in one’s thinking. “Any experience, however trivial in its first appearance, is capable of assuming an indefinite richness of significance by extending its range of perceived connections. Normal communication with others is the readiest way of effecting this development…” (Dewey, 1916, p. 217).

We learn from both listening to others, and by attempting to explain our thoughts clearly to others. In order to communicate our thoughts clearly, we must first formulate our ideas.

To formulate requires getting outside of it, seeing it as another would see it, considering what points of contact it has with the life of another so that it may be got into such form that he can appreciate its meaning…one has to assimilate, imaginatively, something of another's experience in order to tell him intelligently of one's own experience (Dewey, 1916, pp. 5-6).

In the acts of sharing with and listening to others, one’s own experiences are broadened.

…one learns much from others. They tell of their experiences and of their experiences which, in turn, have been told them…their matter becomes a part of one’s own experience…In so far as we are partners in common undertakings, the things which others communicate to us as the consequences of their particular share in the enterprise blend at once into the experience resulting from our own special doing (Dewey, 1916, p. 186).

Dewey felt that discussing and sharing of experiences in a common situation would lead to a deeper understanding of our own experiences. We take on board that which others have experienced, and this then becomes part of our experience in the shared situation.
2.2.3 **Attitudes for reflection:**

In order to get the most out of our own reflections on experience, as well as learn from others as we share our reflections with them, Dewey felt there were certain attitudes we should take which would open the way to reflective thinking. His articulations of the attitudes that can help or hinder reflection are another major contribution to reflective teaching. He believed strongly that the attitudes that the individual brings to bear on the act of reflection can either open the way to learning, or block it (Rodgers, 2002).

2.2.3.1 **Attitudes that can block reflective thinking**

Dewey felt strongly that there were certain attitudes that “…may lead a person too readily to fall in with the prejudices of others and may weaken his independence of judgement” (Dewey, 1933, p. 29). He cites our tendency to jump to conclusions, the failure to examine our own attitudes, and powerful social influences such as regard for parents, those in authority, or the beliefs of a group to which one belongs, as such influences. Having the disposition to pass judgement on the basis of custom, tradition or prejudice is also seen by Dewey as an attitude that can get in the way of thinking reflectively.

2.2.3.2 **Attitudes that lead to reflective thinking**

Dewey (1933) names three main attitudes that he feels lead to a readiness to engage in reflection; open-mindedness, whole-heartedness and responsibility. Other attitudes that arise in his writings in relation to encouraging a readiness to engage in reflection are directness (Dewey, 1916), curiosity (Dewey, 1910; 1933) and a sense of playfulness in one’s work (Dewey, 1933).

2.2.3.2.1 **Open-mindedness**

Dewey describes open-mindedness as a “…freedom from prejudice, partisanship, and such other habits as close the mind and make it unwilling to consider new problems and entertain new ideas” (1933, p. 30). Other qualities of open-mindedness include; being open to new ideas, a desire to listen to more than one side of an argument, being open to facts from
alternate sources, giving attention to alternative possibilities, recognising the possibility of error even in the beliefs that are dearest to us, an alert curiosity, and spontaneous outreaching for the new. Defensive attitudes and a self-conceit, or the inability to admit that one’s held belief is wrong, can also stand in the way of open-mindedness (Dewey, 1933).

2.2.3.2.2 Whole-heartedness

Whole-heartedness has to do with being thoroughly engaged in a topic; throwing oneself whole-heartedly into something with a straightforward and single-minded approach. This attitude also encompasses being absorbed completely by the subject at hand, and with having a genuine enthusiasm for the topic. The opposite of being whole heartedly involved in a topic is to have a divided interest, allowing one’s mind to dwell on topics other than the one at hand (Dewey, 1933).

2.2.3.2.3 Responsibility

Being intellectually responsible has to do with not believing things blindly, and accepting the consequences of one’s beliefs. Dewey states that to be intellectually responsible, one has to consider the consequences in a projected step of inquiry, and be willing to accept these consequences even if they do not agree with previously held beliefs. Dewey also equates this attitude with “intellectual thoroughness”, which he describes as “seeing a thing through” (Dewey, 1916, p. 179, italics in original).

2.2.3.2.4 Directness

Dewey says that confidence is a good name for what he means by directness. It entails trusting one’s own judgement without worrying about the judgement of others. Directness implies being directly involved in the task at hand. He describes self-consciousness, embarrassment and constraint as the “menacing foes” of directness (Dewey, 1916, p. 173). If a person is feeling self-conscious, embarrassed or constrained, they cannot be involved with the subject matter they are investigating; their thoughts are deflected to side issues, they are distracted. This diverted energy “…means loss of power and confusion of ideas” (Dewey, 1916, p. 173).
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2.2.3.2.5 Curiosity

Dewey felt that curiosity was essential for reflective thought. He describes it as a “native resource” (1933, p. 36) that can be utilised for the development of reflective thinking. He sees curiosity as being intellectual when it is “transformed into interest” (Dewey, 1933, p. 39). Our interaction with the world around us constitutes experience, and having a sense of curiosity makes us open to new experiences (Dewey, 1933). Dewey warns that as adults, we tend to lose our sense of curiosity about the world, becoming stale and falling into ruts. He feels that curiosity can be lost through indifference or carelessness, frivolous flippancy, or dogmatism, which he sees as “equally fatal to the spirit of wonder” (Dewey, 1933, p. 39). Dewey encourages a child-like wonder and curiosity for the world. For Dewey, curiosity “…is the basic factor in enlargement of experience and therefore a prime ingredient in the germs that are to be developed into reflective thinking” (Dewey, 1933, p. 37).

2.2.3.2.6 Playfulness

Dewey discusses playfulness as an “attitude of mind” (1933, p. 10). He sees the ability to be playful and serious at the same time as the “ideal mental condition” (1933, p. 286). “Absence of dogmatism and prejudice, presence of intellectual curiosity and flexibility, are manifest in the free play of the mind upon a topic” (Dewey, 1933, p. 286). He also stresses that a sense of play is necessary if one is to get the most out of inquiry. One must not only be interested in the outcome, but should be interested in the process of reaching the outcome as well. Interest exclusively in the outcome can lead to drudgery (Dewey, 1933). For by drudgery is meant those activities in which the interest in the outcome does not suffuse the process of getting the result. Whenever a piece of work becomes drudgery, the process of doing loses all value for the doer; he cares solely for what is to be had at the end of it. The work itself, the putting forth of energy, is hateful; it is just a necessary evil, since without it some important end would be missed (Dewey, 1933, pp. 285-286).
2.3 Donald Schön

Donald Schön’s theory of reflective practice (Schön, 1983; 1987) has pervaded ideas of reflection in teacher education for the last four decades. He describes reflective practice as “…the kinds of inquiry by which competent practitioners bring available knowledge to bear on practice situations where its application is problematic” (Schön, 1987, p. 34). As a Dewey scholar who wrote his PhD thesis on Dewey’s theory of inquiry, many of Dewey’s ideas on reflection are apparent in Schön’s theories.

The theory of reflective practice was born out of Schön’s desire to heal what he saw as a rift between theory and practice in the schools of the professions in the later part of the 20th century (Schön, 1983). He felt that educational programmes for the ‘major’ professions such as medicine, law, and business, as well as the ‘minor’ professions such as education and social work, were teaching their students the theory of the professions without teaching them how to deal with and reflect on the everyday problems of practice in their professions. He held that the professional schools located in the universities were guided by the positivist paradigm of ‘technical rationality’ which sees professional action as an applied science that “…consists in instrumental problem solving made rigorous by the application of scientific theory and technique” (Schön, 1983, p. 21).

Schön called for a restructuring of the education of professionals that would prepare them to deal with the everyday problems they would encounter on the job, the “…complexity, uncertainty, instability, uniqueness, and value conflict – which do not fit the model of Technical Rationality” (Schön, 1983, p. 39). He felt there was a conflict in the professions between the need for ‘rigor’ and ‘relevance’, and illustrated this by comparing those in the professions who chose to stick to the “high, hard ground” of research based theory and technique, and those who dealt with the real life situations and problems of the profession that can be found in the “…swampy lowland where situations are confusing ‘messes’ incapable of technical solutions” (Schön, 1983, p. 42). He felt that those problems dealt with on the research-based ‘high ground’ were often relatively unimportant to the larger society,
whereas those problems that occur in the ‘swampy lowlands’ of actual practice usually deal with the problems of greatest human concern.

There are those who choose the swampy lowlands. They deliberately involve themselves in messy but crucially important problems and, when asked to describe their methods of inquiry, they speak of experience, trial and error, intuition, and muddling through (Schön, 1983, p. 43).

2.3.1 Reflective practitioners and reflective practice

Schön describes professional practitioners as those

…whose special knowledge sets them off from other individuals in relation to whom they hold special rights and privileges….They share conventions of action that include distinctive media, languages and tools….they also share a common body of explicit, more or less systematically organised professional knowledge (Schön, 1987, pp. 32-33).

From the perspective of technical rationality, Schön sees professional competence as consisting of “…the application of theories and techniques derived from systematic, preferably scientific research to the solution of the instrumental problems of the practice” (Schön, 1987, pp. 33). Practitioners in this light “…follow the rules for data gathering, inference and hypothesis testing, which allow [them] to make clear connections between presenting situations and the body of professional knowledge” (Schön, 1987, pp. 34).

The reflective practitioner, however, is one who goes beyond the rule-governed inquiry to solve those unfamiliar situations where the problem is initially unclear. The reflective practitioner “…responds to the unexpected or anomalous by restructuring some of her strategies of action, theories of phenomena, or ways of framing the problem; and she invents on-the-spot experiments to put her new understandings to the test” (Schön, 1983, p. 35). A reflective practitioner is someone who tries to make sense of puzzling phenomena with which he or she is trying to deal. “As he tries to make sense of it, he also reflects on the understandings which have been implicit in his action, understandings which he surfaces, criticizes, restructures, and embodies in further action” (Schön, 1983, p. 50).

Schön uses many terms to describe what he sees as the inherent qualities of reflective practice. Terms such as ‘artistry’, ‘tacit knowledge’, ‘reflection-
in-action’ and ‘reflection-on-action’ continue to pervade the literature on reflection and reflective practice.

2.3.2 Artistry

Throughout his writings on reflection, Schön uses the terms art and artistry to describe the professional’s ability to cope well with uncertain situations. Similar in theme to Dewey’s ideas on artistry (see Dewey, 1958a; 1958b), Schön uses the term “professional artistry” (1987, p. 27) to describe the kinds of competence practitioners sometimes display in their unique and uncertain situations of practice. He felt that we could learn a great deal about this artistry by studying unusually competent professionals.

Artistry is an exercise of intelligence, a kind of knowing, though different in crucial respects from our standard model of professional knowledge. It is not inherently mysterious; it is rigorous in its own terms….There are an art of problem framing, an art of implementation, and an art of improvisation – all necessary to mediate the use in practice of applied science and technique (Schön, 1987, p. 13).

2.3.3 Tacit knowledge

Schön refers to the ‘tacit knowledge’ of professionals, using Polanyi’s (1967) term to refer to the professional’s ability to know more than they can tell. Schön states, “Our knowing is ordinarily tacit, implicit in our patterns of action and in our feel for the stuff with which we are dealing. It seems right to say that our knowing is in our action” (Schön, 1983, p. 49, italics in original). Understanding this tacit knowledge is important for practitioners as once they are aware of the tacit knowledge that they possess, they can then make this implicit knowledge explicit, and examine their actions in practice. Schön (1983) discusses the tacit professional frames that practitioners employ as they deal with situations in their practice, and states that

…when practitioners are unaware of their frames for roles or problems, they do not experience the need to choose among them. They do not attend to the ways in which they construct the reality in which they function; for them, it is simply a given reality (1983, p. 310, italics in original).
By making these implicit frames explicit, Schön suggests the practitioner can become aware of alternative ways of framing their practice, and can create awareness for more possibilities of practice.

2.3.4 Reflection in and on action

Donald Schön’s theories on reflection-in-action and reflection-on-action have their basis in Dewey’s notion of reflection (Calderhead, 1989; Kinsella, 2009), harking back to Dewey’s theory of inquiry.

2.3.4.1 Reflection-in-action

The main emphasis of Schön’s work is on his theory of reflection-in-action, which he developed to describe the practical competence professionals have in divergent situations; what he calls “…an epistemology of practice implicit in the artistic, intuitive processes which some practitioners do bring to situations of uncertainty, instability, uniqueness, and value conflict” (Schön, 1983, p. 49).

Schön explains that we perform actions in our everyday lives or professions which are spontaneous, intuitive. When we have learned to do something, we can do it without thinking about it. This “…spontaneous knowing-in-action usually gets us through the day” (Schön, 1987, p. 26). We have knowledge and skills which are a part of our profession, which we can go about doing on a daily basis without thinking about too much. If asked to explain these, we might not be able to articulate exactly what it is that we know. But sometimes a familiar routine produces an unexpected result. One way we can reflect on this is to stop and think about it, which Schön calls reflection on action. Another way is to reflect in the midst of action without interrupting it; we think about what we’re doing, even while we’re doing it.

In an action present – a period of time, variable with the context, during which we can still make a difference to the situation at hand – our thinking serves to reshape what we are doing while we are doing it…in cases like this…we reflect-in-action (Schön, 1987, p. 26, italics in original).

Like Dewey, Schön states that this is usually brought on by something that surprises us in our everyday actions:
When intuitive, spontaneous performance yields nothing more than the results expected for it, then we tend not to think about it. But when intuitive performance leads to surprises, pleasing and promising or unwanted, we may respond by reflecting-in-action…In such processes, reflection tends to focus interactively on the outcomes of action, the action itself, and the intuitive knowing implicit in the action (Schön, 1983, p. 56).

Further links to Dewey can be seen in the way that practitioners focus on problems and experiment with situations.

2.3.4.1.1 Process of reflection-in-action

Schön states that as we go about our daily routine, we are able to complete most tasks without conscious deliberation, as long as things move along as normal. But if something unexpected happens as we move through our daily routine, this produces surprise. It gets our attention.

This surprise “…leads to reflection within an action-present” (Schön, 1987, p. 28). This reflection is in some ways conscious, but might not manifest itself at the level of words.

We consider both the unexpected event and the knowing-in-action that led up to it, asking ourselves, as it were, “What is this?” and, at the same time, “How have I been thinking about it?” Our thoughts turn back on the surprising phenomenon and, at the same time, back on itself (Schön, 1987, p. 28).

Schön feels that this reflection-in-action has a critical function, that of “…questioning the assumptive structure of knowing in action” (Schön, 1987, p. 28). It causes us to think critically about the thinking that caused the surprise in the first place. As we are doing this, “…we may, in the process, restructure the strategies of action, understandings of phenomena, or ways of framing problems” (Schön, 1987, p. 28).

2.3.4.1.1.1 Problem framing and problem setting

Schön uses the terms ‘problem framing’ and ‘problem setting’. He sees problem setting as “…the process by which we define the decision to be made, the ends to be achieved, the means which may be chosen” (Schön, 1983, p. 40).

In real world practice, problems do not present themselves to the practitioner as givens. They must be constructed from the materials of problematic situations which are puzzling, troubling, and uncertain. In
order to convert a problematic situation to a problem, a practitioner must do a certain kind of work. He must make sense of an uncertain situation that initially makes no sense (Schön, 1983, p. 40).

Similar to Dewey’s step in the reflective process of ‘naming the problem’, Schön sees problem setting as “…a process in which, interactively, we name the things to which we will attend and frame the context in which we will attend to them” (Schön, 1983, p. 40). This is also referred to as ‘reframing’ (Schön, 1983).

In the next part of the process, reflection gives rise to on-the-spot experimentation, which Schön also calls a ‘frame experiment’ (1983, p. 269). We think up and try out new things in order to explore the newly observed phenomena. This allows us to “…test our tentative understandings of them, or affirm the moves we have invented to change things for the better” (Schön, 1987, p. 28). This on-the-spot experimentation may work in that it might yield intended results, or it may produce more surprises which lead to further reflection and experimentation (Schön, 1987).

Schön points out that the moments of reflection-in-action are usually not as distinct as in his description of the process, or follow the same sequence. He stresses that “…what distinguishes reflection-in-action from other kinds of reflection is its immediate significance for action…the rethinking of some part of our knowing-in-action leads to on-the-spot experiment and further thinking that affects what we do…” (Schön, 1987, p. 29).

2.3.4.2 Reflection-on-action

Schön devotes very little time to discussing reflection-on-action in his writings. He sees reflection-on-action as something that we do after the fact.

Practitioners do reflect on their knowing-in-practice. Sometimes, in the relative tranquillity of a post-mortem, they think back on a project they have undertaken, a situation they have lived through, and they explore the understandings they have brought to their handling of the case. They may do this in a mood of idle speculation, or in a deliberate effort to prepare themselves for future cases (Schön, 1983, p. 61).

Looking back on our reflection-in-action may shape our actions in the future. By reflecting-on-action, we can consolidate the problem we were
dealing with, develop a better understanding of it, or come up with a better solution for it, shaping our future action (Schön, 1987, p. 31).

2.3.5 Research and practice

Schön feels that the worlds of research and practice must be brought more closely together, recognising that “…practitioners may become reflective researchers…” (Schön, 1983, p. 308). He suggests four kinds of ‘reflective research’ which “…can be undertaken outside the immediate context of practice in order to enhance the practitioner’s capacity for reflection-in-action” (Schön, 1983, p. 309). These are frame analysis, repertoire-building research, research on the fundamental methods of inquiry and overarching theories, and research on the process of reflection-in-action. A summary of Schön’s description of each follows:

- Frame analysis: the study of the ways in which practitioners frame problems and roles, which can help them to become aware of and criticize their tacit frames.

- Repertoire-building research: the description and analysis of images, category schemes, cases, precedents and exemplars which practitioners bring to their situations of practice.

- Research on the fundamental methods of inquiry and overarching theories: the theories and methods a practitioner uses as springboards for making sense of new situations and can use as a way to explain the situation (which Schön referred to as ‘action science’ (1983, p. 319).

- Research on the process of reflection-in-action: involves observing someone engaged in reflection-on-action to derive how the person is thinking and acting. In doing this, the researcher must keep in mind the effects of cognitive, affective and group dynamics, and be aware of their own effects on the situation.

In all of these types of reflective research, Schön envisions the researcher and practitioner entering into modes of collaboration that are very different from those used under the model of applied research. He states that the researcher must somehow gain an inside view of the experience of practice. “Reflective research requires a partnership of practitioner-researchers and researcher-practitioners” (Schön, 1983, p. 319).
Schön saw this as leading in turn to a new relationship between universities and practice institutions.

### 2.3.6 Implications for reflective practice

In describing institutions for reflective practice, Schön (1983) saw the majority of professionals being bound up with the formal bureaucratic organizations through which most of their work was done. He saw bureaucracies as organizations that reinforced the model of technical expertise, and left little room for the role of the reflective practitioner, seeing the reflective practitioner instead as someone who would be “…a danger to the stable system of rules and procedures…” (Schön, 1983, p. 328) inherent in a bureaucracy. He describes in particular the educational bureaucracy of a school, and what might happen “…when a teacher begins to think and act not as a technical expert but as a reflective practitioner…Her reflection-in-action poses a potential threat to the dynamically conservative system in which she lives” (Schön, 1983, p. 332).

Schön saw the typical schools of the day as being very conservative, controlled and rigid.

The efficient transmission of knowledge requires a system of controls. The teacher is supposed to convey standard units of knowledge to large numbers of students and must employ measures, in the forms of quizzes and examinations, in order to determine what the students had learned or failed to learn….Teachers are also subject to similar systems of controls. They are monitored, and rewarded or punished, according to the measures of their students’ progress (Schön, 1983, p. 330).

He did not see these types of typical schools as being conducive to encouraging teachers’ reflection on practice. He felt that in order to be a reflective practitioner, the teacher would need to come out of the isolation of her classroom and “…communicate her private puzzles and insights, to test them against the views of her peers” (Schön, 1983, p. 333). As the teacher began to inquire into how her students were learning, and how she could best help them to understand the material, she would need to move beyond the institutional order of space and time typical in a school, and have the freedom to reflect, invent and
differentiate for her students. He also thought that, as teachers attempted to become reflective practitioners, they would feel constrained by and would push against the rule governed system of the school, and in doing so, they would be pushing against the theory of knowledge that underlies the school (Schön, 1983).

In schools supportive of reflective teaching, Schön envisioned that:

- Schools would deal with conflicts and dilemmas which were absent, hidden or of minor importance in an ordinary school
- Schools would debate the meanings of ‘good teaching’ and ‘a good classroom’ as topics of urgent institutional concern
- Curriculum would be an inventory of themes of understanding and skills to be addressed and student-centred
- Student teacher ratios would be much smaller than twenty-five to one to allow teachers to “…engage the learning capacities and difficulties of particular students” (Schön, 1983, p. 334).
- Teachers would be able to challenge the prevailing knowledge structure
- Teachers would use their on-the-spot experiments to “…affect not only the routines of teaching practice but the central values and principles of the institution” (Schön, 1983, p. 335).

Schön states that,

> An institution congenial to reflective practice would require a learning system within which individuals could surface conflicts and dilemmas and subject them to productive public inquiry, a learning system conducive to the continual criticism and restructuring of organizational principles and values (Schön, 1983, p. 335).

Many of Schön’s ideas can be seen in the reflective practice literature which followed (Smith, 2011). Schön referred to ‘action science’ as being an area that reflective practitioners could investigate in order to help them to become more adept at reflection-in-action. He cited Kurt Lewin’s work as a precursor to action science (1983, p. 319), which later was cited by many as the basis for what today is known as action research (Adelman, 1993; Lawson, 2009; Masters, 1995). Kemmis and McTaggert (1990, p. 5) define action research as “…a form of collective self-reflective inquiry undertaken
by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their understanding of these practices and the situations in which these practices are carried out." This form of self-reflective inquiry is commonly used by teacher-researchers today to study aspects of their own practice (Lawson, 2009).

2.3.7 The student practitioner

Schön sees a particular type of practicum, which he defines as “…a setting designed for the task of learning a practice…” (Schön, 1987, p. 37), as the best situation for students of a profession to learn their practice. Schön sees coaching and students working together in small groups, as well as an immersion in ‘background learning’ as integral to the practicum. The kind of practicum envisaged by Schön goes beyond the traditional practicum, which he sees as a form of technical training, dealing only with the rules, operations and cases pertinent to the facts of practice. Schön envisions a practicum where the students learn the relevant facts and operations of the profession, but

…will also learn the forms of inquiry by which competent practitioners reason their way, in problematic instances…we will see students as having to learn a kind of reflection-in-action that goes beyond statable rules…by constructing and testing new categories of understanding, strategies of action and ways of framing problems. Coaches will emphasize indeterminate zones of practice and reflective conversations with the materials of a situation (Schön, 1987, pp. 39-40).

It is through this kind of practicum that students of a profession can be initiated into the reflective practices of the profession. The suggestion of this style of practicum could possibly be what started the trend for professional training based on the ‘reflective practitioner’ over thirty years ago.

2.3.8 Criticisms of Schön

Schön’s ideas on reflective practice and reflection-in-action served as a stimulus to rethink the relationship between theory and practice in the professions (Smyth, 1989). However there is a great deal of criticism of his work. Critics cite his lack of precision with terminology and his own
definitions (Eraut, 1995; Moon, 1999) as well as his comparison of technical rationality with artistry as a discussion of good versus evil (Fenstermacher, 1988). Others disagree with Schön’s ideas that reflection can coincide with action (Court, 1988; van Manen, 1991). Many have criticised his work for the fact that he pays too much attention to reflection-in-action and does not deal with other possible time-frames for reflection, such as before an event, which van Manen (1991) calls ‘anticipatory reflection’.

2.4 Models of reflection/learning

Many of the theories and models used for reflection in education stem from the experiential learning movement. Concerned with learning from experience, and certification of this experience, experiential learning has to do with learning situations such as field experience, internships, work/study assignments and other forms of experience based education (Kolb, 1984). Korthagen and Wubbels (2001b) state that student teaching can be seen as a form of experiential learning.

Theorists in this area developed their models in an attempt to show how we learn from experience, and reflection plays a large part in all the models developed for this purpose. Kolb (1984) states that experiential learning theory “…offers the foundation for an approach to education and learning as a lifelong process that is soundly based in intellectual traditions of social psychology, philosophy, and cognitive psychology” (p. 4). Kolb places the foundations for experiential learning in the learning theories of John Dewey, Kurt Lewin and Jean Piaget, as well as the socioemotional theories of Carl Jung, Erik Erikson, Carl Rogers, Fritz Perls and Abraham Maslow. “Taken together, these socioemotional and cognitive development models provide a holistic framework for describing the adult development process and the learning challenges it poses” (1984, p. 16).

Several models of the role of reflection in the learning process have been presented by authors over the last few decades. These have influenced the use of reflection in many learning experiences. Of particular importance are the models of Kolb (1984), Boud Keogh and Walker (1985a), Moon (1999) and Korthagen and Vasalos (2005).
2.4.1 Kolb

Kolb (1984) presents a model of experiential learning which emphasizes the important part that experience plays in the learning process. Based on Lewin’s experiential learning model (Kolb, 1984) as well as the ideas of Dewey and Piaget, the model shows how experience is translated into concepts, which are then used as guides to choosing new experiences. Kolb presents learning as a four stage cycle, as shown in Figure 2.1.

![Figure 2.1: Kolb's description of the learning cycle (1984, p. 21)](Content has been removed due to copyright restrictions)

This model exemplifies Kolb’s ideas about experiential learning. These are that:

- Learning is best perceived as a process, not in terms of outcomes
- Learning is a continuous process, grounded in experience
- The process of learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world
- Learning is an holistic process of adaptation to the world
- Learning involves transactions between the person and the environment
- Learning is the process of creating knowledge (Kolb, 1984, pp. 26-36).

Kolb feels that learners need four different kinds of abilities if they are to be effective: concrete experience abilities (CE), reflective observation abilities (RO), abstract conceptualization abilities (AC), and active experimentation abilities (AE). He explains these by stating:

…they must be able to involve themselves fully, openly and without bias in new experiences (CE). They must be able to reflect on and observe their experiences from many perspectives (RO). They must be able to create concepts that integrate their observations into logically sound theories
(AC), and they must be able to use these theories to make decisions and solve problems (Kolb, 1984, p. 30).

He sees these abilities as polar opposites; concrete experience is opposite to abstract conceptualization, while reflective observation is opposite to active experimentation. The learner “…must continually choose which set of learning abilities he or she will bring to bear in any specific learning situation” (Kolb, 1984, p. 30). However, as he sees learning as a holistic process, and the learner continually functioning between these dialectic tensions while relating to the world, he states that, “To learn is not the special province of a single specialized realm of human functioning such as cognition or perception. It involves the integrated functioning of the total organism – thinking, feeling, perceiving and behaving” (Kolb, 1984, p. 31).

While used as a model of reflective activity in much of the literature on reflective learning, Kolb does not discuss the nature of his stage of observation and reflection in much detail (Boud, Keogh, & Walker, 1985b; Moon, 1999). Boud et al (1985b) feel that it appears to refer to the act of associating an incoming idea with one already in the mind of the observer, while Moon (1999) states that an important feature of Kolb’s use of reflection in the process of learning is that the quality of reflection is crucial in ensuring that the learner does progress in their learning.

2.4.2 Boud, Keogh and Walker

Going into much more depth on the role of reflection in learning, Boud, Keogh and Walker (1985a) present their model as a model for reflection in learning. They believe that teachers and learners can use the model to organize learning activities so that the link between a learning experience and the reflective activity which follows it can be strengthened (Boud et al., 1985a). The model is based on their own experiences in the processes of learning as well as the ideas of many authors who consider reflection as part of learning. Some of these authors include Dewey (1933), Mezirow (1981), and Habermas (1974). In their book, they present the model in stages, but it has been presented here in its final form (Figure 2.2), and is explained below.
Starting from the left side of the model, the experience section includes all those behaviours, ideas and feelings that the learner brings to a learning experience. For Boud, Keogh and Walker, “…reflection is a form of response of the learner to experience…experience consists of the total response of a person to a situation or event: what he or she thinks, feels, does and concludes at the time and immediately thereafter” (1985a, p. 18). They feel that the characteristics and aspirations of the learner are the most important aspects in the learning process. How a learner responds to a new experience is determined by their past experiences, which contribute to how the learner sees the world. They also feel a learner’s intent is an important aspect of the learning process. “The intent of the learner permeates every stage of the process from the choice to engage in a particular activity to the ultimate results of the reflective process” (1985a, p. 24). They cite research that has to do with approaches to learning, which are classified as either deep or surface learning approaches. They state that “…the adoption of a reflective approach is a choice which we can make or not as we wish, and is one which can be associated with the deep approach to learning” (1985a, p. 24).

In the centre of the model, the processes of reflection on the experience are laid out. These are the three elements Boud et al (1985a) feel are important to the learning process: returning to the experience, attending to feelings and re-evaluating the experience, and are explained briefly below. It is important to note that central to the process of reflecting on an experience is the
allocation of time during learning activities for reflection. Boud et al (1985a) suggest that this can take the form of a debriefing period for the group or setting aside time to write in a journal. They feel that if learners are exposed to one new event after the other without a break, they will be unlikely to make the most of any of the events separately.

Returning to the experience is a recollection of the salient events, a replaying of the events in the mind of the learner. This chronological recounting of the experience can be written or described to others, and should involve a close attention to detail, while refraining from making judgements. “As we witness the events again they become available for us to reconsider and examine afresh; we realize what we were feeling and what responses prompted us to act as we did” (1985a, p. 27).

Attending to feelings has two aspects; utilizing positive feelings and removing obstructing feelings. Focussing on the positive feelings the event has brought up, and removing the impediments of any negative feelings surfaced by the event can assist with reflecting on the experience. They state that removing obstructing feelings involves “…whatever needs to be done in order to remove impediments to a thorough examination of the experience” (Boud et al., 1985a, p. 26). Emotions and feelings can become barriers to learning. Boud et al state that if emotions and feelings do become barriers, it is important to recognize them as such and remove them before the learning process can proceed.

The third stage of the reflective process is re-evaluating the experience, which Boud et al feel is the most important part of the process. They warn, however, that this part is not often completed if the first two steps are omitted.

Boud et al go on to break re-evaluating experience into four stages: association, which they describe as the relating of new data to that which is

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already known; integration, which is seeking relationships among the data; validation, seen as determining the authenticity of the ideas and feelings which have resulted; and appropriation, which they describe as making knowledge one’s own. They feel that all of these stages are influenced by the learner’s goals and intentions.

Finally, on the far right side of the model, Boud et al present what they feel are the outcomes of reflection. They state that the “…outcomes of reflection may include a new way of doing something, the clarification of an issue, the development of a skill or the resolution of a problem (1985a, p. 34). Outcomes can also be of an affective nature, which allow us to continue on to future learning, change our emotional state, attitudes and even values.

Action on what has been learned during the reflective process ends the process for the time being. Boud et al (1985a) feel that some of the benefits of reflection may be lost if they are not linked to action or application. The learner should make a commitment of some kind on the basis of their learning. They state that action can “…occur at any stage of the learning process and it may itself precipitate a new phase of reflective activity” (p. 35).

Boud et al (1985a) point out that the elements of reflection do not always proceed in the order suggested in the model, and that they have represented the stages diagrammatically in order to help in explaining their ideas, as well as to draw attention to some features of the process that they feel teachers and learners often overlook. They conclude the explanation of their model by stating:

To do justice to the full complexities of the process would involve a description which indicated the continual cycling back and forth between elements, the omission of some stages at times and the compression of some of the elements we have described. Nevertheless if learners are having difficulties in reflecting, it can be useful to think about the stages we have described and examine whether any of them have been omitted (Boud et al., 1985a, p. 36).

2.4.3 Jenny Moon

Jenny Moon’s work with reflection and learning (1999) and reflection and experiential learning (2004) were written in an attempt to fill the gap in the
literature on reflection and its role in the process of learning. Writing more than a decade after Schön and Kolb, her work on developing a map of learning and teasing out what ‘depth’ of reflection is and looks like, has been of great assistance to educators in the fields of higher education, professional development and experiential learning working to enhance student’s reflective abilities (Barrett, 2005c; McDrury & Alterio, 2002).

Moon’s work is important because she makes the connection between learning and reflection evident, and stresses the representation of learning/reflection as well as the depth of reflection evident, in written or other representations. She clarifies for educators what depth of reflection looks like, what we should do to enhance students’ reflective abilities, and how we might go about assessing reflective work produced by our students.

2.4.3.1 Purposes for/outcomes of reflection

Moon (1999) develops a list of the purposes for, or outcomes of reflection as she sees them stemming from the relevant literature. She states that these are:

- learning or material for further reflection;
- action or other representation of learning;
- understanding of the process of learning;
- the building of theory;
- self-development;
- decision making or resolution of uncertainty;
- empowerment and emancipation;
- other outcomes that are unexpected – e.g. images
- or ideas that might be solutions;
- ?? emotion
  (Moon, 1999, p. 77, question marks in original)

2.4.3.2 Moon’s map of learning

One of Moon’s major contributions to the use of reflection in education is her map of learning (Figure 2.3), which she developed as a means of attaining a better understanding of reflection and its role in learning (Moon,
1999). She states that the map is based on the literature on reflection and student learning such as Entwistle’s (1996) work on deep and surface approaches to learning, Habermas’s (1971) theory of human interests and Mezirow’s (1981) work with perspective and transformation. The map is also supplemented by her own observations and personal reflections. The supporting ideas for her map of learning are the:

- constructivist view of learning;
- notion of cognitive structure;
- materials of learning and the learner;
- stages of learning;
- environment of learning;
- deep and surface approaches to learning and the representation of learning.

(Moon, 1999, p. 105)

Moon states that the map is speculative, hypothetical, and that it is “…based on theory, empirical work and observation, the work on deep and surface learning and the relationship between the two and the outcomes of that learning. It is also based on the ideas of the cognitive structure and its function in learning.” (Moon, 1999p. 136)
At the left of the map, the cognitive structure is represented, showing how new learning is accommodated and assimilated into what is already known by the learner. Emotion is seen as being involved at least as an influence on the guidance of assimilation. In the centre of the map, the stages of learning represent different levels of complexity of processing. These are linked to a corresponding quality of representation of learning at the far right of the map. The learning environment on the map, on the two axes, is shown as influencing all stages of learning (Moon, 1999).

The first two stages of learning involve assimilation of new material of learning and happen while in contact with the new material, while the other stages can occur at a later time when the learner reprocesses their knowledge. ‘Noticing’ is the stage at which new learning is taken in, this is a selective process, guided by what is known already. ‘Making sense’ is the stage at which the learner becomes aware of the coherency of the material, “…organizing and ordering the material of learning and slotting ideas together” (Moon, 1999, p. 142). The ‘making meaning’ stage is where the new material is related to what is already known in the cognitive structure. Moon states that there could be some accommodation of the cognitive structure at this stage. There is some sense of understanding of the material.
at this level. Reflection comes in at the next stage, that of ‘working with meaning’.

This is a stage of greater accommodation – or re-accommodation – of the cognitive structure. This stage could be a process of ‘cognitive housekeeping’, thinking over things until they make better meaning, or exploring or organizing the understanding towards a particular purpose or in order that it can be represented in a particular manner (Moon, 1999, p. 139).

Moon points out that the stage of transformative learning is not reached by all learners. Transformative learning “…involves a more extensive accommodation of the cognitive structure and the learner demonstrates that they are capable of evaluating their frames of references, the nature of their own and others’ knowledge and the process of knowing itself” (Moon, 1999, p. 146).

2.4.3.3 Upgrading learning

Moon suggests that learning may be upgraded to another stage after the original time of learning. Using the map of learning to illustrate how this might happen, Moon notes that students might move from the stage of ‘making sense’ to ‘making meaning’ by deliberately recalling the information and then consciously relating it to what they know already, integrating it into the cognitive structure in the process of ‘making meaning’ (Moon, 1999).

2.4.3.4 Reflection in learning

In relating the role of reflection to learning on the map, as seen in Figure 2.4, Moon notes that reflection is more “…heavily implicated in the processes of the more sophisticated stages of learning where there is manipulation of meaning that has already been developed in the cognitive structure. In this way, reflection is integral to a deep approach to learning” (Moon, 1999, p. 152).
She sees three main areas, in terms of the map, where reflection is involved in learning:

- Reflection is involved in straightforward learning, due to the accommodation of the cognitive structure at the stages of ‘making meaning’, ‘working with meaning’ and ‘transformative learning’.

- Reflection is involved in learning that results from the representation of learning (when students have to represent what they have learned) “…in that this feedback and reconsideration process also involve the manipulation of meaning” (Moon, 1999, p. 153).

- The process of upgrading learning to deeper levels implies reflection. Initial surface learning that is relatively unconnected to previous knowledge could be integrated more fully into the cognitive structure.

Moon sums up her ideas on the role of reflection in learning by stating that, “…reflection makes deeper and better considered knowledge available to us” (Moon, 1999, p. 155).

### 2.4.4 Korthagen

Korthagen (1985) developed a model to describe what he felt was the ideal process of reflection. His model (Figure 2.5) is based on the assumption “…that by nature people reflect on their experiences, but that systematic reflection often differs from what teachers are accustomed to doing”
(Korthagen & Vasalos, 2005, p. 48). The model is used in many countries as a basis for systematic reflection in teacher education (Korthagen & Vasalos, 2005).

The five phases in this process are: “…action, looking back on the action, awareness of essential aspects, creating alternative methods of action, and trial, which itself is a new action and therefore the starting point of a new cycle” (Korthagen & Wubbels, 2001b, p. 44). The model is named as the ALACT model, after the first letters of the five phases.

This model is followed in Korthagen’s ‘realistic teacher education’ programme. In this programme, student teachers enter the school setting very early in their student teaching so they can develop experiences for the reflective process. “Realistic teacher education starts from student teachers’ experiences and their gestalts rather than from the objective theories on learning and teaching from the literature” (Korthagen & Wubbels, 2001b, p. 45). Student teachers and supervisors use the model to help student teachers work through the “…images, feelings, needs, behavioural tendencies, and so forth, triggered by small teaching experiences” (Korthagen & Wubbels, 2001b, p. 45).

The first phase of the model, action, has to do with looking at an action or incident that has taken place in the student teacher’s practice. Phase two of
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the model has to do with looking back on the action or incident with the help of the supervisor. Korthagen and Vasalos (2005) suggests types of questions supervisors can ask to help the student teacher delve more deeply into the incident, such as; “What was the context? What did you want? What did you do? What were you thinking? How did you feel?” (p. 50) It’s also important to ask similar questions about what the student might have wanted, done, been thinking, or felt in the situation. Korthagen and Vasalos (2005) note that, “By asking further questions related to these specific areas, the supervisor can help the teacher discover how to address them more systematically” (p. 50).

Phase three of the model is explicitly aimed at developing awareness of the less rational factors that might govern a student teacher’s actions, such as the effect of role models of teaching held by students, values held, feelings and emotions, as well as human needs that might shape peoples’ functioning (Korthagen & Vasalos, 2005). Phase four of the model has to do with the student developing alternatives in order to deal with the action or incident. The supervisor can suggest “small theoretical elements” (p. 52) to introduce educational theories to the student teacher’s repertoire. The final phase has to do with trying out these alternatives, and essentially “…becomes the first phase in the next cycle of reflection, creating a ‘spiral’ of professional development.” (p. 52)

While the model is initially used during conferences between the supervisor and the student teacher in order to bring structure to the reflective process, the intention is that the student teacher will eventually be able to use the model on their own, developing what Korthagen calls a ‘growth competence’ (Korthagen & Vasalos, 2005).

Korthagen and Vasalos (2005) point out the differences between their model and Kolb’s (Kolb, 1984), stating that Kolb’s model “…stresses conceptualization much more than the development of an awareness of less rational sources of behaviour” (p. 50).
2.5 Critical reflection

The term ‘critical reflection’ is used extensively in the literature on reflection in teacher education. It is important to point out that this term has a specific meaning, and describes a type of reflection that focusses on a teacher’s taken-for-granted beliefs and assumptions, as well as how “…considerations of power undergird, frame, and distort educational processes and interactions” (Brookfield, 1995, p. 8).

Mezirow (1991) defines critical reflection as involving “…a searching view of the unquestionably accepted presuppositions that sustain our fears, inhibitions and patterns of interaction…” (1991, p. 87). When asking student teachers to investigate their own pre-existing ideas about teaching we are asking them to engage in critical reflection.

2.5.1 Student teachers’ pre-existing ideas

In reflecting on their practice, student and practicing teachers need to take into account their own theories on education and how these affect their practice. Zeichner and Liston (1996) state that “…it is clear that all teachers come to their teacher education programmes and schools with beliefs, assumptions, values, knowledge and experiences that are relevant to their teaching practice” (1996, p. 24). Brookfield (1995) calls teaching without taking our own assumptions and intentions into consideration ‘teaching innocently’.

Teaching innocently means thinking that we’re always understanding exactly what it is that we’re doing and what effect we’re having. Teaching innocently means assuming that the meanings and significance we place on our actions are the ones that students take from them…Since we never have full awareness of our motives and intentions, and since we frequently misread how others perceive our actions, an uncritical stance toward our practice sets us up for a lifetime of frustration” (p. 1).

Different researchers in the field of the use of reflection in teacher education have used different phrases to explain the phenomenon of teachers’ pre-existing beliefs and assumptions. Korthagen (1993) refers to the idea as the student teacher’s ‘gestalt’, “…the whole of a person’s experiences with regard to a certain situation” (p. 319). Connelly and Clandinin (1984) describe a teacher’s personal knowledge as “…that body of convictions and
meanings, conscious or unconscious, which have arisen from experience, intimate, social and traditional, and which are expressed in a person’s actions” (p. 137).

Handal and Lauvas (1987) use the term ‘teacher’s practical theories’ to describe this concept. They theorize that, “Every teacher possesses a ‘practical theory’ of teaching which is subjectively the strongest determining factor in her educational practice” (Handal & Lauvas, 1987, p. 9, italics in original). They define the term ‘practical theory’ as “…a person’s private, integrated but ever-changing system of knowledge, experience and values which is relevant to teaching practice at any particular time” (p. 9). This theory can be personally constructed from practical experience, reading, listening, and looking at other peoples’ practice, among other things. Each person’s practical theory is unique to them (Handal & Lauvas, 1987). Personal experience refers to all our experiences of educational situations, as pupils throughout our lives as well as educators, teachers or trainers. Some of these experiences of practice are good, some bad, some boring, some rewarding – all have influenced our personal conclusions as to why things were experienced in the way they were (Handal & Lauvas, 1987).

2.5.1.1 Apprenticeship of Observation

Lortie (1975) coined the phrase ‘apprenticeship of observation’ in his seminal study of teachers, Schoolteacher: a sociological study. The term specifically describes the phenomenon of student teachers arriving for their teacher education courses after spending thousands of hours as schoolchildren, observing and evaluating their teachers. Lortie felt that this apprenticeship of observation is responsible for many of the preconceptions that student teachers have about teaching (Borg, 2004, p. 274). This can have a profound effect on how student teachers understand and enact teaching (Conway et al., 2009, p. xx).

In describing a pupil’s view of teachers as ‘front stage and centre like an audience viewing a play,’ Lortie says that they do not have any idea about
the things that teachers do ‘backstage’, which are such an important part of their job.

Students do not receive invitations to watch the teacher’s performance from the wings; they are not privy to the teacher’s private intentions and personal reflections on classroom events. Students rarely participate in selecting goals, making preparations, or post-mortem analyses. Thus they are not pressed to place the teacher’s actions in a pedagogically oriented framework (Lortie, 1975, p. 62).

Conway, Murphy, Rath and Hall (2009) recommended that initial teacher education programmes “… proactively address the apprenticeship of observation in designing learning experiences given that it profoundly shapes teacher stance” (Conway et al., 2009, p. xx).

2.6 Levels of reflection

While reflection is a goal in most teacher education programmes, difficulties lie in defining the term itself, as well as describing what different levels of reflection actually look like (Hatton & Smith, 1995). Educators have noted a lack of depth of reflection in student work (Calderhead, 1989; MacLeod & Cowieson, 2001; Moon, 1999; 2004). Moon discusses the difficulties that educators can have in getting their students to engage in the reflective process, and to achieve a measure of depth in their reflections. She states that,

…the idea of depth has become more important as reflective activities have been increasingly applied in formal education and professional development. There is a frequent observation that while an initial struggle of getting learners to reflect can be overcome, it can be difficult to persuade them to reflect in other than a superficial manner – which might be little different from descriptive writing (Moon, 2004, p. 95).

Two models which elucidate depth of reflection can be found in the works of Hatton and Smith (1995), and Moon (2004). These models were instrumental in this study in characterizing what depth of reflection looked like.

2.6.1 A reflective writing framework

Hatton and Smith (1995) conducted research into the types of activities that facilitate reflection in student teachers, and how the results of these might be evaluated to show evidence of student teachers’ reflection. Among other
things, they wanted to know, “What constitutes evidence of reflection?” (p. 40). In their review of the literature, they found only broad guidelines against which evidence of reflection could be evaluated. Using their own students’ written reflective reports, which they found provided the most evidence of reflection, they developed a framework to identify four types of writing, three of which were characterised as different kinds of reflection. The different types of writing they identified are; descriptive writing, descriptive reflection, dialogic reflection and critical reflection. They describe the levels as:

- **Descriptive writing**: this writing is not reflective at all, but merely reports events or literature
- **Descriptive reflection**: attempts to provide reasons based often on personal judgement or of the students’ reading of the literature
- **Dialogic writing**: is a form of discourse with oneself, a stepping back from and mulling over, an exploration of possible reasons
- **Critical writing**: involves “…reason giving for decisions or events which takes account of the broader historical, social, and or political contexts” (Hatton & Smith, 1995pp. 40-41).

While using the framework to assess students’ written work for levels of reflection, they found that “…within each type of reflection, it became clear that students could adopt single or multiple perspectives in accounting for decisions or events, so this dimension was also considered when essays were coded” (p. 41).

Hatton and Smith found that the most common type of reflection evident in student writing was descriptive, but this included a high incidence of multiple perspectives. In addition, they found that students would often begin with a unit of descriptive reflection and then lead on to dialogic reflection. “The descriptive phase often served to establish the context in an initial accounting for what took place, providing a basis for a change of
stance within the writing, where further issues and alternative reasons were explored, usually in a more tentative way” (p. 41).

While they found that examples of critical reflection in the students’ writing were often “…brief and rather superficial…”, they also found that “…many instances of dialogic and descriptive reflection were complex, sustained, multi-dimensional, and insightful” (Hatton & Smith, 1995, p. 45). They feel that this may be evidence of a developmental sequence, “…starting the beginner with the relatively simplistic or partial technical type, then working through different forms of reflection-on-action to the desired end-point of a professional able to undertake reflection-in-action” (Hatton & Smith, 1995, p. 45). They see the practitioner’s ability to reflect-in-action as “…the most demanding type of reflecting upon one’s own practice, calling for the ability to apply …qualitatively distinctive kinds of reflection…to a given situation as it is unfolding” (Hatton & Smith, 1995, p. 46).

They propose that the high levels of descriptive reflection in their students’ writing could be due to the fact that at the pre-service level of the profession, student teachers are most concerned with the technical competencies of the profession, the technical skills. They feel however that as the students progress through the programme and gain confidence in these skills, “…it is possible to move on to create learning situations which foster the development of more demanding reflective approaches…” (Hatton & Smith, 1995, p. 46). Hatton and Smith therefore see all levels of reflection evidenced by students as useful in its own right, stating that

…the technical form is a useful starting point addressing the concerns of students, who can then be encouraged to move on from that basis to understanding and using the other forms of reflection-on-action. The descriptive it would appear from this study is more easily mastered and utilised than either the exploratory dialogic or demanding critical forms, both of which require knowledge and experiential bases that take some time to develop (Hatton & Smith, 1995, p. 46, emphasis in original).

2.6.2 A generic framework for reflective writing

Nearly a decade after Hatton and Smith’s study, Moon (2004) investigated the concept of depth in students’ written reflections. In her review of the
literature on depth of reflection, Moon states that in the frameworks she reviewed, similar qualities could be attributed to deeper levels of reflection.

…deep reflection is generally characterized by perspective transformation… transformative critique… or transformative learning… These terms refer to the ability to revise the ‘meaning structures’… which are the bases of judgements. In other words, we are talking here about a review of the manner of the function of internal experience and what frames of reference are used and how” (Moon, 2004, p. 96).

She credits Hatton and Smith’s (1995) work with creating the best known framework for levels of reflection. Moon expands on this later in the creation of her own framework for reflective writing. While her work on the framework for reflective writing deals with encouraging depth of reflection in students’ reflective writing, she notes that, “An interesting point that became evident in the process of this work is that we should take care not to reject all descriptive writing. Some description is necessary in a reflective account that is used in an educational situation to provide the background for the reflection” (Moon, 2004, p. 98).

Moon’s generic framework for reflective writing describes four levels of reflective writing in a continuum, from superficial and descriptive, to deep levels of reflective writing (Moon, 2004, pp. 214-216). These were developed to use with students in teaching them what reflective writing looks like, as well as a means to assist educators in the development of assessment tools for reflective writing (Moon, 2004).

For Moon, deep reflection is characterized by:

- A brief description of the event, covering the issues for reflection and noting their context.
- A standing back from an event, there is mulling over and internal dialogue.
- The account incorporates a recognition that the frame of reference with which an event is viewed can change.
- A metacognitive stance is taken (i.e. critical awareness of one’s own processes of mental functioning – including reflection).
• Can recognise that events exist in a historical or social context that may be influential on a person’s reaction to them. In other words, multiple perspectives are noted.

• Self-questioning is evident, deliberating between different views of personal behaviour and that of others.

• The view and motives of others are taken into account and considered against those of the writer.

• There is recognition that prior experience, thoughts (own and other’s) interact with the production of current behaviour.

• There is observation that there is learning to be gained from the experience and points for learning are noted.

• There is recognition that the personal frame of reference can change according to the emotional state in which it is written, the acquisition of new information, the review of ideas and the effect of time passing.

(Based on Moon’s Reflective Writing (2) framework level, 2004, p. 216)

2.7 Working with others to reflect together

Some of the best methods of deepening reflection involve working with others (Moon, 2004, p. 147).

Working with others can deepen reflection on practice (Dewey, 1916; Hatton & Smith, 1995; McDrury & Alterio, 2002; Moon, 2004; Rodgers, 2002). Dewey (1916) discusses the need to talk to others, to explain your ideas, in order to truly understand the strengths and weaknesses in one’s thinking.

To be a recipient of a communication is to have an enlarged and changed experience. One shares in what another has thought and felt and in so far, meagrely or amply, has his own attitude modified. Nor is the one who communicates left unaffected. Try the experiment of communicating, with fullness and accuracy, some experience to another, especially if it be somewhat complicated, and you will find your own attitude toward your experience changing…(pp. 5-6)

In her work with teacher education on reflection and reflective practice, Rogers (2002) identifies three factors that highlight the benefit of collaborative reflection for teachers:

1. Affirmation of the value of one’s own experience: In isolation, what matters can be too easily dismissed as unimportant;
2. Seeing things “newly” – others offer alternative meanings, broadening the field of understanding;
3. Support to engage in the process of inquiry…(p. 357)

Rodgers feels that teachers can benefit from collaborative reflection in a supportive community, and states that “No teacher outgrows the need for others’ perspectives, experience and support…” (p. 357)

Hatton and Smith (1995) support the use of the ‘critical friend’ as a means of collaborative reflection. “A powerful strategy for fostering reflective action is to engage with another person in a way which encourages talking with, questioning, even confronting, the trusted other, in order to examine planning for teaching, implementation, and its evaluation” (p. 41). This can create an opportunity “…for giving voice to one’s own thinking while at the same time being heard in a sympathetic but constructively critical way” (p. 41).

Moon (2004) suggests that activities such as working with critical friends, or allowing students to work together in small groups, can deepen reflection “… by prompting and asking questions, querying frames of reference, and so on” (p. 147). She warns, however, that working with others will affect what is shared publicly.

The idea of work with others in itself will affect the nature of the material that will be written in the first place, and it is important that learners should recognize this. However the effect may be less than the effect of tutors seeing or assessing reflective material (Moon, 2004, p. 147).

McDrury and Alterio (2002) note that by working with others in reflective dialogue, reflexive capacity can be developed. “Through dialogue, shaped to explore experiences in depth, multiple perspectives can emerge. From these perspectives, new learning and relationships can be constructed” (pp. 38-39). They feel that simply reporting practice experiences to others is not enough.

Merely reporting on events, and having little engagement with emotional responses, actions or desired outcomes, is not likely to lead to new insights. It is through dialogue that we make meaning from experience, come to understand our roles within these experiences and construct new appreciations of practice realities (p. 115).
In sharing stories of practice with each other, through reflective dialogue, McDrury and Alterio (2002) posit that we are able to “…reshape, reassess and reconstruct particular events…” and that this “…allows us to learn from discussing our experiences with individuals who may raise alternative views, suggest imaginative possibilities and ask stimulating questions” (p. 38).

### 2.8 Representations of reflection

Most reflective assignments required of student teachers are written assignments (Moon, 1999). However, this might not be the best way for students to evidence their reflection. Hatton and Smith (1995) found that the essay format of the writing they asked their students to produce might have gotten in the way of students producing more deeply reflective writing. During interviews with the students they found that

…students saw the academic context and expectations of essay writing established within the wider institution as inhibiting their ability and willingness to reflect in an assessable piece of work. The traditional academic genre is characterised by features that are in many ways the antithesis of the personal, tentative, exploratory and at times indecisive style of writing which would be identified as reflective” (p. 42).

Hatton and Smith (1995) suggest journal or diary writing as written forms of reflection that allow more opportunities for reflection than traditional essays, but note that there are issues with whether private journals should be assessed. On the topic of the assessment of reflective journals, Moon (1999) states that

If the journal is to be assessed, there is the issue of the privacy of the free writing to be considered. Material will be written differently if it is to be seen – and the learning from it will be different – than if it is purely private” (p. 196).

Both Moon (1999) and Hatton and Smith (1995) however, feel that private journal entries can successfully be used as the substance for subsequent structured reflective tasks. Moon (2004) holds that students’ secondary reflections, those that draw on and quote from their original reflective writing, are more valuable and are “…likely to yield deeper levels of reflection with improved learning” (Moon, 2004, p. 156).
2.8.1 Creative methods for reflection

Several researchers in the field of reflection in teacher education suggest the use of creative methods for reflection, in addition to written reflective assignments. Korthagen (1993) feels that much of the reflective activities employed in teacher education emphasise the rational, left hemisphere of the brain.

Although there are many different conceptualizations of reflection and reflective teaching…most of them seem to share the underlying assumption that teachers should use logical, rational, step-by-step analyses of their own teaching and the contexts in which that teaching takes place (p. 317).

He encourages instead the use of non-rational modes for reflecting, which employ the right hemisphere of the brain in the reflective process. These non-rational, creative modes of reflection can take the form of using metaphor, drawing, taking photographs or presenting pictures to promote associations. He feels that these non-rational forms of reflection can be “…helpful in promoting awareness in teachers of the non-rational processes guiding their actions” (p. 321).

McDrury and Alterio (2002) also encourage the use of creative ways of representing events for reflection, such as drawings, collage, poetry and journaling. They feel that these creative forms of reflective activities can “…assist students to present complex realities…” and state that “…it is important to encourage use of these tools so students can reflectively access practice realities (McDrury & Alterio, 2002, p. 110).

Moon (1999), too, encourages the use of creative methods for reflective learning. She states that the use of these different techniques can “…generate different forms of reflection and may bypass the resistances that can block normal reflective processes or else introduce new perspectives for reflection” (p. 204). Two of her suggestions for these creative types of reflection are reflection on a critical incident, and the use of story, both of which involve thinking about learning in the placement situation (Moon, 1999).
2.8.2 Storytelling for reflection on practice

Moon (2004) encourages the use of story as a creative activity that can be used to enhance reflection as she feels it can “…exploit creative means whereby the deeper or less predictable experience can be brought to the fore for examination” (p. 159). She sees storytelling as a useful reflective activity as she feels that “…stories have the ability to lift aspects of external experience from their context. Stories can be subjected to closer examination, experiment (imbued with different meanings in new contexts) and further development in fantasy” (Moon, 2004, p. 174).

McDrury and Alterio (2002) also encourage the use of storytelling as a means of enhancing reflection on practice. Nurse educators in Australia, they propose storytelling as a theory of learning. They feel that in getting their students to tell stories of practice, both tellers of stories, as well as listeners, can be transformed, and can bring about changes in practice. However, in order for this to happen, they propose the manner in which stories are told is of the utmost importance. In their own work with nursing students, they “…discovered that how students told and processed their stories determined what learning outcomes they could achieve” (p. 50). These learning outcomes were determined by mixing three key factors: setting, number of listeners and type of story told. McDrury and Alterio (2002) state that “…these factors are clustered into three key storytelling characteristics:

1. **Setting** – is it informal or formal?

2. **Listeners** – is there one or are there many?

3. **Story** – is it spontaneous or pre-determined?” (p. 50).

Their model of storytelling pathways illustrates these factors, as shown in Figures 2.6 and 2.7. Depending on the pathway followed for the storytelling activity, different learning outcomes are achieved. McDrury andAlterio (2002) have found that informal settings usually lead to what they call ‘emotional catharsis’, for learners, whereas formal pathways can lead to
deeper learning. While emotion and emotional catharsis are essential affective processes in the reflective, professional life of the teacher (Korthagen & Vasalos, 2005), giving learners a more structured approach to analysing these emotions in regards to their practice can deepen their understanding (McDrury & Alterio, 2002). In Figure 2.6, the first four storytelling pathways are illustrated:

**Figure 2.6: Storytelling pathways 1-4, based on** (McDrury & Alterio, 2002, pp. 56-57), used with permission

Table 2.1, below, briefly describes pathways 1-4 and the impact they have on reflection and learning.

**Table 2.1: Description of McDrury and Alterio’s storytelling pathways 1-4 (2002, pp. 56-58)**

| Pathway 1: | Informal setting, single listener, spontaneous story | • Likely to provide the most emotional catharsis  
• One listener provides undivided attention  
• Teller more likely to focus on the affective domain |
| --- | --- | --- |
| Pathway 2: | Informal setting, single listener, pre-determined story | • Still likely to contain a strong affective element  
• Contains initial reflective phase when teller decides on story to tell which can help teller focus on experience  
• Listener likely to pick up on teller’s concerns |
| Pathway 3: | Informal setting, multiple listeners, spontaneous story | • Likely to be dominated by various listeners sharing their stories, resulting in the teller’s story being ‘hijacked’  
• Can lead to fragments of stories shared |
McDrury and Alterio (2002) note that dialogue can occur in two ways when stories of practice are shared; as \textit{response discourse} or as \textit{response story}. When a listener remains focused on the teller’s story, dialogue centres on the original story. However, when a listener responds to a teller’s story with their own story, focus can be taken off the original story. The authors use the term ‘story hijacking’ (p. 52) to describe when listeners begin to tell their own story instead of focusing on the original teller’s story. In a formal storytelling setting, listeners are more likely to respond with \textit{response discourse}, and remain focused on the original teller’s story.

McDrury and Alterio’s (2002) pathways 5-8 start with a formal setting for telling stories. Figure 2.7 below illustrates these storytelling pathways.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{storytelling_pathways}
\caption{Storytelling pathways 5-8, based on (McDrury & Alterio, 2002, pp. 58-59), used with permission}
\end{figure}

Table 2.2 briefly describes pathways 5-8 and the impact they have on reflection and learning.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{Pathway 4:} & \textbf{Informal setting, multiple listeners, pre-determined story} \\
\hline
\textbullet{} Likely to result in dialogue that focuses on the practice event, however might shift away from teller’s needs \\
\hline
\end{tabular}
\end{table}
Table 2.2: Description of McDrury and Alterio’s storytelling pathways 5-8 (2002, pp. 58-59)

| Pathway 5:          | Formal setting, single listener, spontaneous story | • Provides an opportunity for teller and listener to enter into a focused and fruitful dialogue as there is an agreed agenda  
|                    |                                                    | • Both teller and listener have responsibilities; the teller to share and explore the story, the listener to ask appropriate questions and encourage reflection |
| Pathway 6:          | Formal setting, single listener, pre-determined story | • Has all the benefits of pathway 5, as well as additional reflective phase for the teller when choosing the story to tell |
| Pathway 7:          | Formal setting, multiple listeners, spontaneous story | • Involves a reflective group process where a practice situation is shared  
|                    |                                                    | • A number of listeners provides multiple perspectives  
|                    |                                                    | • Allows teller to consider alternative actions and possible consequences |
| Pathway 8:          | Formal setting, multiple listeners, pre-determined story | • Teller considers event prior to the storytelling process which enhances those benefits of pathway 7 and can result in significant learning |

McDrury and Alterio (2002) note that there may be other pathways for storytelling and that the different pathways can be appropriate in different situations. However, they feel that

…reflective learning and the ability to bring about thoughtful and reasoned change to practice is more likely to occur when tellers and listeners work collaboratively in formal contexts to construct knowledge using processes which promote reflective dialogue (p. 59).

### 2.9 Designing for reflection: Criteria and considerations

Table 2.3 summarises criteria and considerations which emerged in the comprehensive conceptual exploration of reflection, and which this research would need to try to address, in endeavouring to design digital storytelling to enhance pre-service teachers’ reflection on practice.

Table 2.3: Designing for reflection: Criteria and considerations

<table>
<thead>
<tr>
<th>Designing for Reflection: Criteria and Considerations</th>
<th>Author/Design Informant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinking reflectively needs to be taught, it is a skill that doesn’t come naturally for many</td>
<td>(Dewey, 1916; Korthagen &amp; Wubbels, 2001a; Moon, 1999)</td>
</tr>
<tr>
<td>Student practitioners can struggle with the concept of reflection</td>
<td>(Jay &amp; Johnson, 2002)</td>
</tr>
</tbody>
</table>
There can be a lack of depth in student representations of reflection (Calderhead, 1989; MacLeod & Cowieson, 2001; Moon, 1999; 2004).

There are attitudes that lead to a readiness to engage in reflection:
- open-mindedness,
- whole-heartedness
- responsibility
- directness
- curiosity
- a sense of playfulness in one’s work (Dewey, 1910; 1916; 1933)

The intent of the learner has an impact on the reflective process (Boud et al., 1985a).

Reflection starts with a state of doubt, perplexity, surprise or a problem to be solved (Dewey, 1933; Schön, 1987)

A reflective practitioner is someone who tries to make sense of puzzling phenomena in their practice (Schön, 1983)

Reflection involves emotions, feelings, the whole experience of the learner (Boud et al., 1985a)

Students need time to reflect (Boud et al., 1985a)

Looking back on an experience gives one fresh insight, perspective (Boud et al., 1985a)

Outcomes of reflection can include a new way of doing something, clarifying an issue, developing a skill, changing emotionally, changing attitudes or even values (Boud et al., 1985a; Moon, 2004)

Some of the benefits of reflection may be lost if they are not linked to action or application. (Boud et al., 1985a; Moon, 2004)

Depth of reflection can be evidenced by a stepping back from the event under consideration, a form of discourse with oneself, the inclusion of alternative perspectives, looking at broader historical, social, and or political contexts (Hatton & Smith, 1995; Moon, 2004; Schön, 1983)

Student teachers’ pre-existing ideas are relevant to their teaching practice (Brookfield, 1995; Connelly & Clandinin, 1984; Handal & Lauvas, 1987; Lortie, 1975; Zeichner & Liston, 1996)

Students’ secondary reflections are likely to yield deeper levels of reflection (Moon, 2004)

Reflecting with others can deepen reflection on practice (Dewey, 1916; Hatton & Smith, 1995; McDrury & Alterio, 2002; Moon, 2004; Rodgers, 2002; Schön, 1987)

Written reflection might not be the best way to represent reflection, creative means of reflecting may be better (Hatton & Smith, 1995; Korthagen, 1993; McDrury & Alterio, 2002; Moon, 1999)

Storytelling can be used as a means to enhance reflection on practice (McDrury & Alterio, 2002; Moon, 2004; Moon & Fowler, 2008; Schön, 1988).

The use of multimodal digital methods can be used to support student teacher’s reflective writing (Kajder & Parkes, 2012)
Chapter 2: Reflection in Teacher Education

2.10 Chapter summary

This chapter outlined the ideas of the major theorists who have inspired and shaped the use of reflection and reflective practice in teaching. Several models of reflection created by these theorists, in their efforts to describe the process we go through when reflecting, were discussed. In addition, the concept of depth/levels of reflection and alternative methods for reflecting on practice, including collaboration and creative methods, were investigated. Finally, the use of storytelling for reflection on practice was discussed.

In the field of teacher education, where student teachers are asked to reflect on practice throughout their training, reflective assignments can tend heavily toward the purely written variety. Studies have shown that many students find it difficult to engage deeply in the reflective process through purely written assignments. Within our own initial teacher education programme, this has been found to be the case. In light of the alternative methods for reflection suggested above, might there be a more engaging method of assisting pre-service teachers to reflect on their practice? Is there a method that incorporates the types of creative methods encouraged by the authors above, in addition to written reflection? Inspired by the theorists discussed in this chapter, and the work of Barrett (2005a; 2005b; 2005c) in particular, the researcher holds that digital storytelling could be used as a method for reflection on practice in this manner. Asking students to create a digital story to evidence their reflection, utilising the story format instead of the essay format to present their reflections, could help students to break free of the ‘essay’ format and lead to deeper reflection on their part. In the next chapter, the literature on digital storytelling will be reviewed, and the possibility of using digital storytelling as a creative, engaging method for pre-service teachers to reflect on their practice will be investigated.
Chapter 3: Literature Review – Digital Storytelling

3.1 Chapter introduction

In the previous chapter, the researcher examined in detail the concept of reflection and the specific aspects of reflection that are intrinsic to, and highly important for effective teacher education. The concept of reflection in teacher education was enumerated and interrogated through looking at the key theorists in the area of reflection, and the provenance and development of the concept in teacher education. Building on this detailed exposition of reflection in the last chapter, this chapter investigates the literature on digital storytelling (DST) and the extent to which DST has been studied, designed and used as a reflective tool with pre-service teachers. The chapter aims to establish how much research has been undertaken in this area, and if there has been substantive work done: how has it been implemented, what methods have been used in the research, what evaluation has been undertaken, and what results has it produced?

Having exhaustively reviewed the relevant extant research, this literature review positions the innovativeness of this doctoral project as a first, substantive, longitudinal study of DST as a technology enhanced reflective process in teacher education.

As will be presently outlined, the concept of DST originated in 1995 with the DST Model, which was developed by the Center for Digital Storytelling, now based in Berkeley, CA, and there have since been a number of exploratory applications of DST in teacher education. The research undertaken in this doctorate is inspired by the original, pioneering work of the CDS, and the other frontier implementations of DST (e.g., Banaszewski, 2005; Barrett, 2006). It aims to build on these innovations by undertaking and articulating a detailed, longitudinal exploration and examination of DST for reflection in initial teacher education (ITE).

3.2 The Center for Digital Storytelling model

The digital storytelling format was originally developed by Joe Lambert and Dana Atchley in the mid-1990s. Community theatre activists in the San
Francisco area, they were interested in using the new desktop communication technologies that were becoming available at the time to help those in the community with no voice to tell their own stories. They started delivering workshops to help community members create their own digital stories, and eventually became the *Center for Digital Storytelling* (CDS) in Berkeley, California (Lambert, 2009).

Over the years, the CDS has developed a process for creating digital stories, which they deliver in an intensive three day workshop format. Workshop participants are invited to arrive at the workshop with a story idea or rough draft of a story script completed. They are also asked to bring along any images and music that they would like to use in their digital story. Before the workshop, participants are asked to view digital stories produced in previous workshops, and links to these stories are supplied in pre-workshop materials. On the first day of the workshop, participants are given an overview of the DST process and taken through the centre’s “Seven Elements of Digital Storytelling” which provides the skills they need for crafting a good digital story (Lambert, 2009). Later, they participate in a ‘story circle’ which is a peer feedback activity designed to help participants expand on and improve their script, and are introduced to some of the software they will need to use to compile their digital story. They continue to work on their story, as well as creating a storyboard and collecting images. That evening they are sent off with a homework assignment to finalise their story draft for the next day.

On day two of the workshop, tutorials on voiceover recording and the software needed for audio and video editing are covered. Then, participants begin to compile their digital stories, assisted by the CDS staff when needed. Images and music are sourced, the voiceover is recorded, and all the elements of the digital story are brought together in the video editing software. On the final day of the workshop, the digital stories are completed and shared with the other participants in the workshop (Lambert, 2009).
3.2.1 The seven elements

This busy, intensive three day workshop has been devised in a way to help participants “…find the story they want or need to tell, and then help them clearly define that story in the form of a solidly written script” (Lambert, 2009, p. 29). The CDS has found that introducing participants to what they feel are the elements of successful digital stories on the first day of the workshop greatly improves the process and the stories told.

The Seven Elements of Digital Storytelling presented to workshop participants are:

1. Point of View: involves telling stories from the first person narrative perspective, as well as being clear about the message you want your story to convey to your audience.

2. Dramatic Question: involves the idea of the story arc, and using a hook to grab the audience’s attention in order to draw them into the story.

3. Emotional Content: involves delving into real emotions in your story, using emotions that come from the heart. It’s also about feeling comfortable with the emotions that are shared in the story, and emphasizes that one’s deepest darkest secrets don’t need to be shared to make the story authentic.

4. Economy: involves keeping digital stories short and making every word count. Digital story authors are encouraged to use images and sound to replace words in the text wherever possible, to ‘show’ instead of ‘tell’.

5. Voice: involves the importance of using one’s own voice for the voiceover, and encourages the use of emotion and inflection while recording the voiceover. Images are also considered part of the voice of the digital story, and the importance of using images and music to convey the tone of the story is stressed here.

6. Power of Soundtrack: Music is an optional aspect of digital stories, but if used, it shouldn’t overpower or interfere with the voiceover and should complement the story.

7. Pacing: involves using a regular speaking voice, with natural intonations and varied tone and tempo, not rushing through the recording. Many people don’t like the sound of their own recorded voice, so this element encourages one to relax and get the best out of their recorded voice in order to enhance the digital story.

(Center for Digital Storytelling, 2010b)
The process of helping participants find their stories is a very reflective process and allows them to dig deeper into the emotions and motivations for the story they want to tell. Lambert (2009) stresses the format of a personal narrative as being the most powerful when creating digital stories. The format of ‘personal stories of change’ is suggested as a basic story format that can be used to structure a digital story. He uses John Gardner’s aphorism to illustrate this theme of change in stories:

All stories…can really be boiled down to one of two types: 1) “A stranger came to town…” or 2) “We went on a vacation.” In other words, change came to you or you went towards change. These stories, in essence, fall into the widely used archetype of the symbolic journey, the journey of self-understanding (Lambert, 2009, pp. 30-31).

3.2.2 The digital production process

Lambert (2009) breaks the production of the digital movie during the workshop into four distinct steps:

1. **Importing material to the computer:** scanning and digitizing audio and video either prior to or during the workshop, recording the voiceover.

2. **Preparing media:** editing images, or pre-producing audio and video

3. **The initial video edit or rough edit:** a rough cut of the movie that doesn’t include transitions or special effects to allow participants to get a general feeling for the piece and identify where additional images or video might be needed

4. **Special effects, creating titles, audio mixing:** enhancing the digital video with filters, transitions, graphics etc., available in the video editing software. In order not to get overwhelmed by the process, novice digital video editors are encouraged to start simply and expand their creativity over time.

3.2.3 Circles of story

Lambert (2009) refers to the whole workshop process as ‘circles of story’ as participants are encouraged to help each other through the technical parts of the process if their skills permit, as well as in the story feedback sessions.
...when you gather people in a room, and listen, deeply listen, to what they are saying, and also, by example, encourage others to listen, magic happens (Lambert, 2009, p. 86).

A very important part of the digital storytelling process is the script review portion of the workshop, which the CDS calls the ‘story circle’; a peer feedback session on the digital stories in their rough draft form. In the story circle, each participant reads or tells their story, and the other participants give feedback, ask questions and help the storyteller to flesh out their story. The story circle process can be very emotional for some participants as they delve deeper into their personal story, and care needs to be taken to structure this in a safe manner for all. Lambert (2009) says of this process:

...we like to lead by example and focus our attention on each story as its being told. When a participant has the floor, we make sure we attentively engage with them; hearing their words and listening to the stories they may or may not be telling. We discourage interruptions, such as people talking, or working in another part of the room (p. 88).

The final and most critical step in the workshop process is the sharing of the completed digital stories with the group. Participants are asked to give comments about their effort before their digital story is shown. In the workshop setting, participants are asked to answer questions such as “Who is your audience? What was your purpose in creating the story? Has the purpose shifted during the process of creating the piece?” (Lambert, 2009, p. 45). This helps to bring to the surface how the story and the insight it conveys might have evolved through the process of putting the story together.

Lambert describes the digital storytelling process as a journey, and stresses that the CDS approaches this journey as a group process. “We believe that the connections made between people in the Story Circle help focus and inspire each individual through the process…Therefore, we recommend that digital storytellers connect with others to share ideas and work through these steps together” (2009, p. 47).

3.2.4 Applications of digital storytelling

Lambert lists several applications of digital storytelling, from telling an organization’s story, to working with practitioners and clients in health and
human services, youth outreach programmes, teachers, community activists and many others.

Digital storytelling was enthusiastically embraced by the education community from the beginning, and Lambert notes that, “Educators from K-12 schools as well as colleges and universities have been an integral part of our practice from the start” (2009, p. 99). In discussing the depth of reflection experienced by teachers participating in a digital storytelling workshop, he states, “When stories are completed in an environment of shared reflection, they can inspire and lead to more in-depth reflections by the storyteller’s peers” (2009, p. 101).

3.3 Digital storytelling and reflection

The process of developing a digital story is not only deeply engaging for students, it also fosters a type of reflection that is difficult to accomplish through print assignments (Matthews-DeNatale, 2008, p. 4).

Barrett (2006) promotes the use of digital storytelling in conjunction with reflective learning portfolios in pre-service teacher education. She states that digital storytelling “…is a highly motivating strategy that can make reflection concrete and visible” (2006, p. 1). Barrett’s work in exploring DST for reflection in ITE sparked the researcher’s interest in undertaking this doctorate to examine systematically and in depth the design, deployment and evaluation of DST as a technology enhanced reflective process for pre-service teachers.

Sandars (2009) found the use of digital storytelling with third level students in the UK enhanced reflective learning, “…especially for students who did not have a preference for written approaches” (p. 4) to reflection. Rossiter and Garcia (2010) support the narrative approach of digital storytelling for meaning making in adult education. They argue that the creativity inherent in the use of digital multimedia can add to students’ understanding of the topic of learning.

When a learner sets out to develop a digital story, enormous opportunities for creativity are loosed. Even in using a reasonably simple software product, learners choose each image, the sequence and number of the images, the transitional effects between the images, the background music, the style and content of the titles on the frames, and of course the
voiceover narration. Each and every choice is, in Bruner’s (1990) words, an act of meaning. In each choice, the developer of a digital story makes a creative, interpretive statement of meaning (Rossiter & Garcia, 2010, p. 44).

Lambert (2009) notes that at the CDS, they have found that the digital storytelling process is an excellent vehicle for reflective practice.

Finding and clarifying stories helps people to understand the context of their lives. This process of self-reflection helps move from an awareness of “I am” to a deeper awareness of “I have been, I am… and I will be…” As life proceeds and is reflected upon, changes can be better understood…”(p. 30)

He states that story writing itself is a form of reflection, but also sees video editing and photographic manipulation and special effects as “…a new set of reflective tools” (Lambert, 2009, p. 92).

In his book, *Digital Storytelling: Capturing Lives, Creating Community*, Lambert (2009) interviews other practitioners of digital storytelling with whom he has worked. Pip Hardy and Tony Sumner run the Patient Voices programme of Pilgrim projects, a Cambridge, England-based organization that works with digital storytelling in the healthcare field. In discussing with Lambert why they think DST is useful as a reflective practice, they note the opportunity for participants to reflect on their own and others’ practice. “Sometimes seeing someone else’s story about how they made a decision they might now regret can open the viewer’s eyes to assess their own practice” (p. 145). They also note the opportunity for their storytellers to reflect on their own life experiences while deciding the most effective and affective ways to convey their stories. They see the rigorous process of script revision in digital storytelling as an opportunity to reflect on one’s own experiences, as well as those of others:

Delving deeply into the meaning of a story, refining it, and distilling it to reveal its essence can help us to see it differently….stories spring from, and are linked to, people’s past and current life experiences. Inevitably then, within the process of reflecting upon and distilling their digital story, storytellers are given the opportunity, space, and tools with, and within which, to reflect upon their own life stories. If they get to the essence of their story they usually have a better grasp of the essence of the experience” (Lambert, 2009, pp. 145-146).
Chapter 3: Literature Review – Digital Storytelling

Creating a story can be a more natural form of writing that allows students to show evidence of their reflective process, compared to writing essays or reports. Lambert discusses the difficulty many people in the DST workshops have in breaking free from the more analytical forms of writing when first faced with the task of actually trying to put their personal story down on paper:

The process of moving from a journalistic, technical, or official voice towards a more organic and natural voice is often difficult. It is as if we are trying to merge the two different parts of our brains; the analytical and the emotive…The official voice is the voice of our expository writing class, our essays and term papers, our formal memos and letters to our professional colleagues. We have been taught that this voice carries dispassionate authority, useful perhaps in avoiding misunderstandings, but absolutely deadly as a story” (Lambert, 2009, p. 22).

The digital storytelling process can parallel the process of deep reflection in that it allows the writer to dig deeper into the meanings and emotions behind the story. “Finding and clarifying what a story is really about isn’t easy. It’s a journey in which a storyteller’s insight or wisdom can evolve, even revealing an unexpected outcome” (Lambert, 2009, p. 30). Lambert stresses that using the self-narrative genre can lead to further insights for the storyteller.

Events from the past that may confuse a storyteller hold dormant insights that can be better understood through the realization of self-narratives. And this can happen over the course of years, or from one day to the next. This can even happen in a single moment through the act of hearing another’s story of insight, and it can bring those dormant meanings to light, elucidating layers of meaning (Lambert, 2009, p. 30).

3.3.1 Digital storytelling, personal narrative and identity creation

Banaszewski (2005) holds that personal narrative-based digital storytelling offers students valuable opportunities for identity construction through reflection. He states that, “Because digital stories are most often individual reflections of self, identity construction is a more pronounced part of the digital storytelling process…” (Banaszewski, 2005, p. 48). Davis (2004) discusses his use of DST with youth in an afterschool club in a large urban city in the US. He found the personal narrative structure, and the social process of developing the story with others, to be a strong vehicle for youth
identity development. He proposes that the narrative process is reflexive and contributes to identity development.

Narrative is a means by which we learn from experience by reflecting upon experience, declaring what it means, and distilling it into a symbolic form to be expressed and remembered. The process is essentially reflexive, folding back on itself: experience is distilled into narrative, and the narrative itself becomes a tool which shapes memory and mediates future experience (Davis, 2004, p. 3).

Benmayor (2008) writes of her use of DST with Chicana college students in her Latina Life Stories class in a California university. She found that by introducing her students to testimonios, stories of resistance, struggle, and survival written by US Latinas from multiple ethnic and national origins, they came to see their lives as embodying larger social forces, theories, and identities, and these realizations affected how they told their own stories. She asks her students to create a personal narrative based on “…a significant moment, person, or event in the student’s life that has helped shape their identity” (p. 190). In discussing what her students get out of the creation of their digital stories, she says:

I have seen the multimedia process enhance their understanding of what it means to theorize their own identities ‘from the flesh’. That is, to use their ‘situated knowledge’ – through speaking about, reflecting on, and analysing their lived experience – to produce new social/cultural/historical understandings (Benmayor, 2008, p. 189).

3.4 Digital storytelling and technology self-efficacy

Based on Bandura’s (1997) self-efficacy theory which holds that “…peoples’ level of motivation, affective states, and actions are based more on what they believe than on what is objectively true” (p. 2), technology self-efficacy has to do with peoples’ belief in their ability to use technology effectively (Albion, 2001; Wang, Ertmer, & Newby, 2004). Bandura (1986) notes that “People regulate their level and distribution of effort in accordance with the effects they expect their actions to have. As a result, their behaviour is better predicted from their beliefs than from the actual consequences of their actions” (p. 129). In other words, our belief in our ability to accomplish something is a better predictor of our ability to accomplish it than our actual capability level. For this reason, the level of a
pre-service-teacher’s technology self-efficacy has often been seen as a predictor of their ability to effectively use technology for teaching and learning (Heo, 2009).

Heo (2009) investigated the use of digital storytelling with pre-service teachers in a US university in order to examine the effects of it on their technology self-efficacy and dispositions toward educational technology. She hypothesised that pre-service teachers’ technology self-efficacy and other personal dispositions toward educational technology would improve with exposure to digital storytelling. A pre/post survey format was used to measure participants’ technology self-efficacy and other personal dispositions toward educational technology. Ninety-eight pre-service teachers took part in the survey. Students were given a half-hour tutorial on digital storytelling using the Photo Story software, and were given a week to complete a digital story on the topic “Why do I want to be a teacher?” They were given assistance by the researcher and research assistant if they asked for it.

Quantitative, statistical results of the study showed that both pre-service teacher’s self-efficacy and dispositions toward educational technology greatly improved with exposure to digital storytelling. While these results were very positive in showing that digital storytelling can improve pre-service teachers’ technology self-efficacy and attitudes’ toward educational technology, there were many weaknesses in the study. Analysis was purely quantitative, and lacked the depth that qualitative data might have lent to the study. Another weakness of the study was that the actual implementation of the digital storytelling unit was very limited. This point was raised by the researcher herself, noting that the actual time-on-task for the digital storytelling unit was very short, and that students would have benefited in having a longer period of time to work on their digital stories (Heo, 2009).

### 3.5 Past studies of digital storytelling with pre-service teachers

Several short-term studies into the use of digital storytelling with pre-service teachers, for various purposes, have been conducted. These studies, and their implications for this research, are discussed here.
Chapter 3: Literature Review – Digital Storytelling

Li and Morehead (2006) examined the use of digital storytelling with undergraduate pre-service teachers in a US university. Their study, an exploratory research project, engaged college students (teacher candidates) in using digital storytelling as one of the approaches to build their e-portfolios. The aims of the project were to give the pre-service teachers a chance to integrate multimedia technology into education, learn how to use appropriate technological tools to create the digital stories, and to reflect on their understandings and perspectives of the education they had received in the United States. It was hoped that through the creation of their digital stories, the pre-service teachers would learn to address professional issues. The project took place over two semesters during one school year. Twenty students volunteered to complete digital stories. Students were taken through six workshops of between 2 to 5 hours each, once a month for six months, to assist them with the compilation of their digital stories.

The researchers used both qualitative and quantitative methods for data collection and analysis, such as questionnaires, records of project processes, online discussions and interviews with students. The researchers found digital storytelling to be “…an effective approach in teacher preparation programmes and…a useful tool in the enhancement of teaching and learning new literacies in today’s technology enriched environments” (Li & Morehead, 2006, p. 6). They also found it engaged students in a reflective process, which helped to prepare them to become reflective practitioners.

Kearney (2009) examined the potential role of digital stories in pre-service teacher portfolios, in response to Barrett’s call for the use of digital stories in learning portfolios. He looked at digital storytelling’s support of reflection in teacher education, as well as its ability to support learning from experience, authentic assessment and media literacy. He states that, “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” (Kearney, 2009, p. 1998).
In his study, which took place over the course of one semester in a course for first year primary teacher education students in an Australian university, Kearney investigated the question, “How can digital stories be used to support a professional learning portfolio task in teacher education?” (2009, p. 1989). The study had a particular focus on supporting reflective processes (Kearney, 2009). Participants in the study were eleven volunteer pre-service primary education students and their lecturer. All students on the course had to complete a portfolio and show their understanding of the theme, “What does it mean to me to be a teacher?” Most of the students turned in paper-based portfolios, however, eleven students volunteered to “…create a digital story to capture the ‘story of their learning’ in this subject and incorporate this narrative into their final portfolio…” (Kearney, 2009, p. 1989).

The students received support for their portfolio construction in their regular classes, and those completing a digital story received several opportunities to meet with academic staff “…to become familiar with the ‘digital storytelling’ genre and develop their video production skills” (Kearney, 2009, p. 1990). It is unclear from Kearney’s paper what kind of support for the technology aspect of the digital story construction was made available. However, he does state that students were pointed to appropriate readings and web pages to get a better understanding of the digital storytelling process. They received feedback on their scripts, and shared their final digital stories with peers and staff members.

A qualitative research method was employed in the study, and data collected included student and staff questionnaire responses, student focus groups, observation, and artefact analysis consisting of the students’ digital stories and portfolios. Kearney found that the digital stories produced by the students facilitated the early stages of the reflective process, as defined by Boud et al (1985a), of returning to the experience and attending to associated emotions. However, he notes that

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 (Kearney, 2009, p. 1991).
Students responded positively to the digital storytelling experience, and importantly, Kearney found that “…digital stories can help address the problem of reflection being perceived by students as ‘over-used’ in portfolios…Students can use new media to initiate reflective processes in compelling ways…” (2009, p. 1994). He does note that many students found the process time consuming and technically challenging, and suggests that “…problems of time and skill level required for these types of tasks…needs attention” (Kearney, 2009, p. 1995). He calls for further research into the use of digital storytelling with pre-service teachers, which he terms “…a crucial but underdeveloped area of research into teacher learning” (Kearney, 2009, p. 1995).

As part of a larger study on the use of electronic portfolios and the integration of technology in pre-service teacher education in a US university, Lathem, Reyes and Qi (2006) investigated the use of digital storytelling to capture student voice and reflection in literacy autobiographies. Taking a written assignment from the syllabus that previously asked students to expand a piece of their literary narrative; they reworked the assignment as a digital story. They felt that this would “…complement and enhance the literacy autobiography assignment, provide a performance product that students could potentially use as an artefact in their licensing portfolios, and reinforce the course objectives to develop self-reflection through the writing process” (p. 700).

Sixteen pre-service teachers on the Teaching Young Adolescents course were asked to create a digital story by taking one episode from their previously written literary autobiography and ‘explode it’ (p. 702) for the digital story assignment. They were introduced to digital storytelling early in the semester, and were shown examples of digital stories found on the internet. The instructors also created their own exemplar literacy autobiography digital stories as they could not find any on the internet that fit the assignment. Many of the students had received training on the video editing programme iMovie in a previous class, but some had not, so they were given a tutorial on the use of the software. During a second session they received training on audio editing techniques. After this, students were
expected to work on their projects outside of class, with access to technical help if they needed it.

Lathem et al (2006) note that they learned several things from the experience, such as the need for immediate and constructive feedback in order to keep those students with limited technology skills on track, as well as dealing with the problems of logistics with available technology resources. Many students had access to PCs at home, and therefore wanted to use the Windows Movie Maker application available on their PCs to create their digital stories, instead of the iMovie programme that was taught.

Despite the difficulties many students experienced while constructing their digital stories, Lathem et al (2006) felt that the project inevitably enhanced the students’ technology skills. They state that in the next iteration of the assignment, they will introduce the assignment much earlier in the semester to give students plenty of time to develop and improve their products, teach both iMovie and Windows Movie Maker to give students a choice of platform, and provide more support for those students with less well-developed technology skills.

Overall, Lathem et al (2006) found that creating digital stories was a challenging and worthwhile performance task that enabled student voice in ways that a written narrative could not.

Drazdowski (2007) investigated the use of digital storytelling with in-service teachers in a four day intensive professional development workshop in a US university. Though his focus was not on reflection in pre-service teacher education, he found that the effort to train teachers in the use of digital storytelling definitely had merit, and that digital storytelling has a great deal to offer education. He noted a high degree of cooperation and collaboration amongst the students in the class, stating that they “…served as great resources and sounding boards for each other” (p. 2). He states that, “We in teacher education now face the challenge of infusing these digital storytelling skills throughout the teacher education curriculum” (p. 3).
White and Robin, (2008) report on the use of digital storytelling with both undergraduate and graduate education students in a US university. In their Digital Photography and Digital Storytelling course, students created and collected media based on a popular culture theme they selected, and created a digital story based on this material. The digital stories created had to include a personal element so as to connect them to something important in their lives. Many students who were practicing teachers also integrated instructional elements tied to content so they could use them in their own classrooms.

The instructors had taught digital storytelling before and had focussed those courses on finding the images to illustrate the story. However, this time they spent more time on the ‘storytelling’ instead of the ‘digital’, especially early in the process, and found that this “…made a significant difference and gave students an opportunity to take ownership of the story through the personal nature of their writing” (White & Robin, 2008, p. 3).

Students were taken through the remaining steps of the digital storytelling process such as sharing their rough drafts in small group ‘story circles,’ finding or taking images to include in their story, and creating a storyboard to plan how they would use images, text and sound in their digital stories. Students used audio editing software to record and edit their voiceovers, and could add a soundtrack if they wished. The digital stories were assessed using a rubric based on the CDS’s Seven Elements, and students were required to write a report about the process they went through while creating their digital story.

All of this took place over a semester, but the precise amount of time spent on each step of the process is not stated in the paper. The authors do note in their conclusions that in the next iteration of the course, they plan on incorporating more hands-on time in the computer labs as well as more assistance for students in the areas of script writing and storyboarding.

More studies into the use of digital storytelling with pre-service teachers exist, with varying degrees of the application of the CDS DST format, and varying objectives for the outcomes of the use of DST. A breakdown of
several of these studies, along with those discussed above, can be seen in Table 3.1.

Table 3.1: DST unit focus and structure

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Type of students</th>
<th>Focus of the Digital Story</th>
<th>Structure of DST Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butler and Corbeil (2007)</td>
<td>In-service teachers in South Texas</td>
<td>Teachers could choose their topic</td>
<td>One day workshop on DST and PhotoStory3, given online resources and step-by-step hand-outs, completed the whole DST process in one day</td>
</tr>
<tr>
<td>Carroll and Carney (2005)</td>
<td>Pre-service teachers in a US university</td>
<td>teacher candidates examining and representing their cultural identity</td>
<td>Students work outside of class to assemble media, 4 hours of instruction on using iMovie, then complete the project on their own with tech support available</td>
</tr>
<tr>
<td>Collier and Veres (2006)</td>
<td>Pre-service teachers in a US university</td>
<td>Students create their own literacy autobiography</td>
<td>5 classes on writing the story, one class on intro to DST, two hours of technology lessons, all the rest was done outside of class</td>
</tr>
<tr>
<td>Drazdowski (2007)</td>
<td>In-service teachers in a US university</td>
<td>Free choice of topic, all chose to tell personal stories</td>
<td>4 day intensive workshop, following the CDS model</td>
</tr>
<tr>
<td>Heo (2009)</td>
<td>Pre-service teachers in a US university</td>
<td>&quot;Why do I want to be a teacher?&quot;</td>
<td>One half-hour introduction to digital storytelling and PhotoStory, supplied with links to resources, had one week to complete DST on their own as a ‘take home’ assignment</td>
</tr>
<tr>
<td>Kearney (2009)</td>
<td>Pre-service teachers in an Australian university</td>
<td>Reflection on practice, “What does it mean to me to be a teacher?”</td>
<td>Support provided for DST volunteers outside of class, but structure of classes unclear. Received feedback on story drafts</td>
</tr>
<tr>
<td>Kim (2006)</td>
<td>Pre-service teachers in a US university</td>
<td>Students own perceptions of scientists</td>
<td>Six week class, group projects, one introduction section to DST and the technology (WMM or PPT), the rest of the work was done outside of class with group members</td>
</tr>
<tr>
<td>Latham, Reyes and Qi (2006)</td>
<td>Pre-service teachers in a US university</td>
<td>focus on one episode from a longer, previously written, ‘literacy autobiography’</td>
<td>One semester course, students received instructor and peer feedback on story, followed DST model. One introductory class to DST, one lesson on video editing, one on audio editing, and the rest of the work was done outside of class.</td>
</tr>
<tr>
<td>Li and Morehead (2006)</td>
<td>Pre-service teachers in a US university</td>
<td>to reflect on understandings and perspectives of the education they had received in the US</td>
<td>Two semesters, 6 workshops, 2-5 hours each, once a month for 6 months</td>
</tr>
<tr>
<td>White and Robin (2008)</td>
<td>Undergrad pre-service teachers and postgrad in-service teachers in a US university</td>
<td>based on a popular culture theme they have selected, including a personal element</td>
<td>Semester course, broken up over several classes, followed CDS model closely, class topic breakdown not given</td>
</tr>
</tbody>
</table>
To date though, no long-term, in-depth studies have been completed on the potential use of digital storytelling as a vehicle for reflection with pre-service teachers. Anecdotal papers regarding attempts made at using the technology for various purposes with pre-service teachers constitute, at time of writing, the only extant literature on the topic. Most of these papers conclude with the call for further research into the possibilities of using digital storytelling in this manner, yet none of the research papers used for this review have taken the research any further than a semester or two.

3.6 Digital storytelling design

In addition to the CDS model for the creation of digital stories (Lambert, 2009), many of the studies reviewed above were instrumental in the initial design of the digital storytelling unit described in this study. Other educators who have written extensively on the use of digital storytelling in education, such as Jakes (2007), Matthews-DeNatale (2008), Banaszewski (2002, 2005), Ohler (2008) and Porter (2004b) also influenced the design process.

Jakes (2005) offers advice for implementing digital storytelling for the first time at an educational institution. He suggests developing a pilot programme first, as “Digital storytelling projects are big and messy, and require a thorough understanding of the process, the roadblocks, and techniques necessary for success” (Jakes, 2005, p. 1). The process that he suggests includes

- starting small, with participants who have a range of technology experience and who are risk takers
- using the pilot experience to make sure that all the technology works properly before any type of general rollout
- being honest with participants that this is new, and there will be challenges, but with their help, you will work to overcome them
- developing your own training documents, and modifying them as you go along (Jakes, 2005)

Jakes (2007) also provides excellent information on the use of digital storytelling for the promotion of 21\textsuperscript{st} Century skills in both students and
teachers. Originally introduced by the Partnership for 21st Century Skills (2004) these skills define what students should know and be able to do in the 21st Century. This includes being literate on multiple levels, being capable of independent inventive thinking, being able to communicate in various mediums, and using productivity tools to produce high-quality knowledge products (Jakes, 2007). Twenty-first Century Skills are organized into four categories: Digital Age Literacies, Inventive thinking, Effective Communication, and High productivity, which are further broken down into 20 expectations. Jakes states that

The process of digital storytelling addresses 18 of the 20 expectations for what learning should look like in the 21st Century. The need to be literate in many ways (e.g. information literate, visually literate), being able to be creative and take risks, and in the process use cutting-edge tools to communicate in a highly engaging manner makes digital storytelling a process that is truly reflective of 21st Century learning (Jakes, 2007, p. 7).

Matthews-DeNatale (2008) provides instructions for third level educators to use digital storytelling in their classes and notes that “…if a digital storytelling project isn’t properly planned and implemented, the result can be overwork and frustration for faculty, staff, and students” (p. 4). She suggests plenty of lead time for students to gather and take images for their digital storytelling projects, as well as encouraging students to do as much pre-planning as possible.

Storyboarding and script-writing are the steps that students most frequently give short shrift, or even skip altogether. But be forewarned that, without advance thought and planning, the amount of time students will need for production increases exponentially. In addition, stories created without planning, feedback, and revision, are usually of lesser quality – both in terms of production value and substance (Matthews-DeNatale, 2008, p. 14).

In order to assist students with the creation of their digital stories, she suggests providing students with the assessment rubric at the beginning of the project so they know the criteria expected of them, as well as building in periodic progress reviews into the assignment timeline. “This will allow you to intervene if a project is off-track or floundering, or to offer feedback that will help students create a story that is both intellectually and visually engaging” (Matthews-DeNatale, 2008, p. 5).
3.6.1 Story writing

“Telling your story in the first person is the hallmark of an exemplar digital story” (Porter, 2004b, p. 77).

Banaszewski (2002) has written extensively on the use of digital storytelling in education, specifically on the use of it to teach the genre of personal narrative and media literacy to his primary school students. Banaszewski’s (2005) master’s thesis is an excellent guide for modifying the CDS model to use in an educational setting. He emphasizes the story development part of the digital storytelling process as being the most important element.

There are many challenges to guiding a group of students through a digital storytelling project. When the story part of a digital storytelling project is not clearly defined, the end product will often resemble an anecdote or a narrated slideshow (Banaszewski, 2005, p. 51).

Ohler (2008) also stresses the use of a narrative format for digital stories. He provides excellent guidelines for introducing story format to learners and helping them to flesh out their story in the planning stages. He suggests the use of brainstorming techniques and finding the ‘story core’ of ‘problem, transformation, and solution’, which then leads to the use of a ‘story map’. Ohler’s map is loosely based on Campbell’s (1973) basic story theme of the ‘hero’s journey’, which follows the stages of: the hero being called to adventure, denying the call, accepting a guide to help navigate the journey, passing tests, transformation and return (Ohler, 2008). Ohler feels that, even though there are other story formats that could be used, this story form is appropriate to use to introduce students to story writing as it’s the story format we’re most used to seeing in Western entertainment media. “The media stories that students are bathed in these days – from movies to TV programming to Internet animations – often use Campbell’s approach to story in some form” (p. 71).

Ohler’s (2008) “Visual Portrait of a Story” (Figure 3.1) is a story map which he modified from Bret Dillingham’s model of the story map. It follows the ‘hero’s journey’ story format. He suggests that the story map, if used with students, will be “…the tool they will use to do their most important work in terms of articulating the essential elements of their stories” (Ohler, 2008, p. 71).
79). He emphasises that using story maps to help students flesh out their stories can “…ensure that the sequence of events supports a story that is compelling and memorable” (p. 78).

Figure 3.1: Ohler’s (2008) annotated story map (Visual Portrait of a Story), used with permission

The story map shows the story core of ‘problem, transformation and solution’. It is annotated to describe the nature of the ‘hero’s story’ elements, such as the call to adventure, the problem to solve, conflict and growth experienced, the solution to the problem, and closure, where life resumes, with the ‘hero’ being changed by his or her experience. Ohler suggests taking students through the steps of the story map, and encouraging them to fill out elements of their own story with pencil, using the map as a guide. He states, “You want students to go from idea to story core to story map with as little technological distraction as possible. Have them scribble all over the VPS. The point is for their story maps to make sense to them” (Ohler, 2008, p. 85).

In addition to the excellent guidelines for helping students to write their stories, Ohler also supplies extensive resources for software, royalty free images, sounds and music on his website, http://www.jasonohler.com/storytelling/index.cfm (Ohler, 2007).

3.6.2 Digital story production

Porter (2004b) provides digital storytelling workshops based on the Center for Digital Storytelling model. Her website (2004a) and book (2004b) are
excellent resources for the design and implementation of digital storytelling in a myriad of settings, and especially for education.

Stressing that the best digital stories are those told from the first person, Porter breaks down possible topics for digital storytelling into nine categories and gives possible prompts for starting the different kinds of stories in each category. Of particular significance to this study is her category called “Itza Wrap: Stories of lessons learned”. She describes this category as

…a variation of digital storytelling expressing personal narratives/experiences about lessons learned from projects, initiatives, grants or units of study. They are reflective stories that reveal personal experiences and answer the questions of what did you hear? What did you learn? And what do you think? What insight(s) did the experience give you? What do you now know or understand?” (Porter, 2004b, pp. 93-94)

Porter (2004b) outlines three main plot points for this category of digital story; context, experience and impact.

- Enough information should be given so the audience knows the context of the project or experience.
- Personal experience should be included so that the audience understands the storyteller’s beliefs and attitudes, and key highlights of the experience.
- Impact reveals the difference that was made and the lessons learned from the experience.

Porter stresses that the “… ‘impact’ should not be an afterthought or postscript - it is the heart of the story for the author as well as the viewers” (p. 98). Interestingly, this format contains some of the characteristics of reflective writing proposed by Moon (2004), as discussed in Chapter 2. For Moon, reflective writing can be characterized by a brief description of the event; internal dialogue; self-questioning; noting of alternative perspectives and recognition that there is learning to be gained from the experience, among others (2004).

Porter breaks the process of creating a digital story into four phases of pre-production, production, post-production and distribution. Each of these four
phases are further broken down into Porter’s ‘seven process steps to digital storytelling’ (Figure 3.2).

![Figure 3.2: Porter’s seven process steps for digital storytelling (Porter, 2004b, p. 111), used with permission](image)

During the pre-planning phase, the story is written, the project is planned with the use of storyboards and image and sound lists, and project folders for digital resources are organised. During the production phase, media elements are gathered and prepared, the voiceover is recorded, images and sounds or music are edited. Porter notes that this can be quite time consuming, but stresses that image and sound lists created in the pre-production phase can guide in the selection of media that is needed, saving time in the long-run. During the post-production phase, the media is merged and edited in the video editing software. The distribution phase, which Porter calls ‘Applause, Applause’, is the sharing phase. It includes choosing the playback or publishing format for the finished digital story as well as deciding how and with whom the storytellers wish to share their digital stories.

Porter supplies many materials that can be used, with permission, for scaffolding the digital storytelling process for learners. These range from her “Take Six: Elements of a Good Digital Story”, based on the CDS model of the elements of a good digital story, described above, to brainstorming materials, example storyboards and image and sound lists for keeping track of resources needed for the digital story. She also offers invaluable advice for file management of the media files used in the digital story, which can become quite unwieldy if not kept organised in folders inside a single project folder. She suggests the following format for folder organization (Figure 3.3):
Porter stresses several times that once these folders are created and items are saved to them, it is very important to NOT move these folders or files out of the main project folder. This has to do with the audio and video editing software and their use of the files once they are imported into them. If files or folders are moved after importing them into the software, the software will not be able to locate the files, and the project can be ruined at worst, or cause extreme frustration at best.

Porter offers several helpful tips for the technology challenges that digital story production can entail. She warns that “…creativity and interest can drain away fast when or if hardware or software functions start to break down or get in the way” (2004b, p. 135). Some of these tips are to save your work every five to ten minutes, to make back-up copies of files every few hours at different stages of the compilation process, and to get plenty of technical help from other digital storytellers around you. She also suggests creating a rough-cut of the digital story first, before adding in transitions and special effects, to get an idea of the flow of the digital story, and to see if any additional images might be needed before the final editing process is begun.

The technical side of digital storytelling can be a very daunting experience for some new to using digital media, and even for some who are not new to using it. Porter notes that “…there are a lot of feelings that come up when facing the learning curve of using multiple technical skills” (2004b, p. 167). She suggests keeping an open mind to new learning opportunities and not comparing yourself to others who you might see as ‘experts’ having an easier time putting their digital story together. She says, “Don’t strive to be
an expert – just enjoy doing what you do with what you know thus far. Don’t judge or chide yourself – just learn what you need to know as you go along” (2004b, p. 168). This is excellent advice for anyone trying to use new technology, especially on a project as extensive as the compilation of a digital story.

3.6.3 Copyright issues

A wealth of digitized media is available on the Internet for use in digital stories such as images, music, sound effects and video clips. However, as Porter (2004b) says, “Just because it’s on the Web and CAN be downloaded doesn’t make it yours…” (p. 170). Making students aware of copyright law and fair use policy is a very important part of teaching the digital storytelling process (Banaszewski, 2005; Lambert, 2009; Matthews-DeNatale, 2008; Ohler, 2008; Porter, 2004b). Digital storytellers need to include credits at the end of the movie which cite the original sources of the copyrighted materials used. Under Fair Use Policy, certain amounts of copyrighted material can be used for educational purposes without permission, as long as the original artist is referenced (Stanford University Libraries, 2005). Ohler (2008), Porter (2004b) and Matthews-DeNatale (2008) list websites where more information can be accessed on the fair use of copyrighted material, Stanford University Libraries’ site (http://fairuse.stanford.edu) being the easiest to navigate. Ohler (2008) and Matthews-DeNatale (2008) also mention Creative Commons licencing, which has gained momentum in recent years. Creative Commons licencing allows creative content developers to post their materials online and specify how they can be used. Instead of the ‘all rights reserved’ copyright licence, media creators can specify if their work can be modified, used commercially, remixed, or just used as it is. For more information on Creative Commons licencing, the website can be accessed from www.creativecommons.org.

3.7 Chapter summary

This review of the extant research literature on digital storytelling found that DST has been used successfully to support reflection in pre-service teachers
Chapter 3: Literature Review – Digital Storytelling

(Barrett, 2006; Kearney, 2009; Li & Morehead, 2006), and has been used in other areas to support the reflective process (Lambert, 2009; Rossiter & Garcia, 2010; Sandars, 2009). In addition, DST has been shown to enhance pre-service teachers’ technology self-efficacy (Heo, 2009) as well as their technology skills (Lathem et al., 2006).

Having reviewed exhaustively the relevant research literature on DST, reflection and teacher education, this chapter has identified key issues that need to be addressed within an in-depth, systematic examination of DST as a technology enhanced reflective process in ITE. These salient, interrelated themes taken from the literature include:

- narrative design, and the potentially important role of storytelling as a medium for identity development in teacher education;
- the central importance of collaborative learning among pre-service teachers, especially in relation to ‘personal stories of change’ (Lambert, 2009), and reflection thereon;
- easy-to-use technology and easy-to-access and use, rich media content;
- and creative engagement in the process.

Furthermore, the literature review points to the imperative for an interventionist, design methodology for developing educational technologies – with teachers – to support their reflection on their practice learning. The review illustrates the importance of co-operative design with pre-service teachers, in an iterative, stepwise and collaborative process.

Consequently, based on these key issues emerging from the literature review; the previous, detailed discussion of reflection; and the methodological criteria of the research, the next chapter justifies the selection of design-based research as an appropriate methodology to address the thesis’ central research question: how can we effectively develop digital storytelling to enhance reflective practice in initial teacher education?
Chapter 4: Methodology

4.1 Chapter introduction

Based on the key issues emerging from the literature review; the detailed discussion of reflection; and the methodological criteria of the research, this chapter explains the selection of design-based research (DBR) as an appropriate methodology to address the thesis’ central research question: how can we effectively develop digital storytelling to enhance reflective practice in initial teacher education?

The provenance, characteristics and methods used in DBR are explained, and the possible limitations and challenges of the approach are examined, including strategies for addressing these constraints. Methods used for data collection are also discussed, and the ethical considerations, introduced in Chapter 1, are clarified and addressed. The chapter begins by framing the research question, before outlining in detail the rationale for selecting a methodology and methods predicated on a constructivist and interventionist design-based research paradigm.

4.2 Characterising the problem

The principal research question that this study is concerned with is: How can digital storytelling be designed to enhance reflective practice in initial teacher education? Of key importance to this question is the interrogative how. The principal challenge, in this research, is to try to understand the impact of digital storytelling (DST) on reflection in initial teacher education (ITE) and, building on this understanding, improve iteratively – in-situ, with the pre-service teachers – the potential of DST as a technology enhanced process for their practice learning.

4.3 Methodological requirements

4.3.1 Complexity of teacher education

Therefore, in selecting a methodology, a number of key issues would need to be addressed. The methodology would have to be suitable for the ‘messy’ setting, or what Schön terms ‘the swampy lowlands’ of the local educational
context, and would need to be sensitive and adaptable to the complexities and specific requirements affecting a busy, demanding teacher education course. The literature review looked at several studies dealing with the design of digital storytelling with pre-service teachers (e.g., Drazdowski, 2007; Kearney, 2009; Lathem et al., 2006; Li & Morehead, 2006; White & Robin, 2008). These studies highlighted the complexity of implementing technological interventions with pre-service teachers. In a laboratory setting, one or two hypotheses are typically selected to test. However, in a real-world educational setting, there are multiple dependent variables affecting the success of the innovative technical intervention (Barab & Squire, 2004) designed to enhance reflection in pre-service teacher education. In the context of this research, following from the review of literature and reflection in teacher education chapters, the multiple dependant variables would include, for example: student teachers’ pre-existing technical skill level and their technology self-efficacy; their openness to using new technology; their willingness to engage in the reflective process; narrative; social interaction; engagement; and technology. Therefore, the method chosen would have to help with designing for the complexity of student teachers’ use of digital technologies for reflective practice in the naturalistic ‘real-world’ context of an exacting and pressurised ITE course.

4.3.2 Flexibility and responsiveness to design

The research framework would need to be flexible in order to allow for revisions of the design as the study progressed. As concerns and ideas arose in the study, a flexible research framework would allow for the exploration of “…emerging insightful and promising possibilities” (Hall, 2004, p. 50) in the evolution of the digital storytelling design.

4.3.3 Bridging theory and practice

The methodological approach adopted would need to align theory and practice closely. This study will investigate the use of digital technologies as “…a new set of reflective tools” (Lambert, 2009, p. 92) for pre-service teachers, and could lead to the possible revision of the theory and use of reflective practice, and methods used for supporting reflection among pre-
service teachers. It would have to be well-informed from an ontological and theoretical perspective, yet remain sensitive and adaptable to the local complexities and issues affecting the naturalistic context of a demanding ITE course. The methodology would have to allow for changes as the research unfolded, but would still need to provide sound direction and guidance.

4.3.4 Practical design impact

The key research question is concerned with the practical issues of how digital storytelling can be designed to enhance reflective practice in teacher education. The methodology selected would have to help with creating an effective practical design for a digital storytelling intervention to enhance reflective practice, which could be practically implemented within an initial teacher education programme.

4.3.5 Adaptable and adoptable design model

While the methodology selected would have to help with creating an effective practical digital storytelling design to enhance reflection on practice, an integral part of the research was to provide principles or guidelines to assist other teacher educators in effectively designing a digital storytelling unit for use in their own programmes. As Kelly (2004) argues, design studies “… should produce an artefact that outlasts the study and can be adopted, adapted, and used by others (e.g., either researchers or teachers)…” (p. 116). This was a core part of this thesis’ research contribution because there are currently no such guidelines, only short term, anecdotal studies. Therefore, in addition to improving design practice, the method adopted would also have to support the refinement of the research’s theoretical position and the production of a sharable and reusable model, specifically for designing digital storytelling to enhance pre-service teachers’ reflection on practice.

4.4 Methodology selection and rationale

In attempting to address the transitive focus of this research, to develop new educational technology for teacher education, practice-oriented
interventionist methodological approaches were considered, including action research. Action research is used when practitioners study their own contexts (Zeni, 1998), which is an integral aspect of this study. While DBR can trace its origins to action research, and the two are closely related (Anderson & Shattuck, 2012; Cole, Purao, Rossi, & Sein, 2005), action research does not look specifically at design.

Although action research certainly has merit (Reason & Bradbury, 2001), there is much more potential value in design research, because it combines seeking practical solutions to classroom problems with the search for design knowledge that others may apply (Reeves, Herrington, & Oliver, 2005, p. 107).

As the key research question deals with the practical issues of how digital storytelling can be designed to enhance reflective practice in teacher education, a methodology that took design into consideration was paramount. It was decided to adopt a DBR approach, because this method could help to fulfil the methodological requirements discussed above. “By studying a design in practice with an eye toward progressive refinement, it is possible to develop more robust designs over time” (Collins, Joseph, & Bielaczyc, 2004, pg. 19). DBR could support the researcher to refine and improve the impact and robustness of DST – as a reflective tool in initial teacher education – over the four year period in which the innovation was being introduced and developed within the PDGE/PDE.

DBR has been proven to be an effective methodology for innovative learning environments, invariably including new educational technologies (Barab & Squire, 2004; Sandoval & Bell, 2004). While limitations in the methodology have been identified, such as difficulties arising from the complexity of real-world situations, large amounts of data due to the combination of ethnographic and quantitative analysis, and comparing across designs, the paradigm has arisen as an accepted methodology for use in educational settings (Collins et al., 2004). Additionally, Reeves, Harrington and Oliver (2005) suggest that DBR is the most appropriate method for studying instructional technology in higher education. Reeves et al (2005) would even go as far as to suggest that
If it becomes the preferred model in instructional technology research, design research may well advance the quality and usefulness of a field that is presently at risk of becoming inconsequential and irrelevant (p. 110).

Hofer and Owings Swan (2006) point to the potential specifically of DBR as a systematic and impactful approach to the development and use of digital storytelling. They state,

It will be important for researchers and practitioners to [be] systematic in developing an efficient, effective instructional model to implement digital storytelling projects in a range of settings for a range of purposes…A Design-Based Research approach, in which iterative, formative evaluation helps to both improve an instructional approach and develop theory of teaching and learning, may be particularly effective in assisting this effort (p. 4).

4.5 Design-based research

4.5.1 Origins of design-based research

The provenance and emergence of DBR as an established educational research framework highlight the potential of the approach in developing and deploying successfully educational technologies.

In the early 1990s, DBR arose out of the need for educationally relevant research that could contribute to the improvement of education (O'Donnell, 2004). The practice of studying education through the lens of educational psychology using experimental methods had been criticised for “…not creating usable knowledge…” (Lagemann, 2002, in Sandoval & Bell, 2004, p. 199) and not contributing to educational innovation (Bell, 2004). Many felt that the sanitization of experiments in education, removing the testing of an educational intervention from the ‘real world’ environment of the classroom, made them unusable in a real life educational setting. “An educational psychology that is both usable in a practical sense and scientifically trustworthy cannot proceed without directly studying the phenomena it hopes to explain in its inherent messiness” (Sandoval & Bell, 2004, p. 199). In discussing the origins of DBR, Bell (2004) states that, “Scholars came to engage in Design-Based Research to better understand how to orchestrate innovative learning experiences among children in their everyday educational contexts as well as to simultaneously develop new theoretical insights about the nature of learning” (p. 244). DBR seeks to
study educational phenomena in the real life ‘messy’ situations of actual learning environments.

### 4.5.2 Characteristics of design-based research

The Design-Based Research Collective (2003) propose the following five characteristics of DBR:

- First, the central goals of designing learning environments and developing theories or “prototheories” of learning are intertwined.
- Second, development and research take place through continuous cycles of design, enactment, analysis, and redesign (Cobb, 2001; Collins, 1992).
- Third, research on designs must lead to sharable theories that help communicate relevant implications to practitioners and other educational designers (cf. Brophy, 2002).
- Fourth, research must account for how designs function in authentic settings. It must not only document success or failure but also focus on interactions that refine our understanding of the learning issues involved.
- Fifth, the development of such accounts relies on methods that can document and connect processes of enactment to outcomes of interest.

(The Design-Based Research Collective, 2003, p. 5).

Further key characteristics of DBR include:

- DBR is set in complex, real-world settings (Collins et al., 2004; Edelson, 2002; Reeves et al., 2005)
- the tight relationship between the researcher and teachers or implementers (Bannan-Ritland, 2003; Hoadley, 2004; Kelly, 2003; Reeves et al., 2005)
- the focus on the context of the educational intervention being studied (Bell, 2004; Sandoval & Bell, 2004)
- the importance of using the design process as an opportunity for learning (Edelson, 2002)
- the development of sustained innovation in education (Bell, 2004)
- the long length/longitudinal implementation of most Design-Based Research investigations (Bell, 2004; Reeves et al., 2005)
- the use of a mixed methods approach (Bell, 2004; Brown, 1992; Collins et al., 2004; Hoadley, 2004; The Design-Based Research Collective, 2003)
a pronounced emphasis on the narrative report of the research process (Bannan-Ritland, 2003; Hoadley, 2002)

and the importance of theory refinement to the research process (Bell, 2004; Collins et al., 2004; Sandoval, 2004)

Edelson (2002) states that opportunities to learn arise in the course of any design process. He compares the traditional theory-testing paradigm to DBR, stating that in the traditional theory-testing paradigm,

…design and research are distinct processes that happen sequentially. Design takes place first as the implementation of the theory, followed by the evaluation-oriented research. The design process is not regarded as an opportunity for learning. In contrast, design research explicitly explores the design process as an opportunity to advance the researcher’s understanding of teaching, learning, and educational systems (p. 107).

Joseph, Edwards and Harris (2002) describe DBR as a method that “…calls for ongoing cycles of design, enactment, reflection/evaluation, and redesign. Each design enactment puts into practice ideas developed in the reflection phase, and provides a testing ground for those ideas” (p. 4). Edelson (2002) mirrors this description of DBR in his explanation of the process design-based researchers follow:

…design researchers proceed through iterative cycles of design and implementation, using each implementation as an opportunity to collect data to inform subsequent design. Through a parallel and retrospective process of reflection upon the design and its outcomes, the design researchers elaborate upon their initial hypotheses and principles, refining, adding, and discarding- gradually knitting together a coherent theory that reflects their understanding of the design experience (p. 106).

This characteristic of design research is called progressive refinement. This involves “…putting a first version of a design into the world to see how it works. Then, the design is constantly revised based on experience, until all the bugs are worked out” (Collins et al., 2004, p. 18).

4.5.3 Relating theory and practice

Design-Based Research provides a framework for bringing theory and practice together effectively to achieve practical design goals, while at the same time helping to advance scientific understanding of how interactive educational artefacts and environments can be successfully designed (Hall, 2004, p. 53).
While DBR is concerned with building an intervention to be tested in the real-world educational setting, it is also “…guided and informed by an orienting ontology or theoretical framework” (Hall, 2004, p. 54). Design-based researchers seek to refine theories about the nature of learning in context (Collins et al., 2004) as well as to enhance understanding of how design affects learning (Hall, 2004). “Design-based research is not so much an approach as it is a series of approaches, with the intent of producing new theories, artefacts, and practices that account for and potentially impact learning and teaching in naturalistic settings” (Barab & Squire, 2004, p. 2).

One of the goals of this research is to design a digital storytelling intervention that would utilise “…a new set of reflective tools” (Lambert, 2009, p. 92) to enhance pre-service teachers’ engagement in the reflective process. This includes the refinement of, and a significant contribution to, the theory of reflection in teacher education. The Design-Based Research Collective (2003) describes how “Design-based research, by grounding itself in the needs, constraints, and interactions of local practice, can provide a lens for understanding how theoretical claims about teaching and learning can be transformed into effective learning in educational settings” (p. 8).

Guided by our school of education’s core philosophy of education, which is itself informed very strongly by a Vygotskian social constructivist approach to practice learning (School of Education NUI Galway, 2012), this research follows a social constructivist and constructionist approach to DBR. With an epistemological basis in Deweyan pragmatism (Barab & Squire, 2004; Bell, Hoadley, & Linn, 2004), DBR supports multiple ontologies (diSessa & Cobb, 2004). Based on an emergent understanding, the DBR in this research is inspired by the theories of Dewey (1916, 1929, 1933), Bruner (1986, 1987, 1991, 2002), Papert (1983, 1993) and Vygotsky (1978), among others. As will be discussed in more detail in Chapter 5, one of the overarching theories guiding this study on digital storytelling is narrative, specifically Bruner’s (1986) assertion that our reality is narratively constructed. In addition, Papert’s (1993) constructionist philosophy of learning through the design and the construction of personally meaningful projects has guided the design of the digital storytelling experience.
throughout, igniting the researcher’s particular interest in using narrative technology as a tool in the context of teacher education and reflective practice.

4.5.4 Methods used in design-based research

Anderson and Shattuck (2012) note that “DBR is largely agnostic when it comes to epistemological challenges to the choice of methodologies used and typically involves mixed methods using a variety of research tools and techniques” (p. 17). This “…choice of methods and the focus on authentic and meaningful issues…” (Anderson & Shattuck, 2012, p. 17) situate DBR most closely within the philosophy of pragmatism (Anderson & Shattuck, 2012; Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003; Cole et al., 2005; Reeves, 2000), in particular, Deweyan pragmatism (Barab & Squire, 2004). DBR follows in the footsteps of an educational research model developed by Dewey over 100 years ago (Bell et al., 2004) in which Dewey “…sought to make the act of teaching less ad hoc and mystical” (Bell et al., 2004, p. 74).

To suppose that scientific findings decide the value of educational undertakings is to reverse the real case. Actual activities in educating test the worth of scientific results. They may be scientific in some other field, but not in education until they serve educational purposes, and whether they really serve or not can be found out only in practice (Dewey, 1929, pp. 26-27).

In keeping with this pragmatic philosophy, there is no one method associated with DBR. Instead, accepted practice is to use a mixed methods approach, choosing the methods that best fit the theory or implementation being studied (Bell, 2004; Brown, 1992; Collins et al., 2004; Hoadley, 2004; The Design-Based Research Collective, 2003). Both qualitative and quantitative methods are employed by design-based researchers (Collins et al., 2004). The Design-Based Research Collective (2003) state that, “Design-Based Research relies on techniques used in other research paradigms, like thick descriptive datasets, systematic analysis of data with carefully defined measures, and consensus building within the field around interpretations of data” (p. 7). Collins et al. (2004), give ethnography as one paradigm that can provide qualitative methods “…for looking carefully at
how a design plays out in practice, and how social and contextual variables interact with cognitive variables” (p. 21).

Brown (1992), one of the first to propose the methodology of ‘design experiments’ explains the methods she employs:

…I prefer a mixed approach, suiting the method to the particular data. I mix and match qualitative and quantitative methodologies in order to describe the phenomena, a mixture that is becoming commonplace in the journals…In my own work I routinely combine a concentration on large-scale databases with in-depth microgenetic analyses of a few children or perhaps a group…Our routine practice is to take fairly traditional pre-test and posttest data from all the experimental and control students and combine that with a few selected case studies (p. 156).

Types of quantitative and qualitative methods that have been used in different Design-Based Research studies include:

- field notes, videos, and audiotapes documenting learner behaviour, as well as interviews of learners, student produced videos, video plans, scripts, storyboards (Joseph, 2004)
- standard outcome measures involving reading, writing, content knowledge and computer competence (Brown & Campione, 1994)
- transcripts of children’s planning, revising and teaching sessions, observations of teachers’ coaching and responsive teaching as well as their direct instruction, records of student portfolios, individual and group long-term projects, email queries to peers, teachers and collaborators in the university community, ethnographic observations of cooperative interactions, group discussions, planning sessions, help seeking, peer tutoring, extensive video and audio taping (Brown, 1992)

Bell (2004) argues that Design-Based Researchers should use the research method most suited to the educational phenomena being studied:

Across these Design-Based Research families, there are different scientific research programmes driving the various enterprises— not everyone is seeking to identify relations between dependent and independent variables, and not everyone is conducting ethnographic observation to study the local appropriation of a design…Different kinds of educational phenomena call for the use of different research and design methods and associated forms of knowledge to orchestrate and understand them (p. 251).
4.5.5 Challenges of design-based research

Collins et al. (2004), cite the following as serious challenges faced by Design-Based Research:

- Difficulties arising from the complexity of real-world situations and their resistance to experimental control.
- Large amounts of data arising from the need to combine ethnographic and quantitative analysis.
- Comparing across designs (p. 16).

A major criticism of Design-Based Research studies is that they are set in messy, non-laboratory settings and involve multiple dependent variables. Kelly (2004) worries that design based research is not rigorous enough in its approach. He states,

> When one forgoes experimental controls, how can one generalise to other settings regardless of how rich are the local descriptions? When multiple dependent variables are used, how does one tease complex interactions apart, and are causal attributions plausible? (p. 120)

Collins et al (2004) note that a goal of design-based research is to improve the way a design operates in practice. This includes changes to the design throughout the process. They stress that it is imperative for design-based researchers to document their designs in detail, recording all major changes to the design. They also note the importance of “...thinking systematically about the interdependence of the elements of a design as one tries to assess its impact or modify its elements” (Collins et al., 2004, p. 15). They state that, “A detailed design history of this kind allows research audiences to evaluate the credibility of design decisions, and the quality of lessons learned from the research” (Collins et al., 2004, p. 34). This process has been followed in the reporting of this research, and is documented in detail in the three implementation chapters, 6, 7 and 8.

As will be elucidated in the implementation chapters, the multiple phases of research in this longitudinal study added to the rigour of the research. Similar data instruments were used to gather data across all three phases, as explained in section 4.6 below. Data drawn from both quantitative and qualitative sources, namely the quantitative data drawn from the questionnaire data, and the qualitative data drawn from the students’
reflective feedback essays, allowed for triangulation. According to The Design-Based Research Collective (2003) DBR “…typically triangulates multiple sources and kinds of data to connect intended and unintended outcomes to processes of enactment. In our view, methods that document processes of enactment provide critical evidence to establish warrants for claims about why outcomes occurred” (p. 7).

Hoadley (2004) discusses the drawback of design-based researchers only being able to tentatively generalise their findings, due to the individual contexts of the research setting. He also points out that due to the researcher’s role as a participant observer, they must be aware of their own impact on the results of a study.

A researcher may produce a successful outcome due to a wonderful theory or an effective treatment or through unintended aspects of her or his own participation in the situation. Design-Based Researchers must not only document their perspective or starting point, but must also document any plausibly relevant interventional strategies used not only by participants observed, but also by the researcher herself or himself (p. 205).

However, McNiff et al (2003) in their discussion of action research, argue that in regards to being a participant observer, “…‘being subjective’ can be both an advantage and a limitation. It can be an advantage because you have an insider knowledge of events. It can be a limitation because you may come to biased conclusions about what you are doing” (p. 25). They suggest self-validation of data, as well as involving other people who will act as ‘critical friends’ to critique your interpretations of data. They note that validity can be established by

… showing how interpretations of experience can be negotiated by different people. This can happen on a number of levels: Self-validation: The initial validation of action research depends on the kind of explanation of their practices that individuals are willing to offer themselves. Peer validation: A second level occurs when co-practitioners, persons who understand the context in which we operate, can work vicariously through the evidence we provide to understand the claims we make. Wider public validation: A third level is going public, convincing others who may be strangers about the truth of our claims (p. 29).

In adopting a DBR approach, this study endeavoured to include these forms of validation. Firstly, from a personal perspective, the researcher was critical of her research motives, results and evaluation of outcomes. Secondly, in
working as a part of a team of education technologists, the researcher consulted often with team members, co-teachers who acted as ‘critical friends’ to critique the researcher’s interpretations of the data and offered advice and criticism accordingly. These processes were captured in the researcher’s implementation logs (Long 2010, 2011, 2012). Finally, this research was shared with a wider audience: locally, through annual presentations to a graduate research committee and university research seminars, as well as nationally and internationally, through conferences and publications, and the external examination process for the PGDE/PDE.

4.6 Data collection

In keeping with established practices of Design-Based Research, (Bell, 2004; Brown, 1992; Collins et al., 2004; Hoadley, 2004; The Design-Based Research Collective, 2003) a mixed methods approach was taken in this study, implementing both qualitative and quantitative research methods. Validated as well as researcher created instruments and data collection protocols were used. Methods of data collection over the course of the study evolved with the study, and included questionnaires, online discussion boards, ethnographic observations and a researcher journal/implementation log. Students’ digital storytelling ‘working portfolios’, including all planning and design documents, were collected in order to analyse the creative and reflective processes followed by students in the construction of their digital stories. Performance based assessment rubrics were also created and used to assess the digital stories produced by the students, as well as to analyse them for depth of reflection. Table 4.1 illustrates the breakdown of data collection over the three design cycles.
Table 4.1: Breakdown of design cycles/data collection

<table>
<thead>
<tr>
<th>Design Cycle</th>
<th>Time Period/Duration</th>
<th>Number of Students Involved</th>
<th>Data Collection Tools Deployed</th>
</tr>
</thead>
</table>
| Design Cycle 1: Initial Experience - Pilot Project | • 2009-2010 academic year  
• 22/2/10 to 13/5/10  
• 13 weeks total | • 18 completed DST  
• 16 participated in research  
• 12 completed questionnaire | • Post DST questionnaire  
• Working portfolio  
• Completed digital stories  
• Online discussion board  
• Student emails  
• Researcher journal/implementation log |
| Design Cycle 2: Pilot to Mainstream | • 2010-2011 academic year  
• 6/12/10 to 9/5/11  
• 23 weeks total | • 208 completed DST  
• 133 participated in research  
• 49 completed questionnaire | • Post DST questionnaire  
• Working portfolio  
• Reflective feedback essays  
• Completed digital stories  
• Online discussion board  
• Student emails  
• Researcher journal/implementation log |
| Design Cycle 3: Capstone | • 2011-2012 academic year  
• 26/9/11 to 2/1/12  
• 16 weeks total | • 197 completed DST  
• 159 participated in research  
• 25 completed questionnaire | • Post DST questionnaire  
• Working portfolio  
• Reflective feedback essays  
• Completed digital stories  
• Online discussion board  
• Student emails  
• Researcher journal/implementation log |

4.6.1 Questionnaire creation

Survey research is used to gather information on the attitudes, opinions, behaviours or characteristics of a population (Creswell, 2005). Cohen, Manion and Morrison (2007) state that questionnaires are useful instruments for “…collecting survey information, providing structured, often numerical data…and often being comparatively straightforward to analyse” (p. 317). Creswell (2005) suggests finding and using or modifying established survey instruments if they are available in order to measure variables. He states that, as the creation of good survey instruments is a challenging and complex process, the use of established instruments can make the data collection process easier.
In keeping with the ethical issues raised in Cohen et al., (2007) students were given a choice of participating or not participating in the questionnaire, their voluntary informed consent was sought, and they were assured of anonymity, confidentiality and non-traceability (including deductive disclosure).

During the pilot project, a post-digital storytelling experience questionnaire (Appendix 28) was developed by the researcher to capture participants’ thoughts and feelings on their involvement in the digital storytelling process. This questionnaire, administered to the students after they completed and submitted their digital stories, was revised slightly during each iteration of the design (Appendices 29 & 30). Much of the questionnaire consists of statements based on several different topics, such as creativity, self-efficacy, engagement, motivation, the digital storytelling process, critical reflection and personal narrative. The majority of these statements are based on a 5 point Likert scale of Strongly Disagree to Strongly Agree.

Other questions on the survey are open-ended, asking students for their opinion on a part of the digital storytelling process. Many of these questions occurred to the researcher during the teaching of the first iteration of the digital storytelling unit, based on observed student behaviour and questions posed by the students themselves. Examples of open ended questions included in the questionnaire are:

- Why did you choose to complete a Digital Story?
- What did you like most about the DST process?
- What did you like least about the DST process?
- What helped you most in putting your digital story together?

Many of the items in the post-digital storytelling experience questionnaire were taken from validated instruments. The items dealing with engagement were based on The User Engagement Scale, created by O’Brien & Toms (2009). This instrument was designed to evaluate engagement with technology. O’Brien & Toms (2009) based this instrument on the theoretical
frameworks of Aesthetic, Play, and Flow Theories. They state, “The survey instrument itself is a... statistically verified tool that may be used by software designers to assess their applications or by researchers for academic purposes” (O’Brien & Toms, 2009, p. 64). An example of a statement that tests for engagement is: *I lost myself in the digital storytelling experience.*

Many questions on the post-digital storytelling questionnaire deal with students’ self-efficacy in regards to technology use. Self-efficacy is the belief that one is capable of performing in a certain manner to attain certain goals (Cherry, 2010). Technology self-efficacy has to do with the belief that one is capable of using technology in a certain manner to obtain certain goals (Heo, 2009). Research has shown that pre-service teachers with high levels of technology self-efficacy are more inclined to use technology in their own classrooms (Heo, 2009). Items dealing with technology self-efficacy were based on an instrument created and validated by Torkzadeh and van Dyke (2001), which deals with internet self-efficacy. Statements from this instrument were rewritten in terms of the digital storytelling process. An example of a statement that tests for self-efficacy is: *I feel confident in the use of educational technology.*

Lastly, items on the survey dealing with motivation were based on the Intrinsic Motivation Instrument (IMI) developed by the Self Determination Theory group at the University of Rochester, New York. This instrument “…was developed to assess participants' subjective experience related to experimental tasks” (Self Determination Theory Group, 2009). The survey instrument is available at:  
http://www.psych.rochester.edu/SDT/questionnaires.php. The instrument can be modified to fit the task being analysed without affecting its reliability or validity (Self Determination Theory Group, 1982).

Other questions and/or statements on the questionnaire were developed based on the literature regarding areas such as reflection, personal narrative and creativity. This questionnaire was administered to the students as an
online survey using the KwikSurveys website on the completion of the digital storytelling project during each design iteration.

4.6.2 Rubric creation

Collins et al (2004) state that design-based researchers use “systematic analysis of data with carefully defined measures” (p. 7). Rubrics were devised to evaluate students’ digital stories and to examine them for depth of reflection. Allen and Tanner (2006) describe a rubric as “…a type of matrix that provides scaled levels of achievement or understanding for a set of criteria or dimensions of quality for a given type of performance” (p. 197). Rubrics are a form of authentic assessment which are particularly useful in assessing criteria which are complex and subjective (Picket & Dodge, 2007). “Authentic assessment is geared toward assessment methods which correspond as closely as possible to real world experience. It was originally developed in the arts and apprenticeship systems, where assessment has always been based on performance” (Picket & Dodge, 2007, p. 1).

A digital story evaluation rubric (Appendix 3) was created by the researcher to assess students’ completed digital stories during the first design iteration. This rubric, which consisted of two pages, was based on other digital storytelling rubrics sourced from the literature (See Barrett, 2005a; Hodgson, 2010; Integrating Digital Storytelling in your Classroom, 2006; Porter, 2004a). This was subsequently altered during successive designs. The rubric designed to measure depth of reflection (Appendix 4) was based on Moon’s (2004) generic framework for reflective writing.

4.6.3 Students’ ‘working portfolio’ materials

Both Joseph (2004) and Brown (1992) have suggested the use of student work as an item for data analysis in Design-Based Research. In keeping with this, students were asked to turn in all the planning documents used in the creation of their digital stories as part of their ‘working portfolio’ (Appendix 32). This material consisted of brainstorming sheets, story drafts, story maps, storyboards, the final voice-over script, music/sound lists, image/shot lists, and references for
articles/chapters/quotes used in the creation of the digital story. For the second and third iteration of the design, an 800-1000 word reflective feedback essay was also included as part of the working portfolio.

4.6.4 Online discussion boards

Another method of data collection utilised were online discussion boards. According to Suler (2004), “Discussion boards provide instructors a unique opportunity to extend their classrooms into cyberspace” (p. 395). They can be used to provide both peer support among students and interaction with the instructor outside of the classroom setting (Wickstrom, 2003). A digital storytelling discussion board was implemented during all three design iterations to keep track of student queries about the process as well as to provide a forum for students to help each other through the process of creating their respective digital stories.

4.6.5 Ethnographic observations and reflections

Collins et al (2004) offer ethnography as one paradigm that can provide qualitative methods “…for looking carefully at how a design plays out in practice, and how social and contextual variables interact with cognitive variables” (p. 21). Hoadley (2002) encourages the use of a narrative record of the design process. He states that

A design narrative describes the history and evolution of a design over time. It may not be as complete as, for instance, videotapes of the entire design process and all uses of the designed artefacts, but it does communicate compactly and effectively how a design came into being. By relating the design’s changes over time, a design narrative can help make explicit some of the implicit knowledge the designer or designer-researcher used to understand and implement the intervention (p. 454).

Throughout the three iterations of the digital storytelling design, the researcher kept a narrative implementation journal (Appendix 27) where she made observations of the digital storytelling implementation, noted student questions on the process, and kept a record of problems that arose, all of which contributed to changes in the design over the course of the study.
4.7 Data analysis

During the pilot project, the main source of student data originated from the post-DST questionnaire. Results from the questionnaire were downloaded from the online survey site KwikSurveys and imported into MS Excel for analysis. As the sample size was very small, it was felt that the use of specialist data analysis software was not necessary.

However, from the second iteration of the project on, when large numbers of students participated in the DST research, the use of more sophisticated and purpose built software was needed for data analysis. NVivo, a qualitative data analysis software package, was used to analyse the students’ reflective feedback essays. The quantitative data analysis package SPSS (Statistical Package for the Social Sciences), was used to analyse the quantitative questionnaire data.

4.7.1 Analysis of reflective essays in NVivo

Original documents can be imported into NVivo and coded within the program. The students’ reflective feedback essays were analysed in this manner.

4.7.1.1 Downloading essays from Blackboard

In July of 2011, the reflective essays from the 2010-2011 cohort’s DST working portfolios were downloaded from the university’s Learning Management System, Blackboard (Bb), to the researcher’s laptop and saved. When downloaded, the files are automatically named by Bb with student ID numbers. The IDs were then matched to the appropriate student, using the DST assessment list, and renamed according to student name.

Once the essays were renamed, essays for all those students who did not want to be included in the research were deleted. Any essays by students who did not turn in a permission slip were also deleted. Table 4.2 shows the breakdown of numbers of reflective feedback essays analysed during the second and third years of the research project.
Table 4.2: Numbers for reflective feedback essay analysis in NVivo, years 2 and 3

<table>
<thead>
<tr>
<th>Year</th>
<th>2010-2011</th>
<th>2011-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of students in Cohort</td>
<td>213</td>
<td>197</td>
</tr>
<tr>
<td>Number that said ‘yes’ to participation in research</td>
<td>142</td>
<td>162</td>
</tr>
<tr>
<td>Number that said ‘no’ to participation in research</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Number who did not turn in permission slip</td>
<td>48</td>
<td>12</td>
</tr>
<tr>
<td>Number of students who said ‘yes’ to research but did not submit soft copy of reflective essay to Bb</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Number left for analysis in NVivo</td>
<td>133</td>
<td>159</td>
</tr>
</tbody>
</table>

4.7.1.2 Anonymizing the essays before importing into NVivo

A spreadsheet was created with a list of all the students who had given permission for their materials to be used for research. Anonymous numbering for the reflective essays was achieved by using the formula =RAND(). The list was then sorted by the random numbers in ascending order. The essays were renamed to include the year of the cohort and the random number (e.g. 2010-2011 1, 2010-2011 2, 2010-2011 3). The anonymous numbers generated through this process were then matched to the student names on the essay files, and the names were replaced with the anonymous numbers. The spreadsheet lists were retained so the source of any data obtained from the reflective essays could be matched back to the original author if necessary.

4.7.1.3 Importing anonymized essays into NVivo

The reflective essays were imported into NVivo using the import External data function. A folder was made for the reflective essays from 2010-2011 in the Internals section of the program. The essays were then batch imported into the folder. This process was repeated in the third year of the study for the 2011-2012 reflective feedback essays.

4.7.2 Levels of Coding

Gibbs (2007) describes three different levels of coding: descriptive codes, categories and analytic codes. Descriptive codes describe what the respondent is saying, and are usually couched in the respondent’s own words, and views of the world. Gibbs states that, “In analysis you need to move away from descriptions, especially using respondents terms, to a more categorical, analytic and theoretical level of coding” (Gibbs, 2007, p. 42).
Chapter 4: Methodology

Categorizing things mentioned by respondents as you are coding is a step up from merely using descriptive codes. Analytic codes are an interpretation of the text; they don’t simply code what happened, but rather suggest the way the respondent thought about or conceptualised the things discussed (Gibbs, 2007, p. 43).

4.7.2.1 Concept-driven or Data-driven Coding

Gibbs (2007) also discusses concept-driven and data-driven codes. Concept-driven codes come from the research literature, previous studies, researcher hunches, etc. These codes can be created before ever using them to code the data. This tactic is taken during framework analysis.

In framework analysis, before applying codes to the text, the researcher is encouraged to build up a list of key thematic ideas. These can be taken from the literature and previous research but are also generated by reading through at least some of the transcripts and other documents such as field notes, focus groups and printed documents (Gibbs, 2007, p. 45).

Coding then “…consists of the identification of chunks of text that exemplify the codes in this initial list. However…the researcher will need to amend the list of codes during analysis as new ideas and new ways of categorizing are detected in the text” (Gibbs, 2007, p. 45).

Gibbs (2007) describes data-driven coding as the opposite of starting with a given list of codes; starting with no codes. Gibbs describes this as ‘open coding’, “…perhaps because one tries to do it with an open mind” (p. 45). He goes on to state that, “Of course, no one starts with absolutely no ideas…We all have ideas of what we might expect to be happening…Nevertheless one can try, as far as possible, not to start with preconceptions” (p. 45). Most researchers move back and forth between these two sources of coding inspiration during their analysis (Gibbs, 2007).

4.7.3 Coding of the reflective feedback essays

The coding of the students’ reflective feedback essays was both concept-driven and data-driven. Several codes arose from the literature and research questions before reading through the essays, based on the theoretical underpinnings of this thesis, exemplified in the R-NEST model: reflection,
narrative, engagement, sociality, and technology. Ideas for coding also came from the pilot project students’ survey answers. As a manner of gaining feedback from the students about the DST process, the researcher was specifically looking for any reference to things pertaining to the process that would help to enhance the design for subsequent iterations. Of particular interest were those factors that caused problems for the students during the creation of their digital stories which led to frustration and a possible disengagement with the process.

The concept-driven codes that were devised before reading through the essays can be seen in Figure 4.1.

![Concept driven codes created for data analysis, design two](image)

**Figure 4.1: Concept driven codes created for data analysis, design two**

4.7.3.1.1 Coding ‘in vivo’

While the researcher had developed a code framework prior to analysing the data, she also chose to code ‘in vivo’. This refers to using the words occurring in the text to label the codes, as ideas emerge from the participants comments (Richards, 2010). NVivo allows you to select the text
you want to code and type in the code in the “Code at” field, as shown in Figure 4.2.

Figure 4.2: Screenshot of coding in NVivo

Once a code was created, it could be chosen from the list of codes, as shown in Figure 4.3.

Figure 4.3: Screenshot of choosing a code created while coding ‘in vivo’ using NVivo, design two

The ‘nodes’ (individual codes) created in this way were saved to the ‘Open Coding’ folder in NVivo. Text was also interpreted and coded categorically, analytically and thematically, using the original coding framework.

Some passages of text were coded for more than one thing, as illustrated in Figure 4.4, where one section of text has been coded for 3 different items.
4.7.3.2 Auto coding

After several essays had been coded, the researcher began noticing some terms that arose over and over again, such as ‘Frustration’ and ‘Daunting’. These had not been noticed or coded in previous essays. Instead of going back and looking for these terms individually in the essays that were already coded, the auto coding facility in NVivo was used. This was done using the **Text Search Query** in NVivo.

In order to code for ‘Frustration’, or variations on the word, such as ‘frustrating’, a text search query for ‘frustr*’ was created, where the * represents a ‘wild card’ which allows any words beginning with ‘frustr’ to be searched for.

A **Frustration** node was created. On the query options tab, ‘Merge Results into Existing Node’ was chosen, and the **Frustration** node was selected. A spread of 40 words was chosen in order to pick up enough surrounding text to keep the coded section in context. The query was run, which added 91 occurrences of the code ‘Frustration’ to the node. This process was then repeated for several other terms as they arose.

4.7.3.3 Condensing the Codes

When the first open coding run through was finished with the 2010-2011 cohort, there were 234 codes. As some of these were coded using the words occurring in the text to label the codes, there were many codes that were redundant. It was decided to review and condense the codes that were
similar at this point. This was done to reduce the number of codes to a manageable set.

Within the Open Coding node in NVivo, the open codes were sorted by frequency in the *Sources* column. Each of these nodes was opened and the codes were re-read. If they fit within another existing code, they were re-coded to that node, and the extraneous code was deleted. If they didn’t fit into another code, they were left as they were. Several codes were renamed for clarity.

### 4.7.3.4 Coding Hierarchy

Once codes have been created, the researcher can begin to arrange them into a coding hierarchy (Gibbs, 2007).

Codes that are similar kinds of things or that are about the same thing are gathered together under the same branch of the hierarchy, as siblings of the same parent...Rearranging codes into a hierarchy involves thinking about what kinds of things are being coded and what questions are being answered (Gibbs, 2007, p. 73).

Gibbs (2007) suggests transforming codes into more analytic and theoretical ones, but cautions that this should not be done lightly. He also suggests keeping the hierarchy shallow, keeping most of the list to two levels, or three if it can’t be avoided. However, he states that if you are using software that can handle many levels, then it is OK to go with three levels (Gibbs, 2007). NVivo allows for several levels of a coding hierarchy to be created. The researcher found that most codes could be organised under two levels of a hierarchy, but some were organised under a third level.

After the first run of open coding was finished, the codes were copied and pasted into a new folder in NVivo called ‘coding round two’ (Figure 4.5), in order to leave the original codes in the ‘open coding’ folder. In the ‘coding round two’ folder, the codes were arranged into a hierarchy of parent and children nodes. The coding framework originally designed by the researcher based on the R-NEST framework was used to organise the nodes into ‘parent’ themes. All codes...
were categorised under these themes. As the researcher had this coding framework in mind when coding the students’ essays, the coded material fit well into the parent nodes.

These were then copied and pasted into a folder called ‘coding round three’, and further sorted into a third level of the hierarchy where possible. An example of this can be found in the coding of the term ‘challenge’. This was one of the terms coded using the auto coding feature of NVivo. The researcher realised after coding many of the student essays that this word appeared over and over again, as many students described the DST assignment as ‘challenging’ or talked about running into challenges while creating their DSTs. Running the auto coding feature turned up many instances of this term. However, as the researcher read through them, she realised that not all were negative, as she had originally thought. Many students spoke of the challenges they faced in a positive way. So the ‘challenge’ code was further categorised as either ‘challenge positive’ or ‘challenge negative’, as shown in Figure 4.6. Not all of the passages had to do with the DST, and some were neither negative nor positive, but those that fit were re-coded in this way.

Other items were coded into sub-codes of the parent code. There were many codes that were categorised under the ‘Engagement Parent’ code that had to do with negative things students said about the DST process. A sub-code of ‘disengagement’ was created, and these negative comments were organised under this code, as shown in Figure 4.7.

Once the codes were organised in this way, they were analysed further. All
the passages coded at a certain node could be called up in one document. The researcher was then able to read through the passages several times to synthesise what the students were saying about their digital storytelling experiences. Figure 4.8 shows a screenshot of passages coded at the ‘fun’ node in NVivo.

![Figure 4.8: Screenshot of passages coded as ‘fun’ from the 2010-2011 reflective feedback essays](image)

4.7.3.5 Coding of the year three essays in NVivo

Similar procedures were followed for importing and coding the reflective feedback essays from the third year of the study. Several new codes were generated with the new data, and some of these codes were retrospectively applied to the year two essays through the use of the auto coding feature in NVivo. These new nodes were incorporated into the parent nodes of reflection, narrative, engagement, sociality and technology in the Round Three Coding folder. As the reflective essays from each year were labelled by year, it was easy to tell the data apart, as shown in Figure 4.8.

4.7.4 Questionnaire data analysis with SPSS

Quantitative data obtained from the post-DST questionnaire in the second and third design iterations was analysed using the software package SPSS. Results from the online questionnaire were downloaded as an MS Excel file. Data was cleaned in Excel to prepare it for importing into SPSS. Many multiple choice answers had to be recoded into a single column for importing into an SPSS variable. Some open-ended questions were coded as
numerical answers for use in the SPSS software, while others were excluded from the quantitative data analysis and used for qualitative analysis instead.

Figure 4.8 illustrates the process followed for data analysis, as suggested by Pallant (2010).

As suggested by Pallant’s (2010) process, a codebook (Appendix 31) was developed to keep track of how data was converted into a format that SPSS could manipulate. The codebook was used to document how variables were labelled in SPSS and what numerical code was assigned to each of the possible responses.

A data file was created in SPSS. Based on the codebook, variables were defined according to the variable label, name and type of data they represented. Once the variables were defined, the cleaned excel data was copied and pasted into SPSS in the appropriate variables in Data View. The data files were then screened for errors and data was cleaned accordingly.

It is important to point out that SPSS was used to portray mostly descriptive data in this study, as the numbers involved in the post-DST questionnaires
were too low to engage in any in-depth statistical analysis. Frequency tables were run to generate descriptive statistics and most data was analysed at this level first. Then some variables were modified for further analysis, as will be described below. Finally, cross-tabs were run on some variables to look for relationships between them.

4.7.4.1 Modified Variables

Eight items from the User Engagement Scale, a Likert scale, were included in the questionnaire to measure students’ level of engagement in the digital storytelling process. All the items were positively worded, with possible answers of 1=Strongly Agree, to 5=Strongly Disagree. Students could obtain a summated score from these items of a low score of 8 to a high score of 40, the lower the summated score, the higher the level of engagement. The SPSS Transform/compute variable command was used to sum results of these questions to obtain an overall engagement score. This summated score was then recoded, using the SPSS Transform/Recode into different variables command as ‘High level of engagement’, ‘Medium level of engagement’ and ‘Low level of engagement’ for each questionnaire participant, as shown in Table 4.3.

Table 4.3: Recoding of levels of engagement

<table>
<thead>
<tr>
<th>Level of Engagement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level of engagement</td>
<td>8-18</td>
</tr>
<tr>
<td>Medium level of engagement</td>
<td>19-29</td>
</tr>
<tr>
<td>Low level of engagement</td>
<td>30-40</td>
</tr>
</tbody>
</table>

Other variables recoded in a similar manner included participants’ levels of self-efficacy and levels of motivation/enjoyment. In addition, new categories were derived for Age, Teaching Practice Qualification(s) and Hours Per Week students spent on the computer, using a similar process.

4.7.4.2 Crosstabulations

Crosstabs are used to explore the relationship between two or more variables (Pallant, 2010). They provide a way of analysing and comparing
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the results for one or more variables with the results of another. Crosstabs were run on some variables during the second and third design iterations to see if a relationship existed between them. Some examples of crosstabs run were the comparison of students’ self-reported computer skill level with their technology self-efficacy scores, or their reported ease-of-use score for the video editing software used compared with the type of software they used. While these gave the researcher a visual representation of the relationship between two variables, the numbers involved in the questionnaires were too low to engage in an in-depth statistical analysis of the relationship between variables.

4.8 Ethical considerations

Zeni (1998) notes that when practitioners study their own contexts, traditional ethical research guidelines “…are either irrelevant or problematic for the teacher investigating her own classroom” (p. 9). Practitioner research creates its own ethical dilemmas, different to traditional educational ethnography and qualitative research. She notes that we need to be aware of the power relations and shared understandings between people within the study group. “We aren’t outsiders peering from the shadows into the classroom, but insiders responsible to the students whose learning we document” (p. 10).

Hearne (2014) suggests that practitioner researchers need to be “…ethically reflective, reflexive and willing to ask critical questions of themselves” (p. 5). As a researcher participant and teacher of the students involved in this study, the researcher is aware of her power relation with the students. She is their teacher and assessor, therefore, in a position of power over them. Zeni (1998) suggests open communication between researcher and researched. Every effort has been made throughout the research process to inform the students of the research being carried out, and due care has been taken to ensure that the students and their work were treated ethically. Some examples of this are:

- During the second and third year of the study, students were asked to give their opinion of what they thought of the DST process in their
reflective feedback essays, be that positive or negative. In order not to bias the researcher’s opinion of student work during the assessment process, the researcher purposefully did not read students’ reflective feedback essays until after assessing all other parts of the DST project.

- Students were assured throughout the DST process that participation in the research aspect of the project was voluntary, and that if they chose not to participate in the research, it would not affect their mark on the project in any way. Once students had made the choice not to participate in the research, the researcher respected this decision and no attempt was made to change students’ minds.

- Some students were embarrassed or uncomfortable when it came to sharing their original DST ideas in the story circle step of the DST process, or sharing their finished DST with their peers. The choice was left up to them to participate in the sharing aspects of the process or not. They were assured that non-participation in the sharing aspects of the DST process would not affect their mark on the project.

Data protection protocols and research ethics regarding voluntary informed consent, disclosure and confidentiality, as outlined by the BERA's (British Educational Research Association) Revised Ethical Guidelines for Educational Research (2004), were complied with.

4.8.1 Voluntary informed consent

Students were informed of the research being carried out during the first lesson of the digital storytelling unit each year. The processes involved, why their participation was necessary, and how and to whom the research would be reported was explained to them. While all students were required to participate in the digital storytelling process as part of their education technology module, every student had the choice of whether or not they wanted to be involved in the research part of the process. Students were assured that their choice to participate or not in the research would in no
Chapter 4: Methodology

way affect their mark/grade on the project, and were therefore under no duress to participate. Consent forms were distributed to the students regarding the use of their digital stories and working portfolios for the research (Appendices 12, 18 and 23). Any students who did not consent to participating in the research, or who did not submit a completed consent form, were not included in the research. Students were informed of their right to withdraw from the research at any time without penalty.

4.8.2 Confidentiality

Participants’ data were treated confidentially and anonymously at all times. Questionnaire participation was anonymous. Data taken from students’ working portfolios were anonymized and have been presented in this thesis and in other publications as such. Names were removed from any digital stories used to share outside the student cohort, unless the author wanted their name left on their creation. Permission for this was sought and granted in writing.

4.8.3 Disclosure

The BERA’s ethical guidelines note that it is good practice for researchers to debrief participants at the conclusion of the research and to provide them with copies of publications arising from their participation. Any publications regarding the research, such as conference presentations, are available from the researcher’s university web page. On publication of this thesis, efforts will be made to disseminate it among past students who were participants in the research. It will also be available from the researcher’s university web page.

4.8.4 Data protection protocols

Data have been kept securely. The data retained electronically on the researcher’s computer are password protected. Hard copy materials, such as the students’ working portfolio data, are stored in a locked file cabinet.

4.9 Chapter summary

This chapter has outlined the research methodology: DBR, and specific research methods which were adopted to answer the thesis’ research
question; how can digital storytelling be designed to enhance reflective practice in initial teacher education? The rationale for choosing DBR as the methodological approach was outlined, and the origins, characteristics and methods used in DBR were explained. The possible limitations and challenges of the approach were examined, and methods used for data collection were outlined. Finally, ethical considerations, and the steps taken to ensure that these considerations were properly addressed, were discussed.

As is the accepted next phase in a DBR study, the following chapter will describe the “proto-theory” (The Design-Based Research Collective, 2003, p. 5) or the orienting conceptual-theoretical framework that helped to guide the collaborative and iterative DBR process.
Chapter 5: Theoretical Framework

5.1 Chapter introduction

Design-based research requires more than simply showing a particular design works but demands that the researcher (move beyond a particular design exemplar to) generate evidence-based claims about learning that address contemporary theoretical issues and further the theoretical knowledge of the field (Barab & Squire, 2004, pp. 5-6, emphasis in original).

Design-based research (DBR) aims to advance theoretical understanding of technology-enhanced learning through the development of robust, adaptable and adoptable design models. These models are both informed by theory and test the application of that theory in practice, thereby helping potentially to further conceptual understanding of contemporary issues in education (Barab & Squire, 2004; Hoadley, 2004; Kelly, 2004). The initial, proto-type design model in this thesis, R-NEST, is predicated on a synthesis of: (1) an exploration of reflection in ITE (Chapter 2); (2) key issues emerging from extensive review of the relevant research literature (Chapter 3); and as will now be discussed in this chapter, (3) in-depth consideration of, and reflection on key relevant concepts and theories. The orienting theoretical framework that informs the model comprises five main educational design concepts or theories: (1) reflection; (2) narrative; (3) engagement; (4) sociality and (5) technology. As the concept of reflection in teacher education was discussed in detail in Chapter 2, the first salient theory that is discussed in this chapter is narrative, and its potentially profound role in identity development, including teacher identity formation, teaching and learning.

5.2 Narrative

We dream in narrative, daydream in narrative, remember, anticipate, hope, despair, believe, doubt, plan, revise, criticize, construct, gossip, learn, hate and live by narrative (Hardy, 1968, as quoted in Egan, 1992, p. 64).

One of the overarching theories guiding this study on digital storytelling is narrative, the raison d'être of the research being the study of student teachers constructing stories to make sense of their experiences and actions during their year as pre-service teachers. Narrative reaches in and touches so
many parts of this study; storytelling, identity creation, the stories we tell about ourselves in order to communicate our experiences to others, as well as the stories we tell ourselves when reflecting on our own experiences.

Of particular influence on this research are Bruner’s theories of ontogenetic narrative and the autobiographical self. For Bruner, reality itself is narratively constructed (Bruner, 1986). He sees no other way of describing “lived time” except in the form of narrative (Bruner, 1987). Bruner states that people anywhere in the world can tell you about their lives, and have been doing so throughout human existence. In essence, “…the self-told life narrative is, by all accounts, ancient and universal.” (Bruner, 1987, p. 695) Bruner (2002) uses the Aristotelian notion of ‘peripeteia’ to describe the turning points in our lives that can turn the routine events in one’s life into a story.

Bruner believes that there may be a biological basis for our narrative way of understanding the world, a “…predisposition to organize experience into a narrative form, into plot structures and the rest” (1990, p. 45). He states that, “Narrative structure is even inherent in the praxis of social interaction before it achieves linguistic expression…it is a “push” to construct narrative that determines the order of priority in which grammatical forms are mastered by the young child” (Bruner, 1990, p. 77).

Our personal narratives are influenced by the culture in which we live, by our language and by the ‘narrative models’ our culture provides us with, by which we come to shape our life stories. Bruner calls stories “…a culture’s coin and currency” (2002, p. 15). He states that

…eventually the culturally shaped cognitive and linguistic processes that guide the self-telling of life narratives achieve the power to structure perceptual experience, to organize memory, to segment and purpose-build the very ”events” of a life. In the end, we become the autobiographical narratives by which we "tell about" our lives (Bruner, 1987, p. 694).

Other narrative theorists support Bruner’s ideas regarding our use of narrative to understand the world around us. McAdams (1993) states that

…much of what passes for everyday conversation among people is storytelling of one form or another. This appears to be so pervasively true
that many scholars have suggested that the human mind is first and foremost a vehicle for storytelling. We are born with a narrating mind…” (p. 28)

From an early age, we have an innate understanding of story. Storytelling “…appears to be a fundamental way of expressing ourselves and our world to others” (McAdams, 1993, p. 27). Egan (1992) explains that the structure and affect of narrative help us to make better sense of our world, “…we can recall items in narrative structures better than in logically organized lists…we more profoundly code knowledge in our memories by affective than by logical associations…” (p. 63). Schank (1990) also notes how the narrative format of storytelling helps us to understand and remember. “Stories give life to past experience. Stories make the events in memory memorable to others and to ourselves. This is one of the reasons why people like to tell stories” (p. 10).

…all we have are experiences, but all we can effectively tell each other are stories. Communication consists of selecting the stories that we know and telling them to others at the right time. Learning from one’s own experiences depends upon being able to communicate our experiences as stories to others” (Schank, 1990, p. 12).

5.2.1 Narrative identity

A self is probably the most impressive work of art we ever produce, surely the most intricate. For we create not just one self-making story, but many of them…The job is to get them all into one identity, and to get them lined up over time (Bruner, 2002, p. 14).

Bruner sees narrative as a vehicle for creating self-identity (Mattingly, Lutkehaus, & Throop, 2008). He holds that in creating our life’s narrative, “…it is not just who and what we are that we want to get straight but who and what we might have been, given the constraints that memory and culture impose on us…” (2002, p. 14). He argues that the stories that we tell and retell, to ourselves and to those around us, become our life story.

I believe that the ways of telling and the ways of conceptualizing…become so habitual that they finally become recipes for structuring experience itself, for laying down routes into memory, for not only guiding the life narrative up to the present but directing it into the future. I have argued that a life as led is inseparable from a life as told—or more bluntly, a life is not "how it was" but how it is interpreted and reinterpreted, told and retold: Freud's psychic reality” (Bruner, 1987, p. 708).
Chapter 5: Theoretical Framework

5.2.1.1 Identity creation

Identity is a concept that speaks to all of us – it is about who we are, who we are not and the features that differentiate us as ‘individuals’ (Pullen, Beech, & Sims, 2007, p. 1).

Erik Erikson was one of the first writers to address issues of identity (Kroger, 2007). In his 8-stage life cycle scheme of development, he identifies key psychological tasks requiring resolution at different stages of the life span. During mid- to late adolescence, our identity development is most concerned with the development of vocational and interpersonal structures for adult life, finding the social roles within the larger community that fit well with our own capacities and interests (Erikson, 1968). These are not static, however, and “…identity reformulations will continue throughout the life span as one’s biological, psychological, and societal circumstances change (Kroger, 2007, p. 8).

5.2.1.2 Narrative approaches to identity

Kroger, (2007) names five contemporary approaches to identity, Historical, Structural Stage, Sociocultural, Narrative, and Psychosocial. Narrative approaches to identity “…suggest that language is a text out of which identities are constructed, justified and maintained” (Kroger, 2007, p. 23).

Narrative approaches to identity development see identity as an unfolding story (McAdams, 2001) and see lifespan development as a process of constructing, and reconstructing, a satisfactory and satisfying life narrative (Kenyon & Randall, 1997).

We use the term narrative identity to refer to the stories people construct and tell about themselves to define who they are for themselves and others. Beginning in adolescence and young adulthood, our narrative identities are the stories we live by (McAdams, Josselson, & Lieblich, 2006a, p. 4).

Just as developmental identity theorists such as Erikson (1968) see identity as changing over time at different stages of the life span, narrative approaches to identity development also see the process as ongoing.

Narrative is the representation of a process, of a self in conversation with itself and with its world over time. Narratives are not records of facts, of how things actually were, but of a meaning-making system that makes
sense out of the chaotic mass of perceptions and experiences of a life (Josselson, 1995, p. 33).

Narrative modes of knowing are not purely personal, but are also social in nature (Bruner, 1987; Clark & Rossiter, 2008; McAdams, Josselson, & Lieblich, 2006b).

Stories are performed in the presence of certain audiences. Different situations call for different kinds of stories. Stories emerge in ongoing conversations and within evolving social relationships. Different societies privilege different kinds of stories (and storytellers). History and culture shape the stories people tell about themselves. Narrative identity, therefore, emerges out of a doubtlessly complex but poorly understood interplay between individual agency and social context” (McAdams et al., 2006b, p. 6).

Our stories are formed as we tell them to others. In the action and interaction of speaking them aloud to an audience, our personal stories are moulded (Holstein & Gubrium, 2000).

5.2.1.3 Influences on the stories we tell

Taylor’s (1992) webs of interlocution (Figure 5.1) illustrates the notion of our narrative environment, and how this environment might influence the stories we tell. Taylor envisions this web as made up of ourselves at the centre, surrounded most closely by the stories of our families and friends, then by the stories of our local community, wider community, and finally, “...some of the really grand stories that cut across many societies…” (Baldwin, 2013, pp 108-109).
We are influenced by the web of interlocution in which we live, and learn from those around us which stories are acceptable to tell, and which ones are not. Baldwin (2013) states that “…the narrative environment in which we live makes it more difficult for some stories to be told than others….the narrative environment nurtures some stories and is hostile to others” (pp. 109-110).

Baldwin encourages the development of narrative environments that allow those whose voice is often silenced or ignored.

A second obligation, I believe, is to create narratively rich environments – ones that extend what can be narrativised and ones that incorporate the widest range of stories. This increases the store of what I call narrative capital – and allows us to respond in flexible and creative ways to others (Baldwin, 2013, p. 112).

In telling our stories to others, McLean and Thorne (2006) note the difficulty inherent in opening up about ourselves to others. “In telling others about ourselves we engage in a process that could culminate in rejection of the story and of the self, which may cause psychological distress and perhaps revision of one’s story” (p. 120). However, they feel that listeners can also provide acceptance of one’s story and oneself, especially when they have experienced something similar.
For telling vulnerable parts of the self, finding peers who have had similar experiences may be crucial for feeling accepted and understood. In thinking about how life stories are constructed the listeners to whom we tell our stories should be considered as important players because their responses can lead us to bury, revise, or solidify our stories (McLean & Thorne, 2006, p. 120).

5.2.1.4 Teacher identity development

Teacher identity is based on the core beliefs one has about teaching and being a teacher; beliefs that are continuously formed and reformed through experience (Walkington, 2005, p. 54).

A teacher’s professional identity is not a static thing. “Professional identity exists as a complex and dynamic equilibrium where personal self-image is balanced with a variety of social roles teachers feel obliged to play” (Volkmann & Anderson, 1998, p. 296). Teachers’ identities are influenced by many things such as personal experience, knowledge, values, schooling practices and policies, as well as the values of the institution(s) within which they teach (Goodnough, 2010).

As they begin the new experience of teaching and start to see themselves as teachers, pre-service teachers have to deal with the shift in their own identities that this entails. There are many influences on the student teacher’s developing teacher identity. Knowles (1992) uses the term ‘Teacher Role Identity’ to describe how teachers learn and are formed by their early experiences in school and family. Chong and Low (2009) feel that it is of primary importance for pre-service teachers to investigate their motivations to teach and the perceptions they have of the profession. Walkington (2005) stresses the need to articulate and evaluate their preconceived ideas about teaching, to develop their core beliefs about teaching and learning, question their personal views, and to work through their own ‘apprenticeship of observation’ (Lortie, 1975), which can have a profound effect on how student teachers understand and enact teaching (Conway et al., 2009, p. xx).

The use of self-narrative has been used extensively with pre-service teachers in the area of teacher identity development, in order to assist them to investigate the underlying influences on their teaching (See Anspal, Eisenschmidt, & Löfström, 2011; Austin & Hickey, 2007; Draper,
Puidokas, Schaafsma, Tendero, & Widmer, 2001; Gaudelli & Ousley, 2009; MacLeod & Cowieson, 2001; Schultz & Ravitch, 2013). Walkington (2005) suggests that teacher educators “…must seek to continually encourage the formation of a teacher identity by facilitating pre-service teacher activity that empowers them to explicitly build upon and challenge their experiences and beliefs” (p. 63). Diamond (1993) believes the use of “…self-narrative practices, with their storying and restorying, can help us as teachers to reclaim and expand our selves” (p. 513).

5.2.1.4.1 Digital storytelling and teacher identity creation

Banaszewski (2005) feels that authoring a digital story is a powerful form of identity construction. “Because digital stories are most often individual reflections of self, identity construction is a more pronounced part of the digital storytelling process…” (p. 48). The personal narrative style of writing inherent in the creation of a digital story allows student teachers to investigate their preconceived ideas about teaching, and to articulate the type of teacher they hope to become (Lathem et al., 2006). Lambert (2009) stresses that using the self-narrative genre in digital storytelling can lead to further insights for the storyteller.

Events from the past that may confuse a storyteller hold dormant insights that can be better understood through the realization of self-narratives. And this can happen over the course of years, or from one day to the next. This can even happen in a single moment through the act of hearing another’s story of insight, and it can bring those dormant meanings to light, elucidating layers of meaning (Lambert, 2009, p. 30).

Davis (2004) equates the personal narrative form to the reflective process, noting that, “The process is essentially reflexive, folding back on itself: experience is distilled into narrative, and the narrative itself becomes a tool which shapes memory and mediates future experience” (Davis, 2004, p. 3).

Sharing our stories of practice in an accepting, supportive narrative environment during the production of the digital stories can allow for feelings of acceptance and being understood (McLean & Thorne, 2006) in this new role as teacher.
5.2.2 Learning through storytelling

Of significant influence on the digital storytelling unit during the second design iteration were the ideas of McDrury and Alterio (2002) regarding the use of learning through sharing stories of practice. As discussed in Chapter 2, they see ways of talking as central to the learning process, and feel that having students share stories of practice can lead to meaning-making and deep learning.

5.2.2.1 Storytelling and reflection

McDrury and Alterio (2002) take the three main stages of reflection derived from the literature by Atkins and Murphy (1993) and link these to storytelling. Briefly, these stages are: a feeling of inner discomfort or surprise, a working stage where events are examined, and a final stage where a demonstration of outcomes can be made. McDrury and Alterio (2002) link the first stage of reflection to the story finding stage. Something causes students to ponder on an event; there is a feeling that something is unfinished, or not quite right. They link the second stage, where events are examined, to stories being told. Analysis of stories through dialogue “ensures that time and space are created to explore what is known about events” (McDrury & Alterio, 2002, p. 110). Finally, they link Atkins and Murphy’s third stage of reflection, that of demonstration of outcomes, to a decision to do things differently or, to continue to do things similarly if there has been a positive outcome from the event (McDrury & Alterio, 2002).

5.2.2.2 A reflective storytelling model

McDrury and Alterio (2002) have linked their theory of learning through storytelling to Moon’s (1999) map of learning (Figures 2.3 and 2.4). Table 5.1 shows how they feel Moon’s five stages of learning mirror their own “Reflective Learning through Storytelling Model”.

Chapter 5: Theoretical Framework
Table 5.1: Links between Learning and Storytelling from McDrury and Alterio (2002, p. 47) used with permission

<table>
<thead>
<tr>
<th>Map of Learning</th>
<th>Learning Through Storytelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Moon, 1999)</td>
<td>(McDrury &amp; Alterio, 2002)</td>
</tr>
<tr>
<td>• Noticing</td>
<td>• Story Finding</td>
</tr>
<tr>
<td>• Making Sense</td>
<td>• Story Telling</td>
</tr>
<tr>
<td>• Making Meaning</td>
<td>• Story Expanding</td>
</tr>
<tr>
<td>• Working with Meaning</td>
<td>• Story Processing</td>
</tr>
<tr>
<td>• Transformative learning</td>
<td>• Story reconstructing</td>
</tr>
</tbody>
</table>

McDrury and Alterio (2002) take their students through these five stages of learning through storytelling by having them share their stories of practice and have found that by doing this they “…were able to work with students and their stories in meaningful ways” (2002).

5.3 Engagement

Engagement is difficult to define operationally, but we know it when we see it, and we know when it is missing. Students are engaged when they devote substantial time and effort to a task, when they care about the quality of their work, and when they commit themselves because the work seems to have significance beyond its personal instrumental value (Newmann, 1986, p. 242).

5.3.1 Defining engagement

A principal concern for this research in designing a digital storytelling unit for pre-service teachers was to help them to engage in the process of reflection. Much of the literature on the use of reflective practices with student teachers discusses the lack of engagement the students have with the reflective process (Hatton & Smith, 1995; Moon, 2004), that their reflective writing lacks depth (Calderhead, 1989; MacLeod & Cowieson, 2001; Moon, 1999; 2004), and that students rarely get the most out of the reflective process, instead approaching it as “…an addendum or compulsory element that had to be tackled to satisfy the interests of tutors and assessors” (MacLeod & Cowieson, 2001, p. 240).

The literature on digital storytelling says it is a motivational strategy that can engage students in the reflective process (Kearney, 2009; Li & Morehead, 2006). In investigating the use of digital storytelling to enhance
student teacher’s reflection on practice, evidence of engagement in the process of reflection while creating their digital stories would need to be found. As Newmann’s quote above suggests, however, engagement is difficult to define operationally. Several characterizations of engagement exist in the literature. Many of these were employed by this study to inform the search for evidence of engagement in the reflective process in both the qualitative and quantitative results.

First among these is Csikszentmihalyi’s (1991) state of ‘flow’. When people are fully immersed in an activity, they can find themselves in this state of ‘flow’.

Concentration is so intense that there is no attention left over to think about anything irrelevant, or to worry about problems. Self-consciousness disappears, and the sense of time becomes distorted. An activity that produces such experiences is so gratifying that people are willing to do it for its own sake, with little concern for what they will get out of it, even when it is difficult…” (p. 71)

Csikszentmihalyi (1991) notes that the state of flow occurs when the difficulty of the task is matched well with our ability to tackle it. If the task is too hard, we may feel anxious. If it’s too easy, we can become bored.

In between those two extremes is a state of mind in which we lose ourselves in the task, forgetting time and place in the process. Flow is the purest form of intrinsic motivation. It explains the drive people have to master skills in a variety of endeavors regardless of any extrinsic rewards (Csikszentmihaly, quoted in Dodge, 2003, p. 3).

Csikszentmihalyi (2004) describes seven conditions that are there when a person is in a state of flow:

1. Completely involved in what we are doing - focused, concentrated.
2. A sense of ecstasy – of being outside everyday reality.
3. Great inner clarity – knowing what needs to be done, and how well we are doing.
4. Knowing that the activity is doable – that our skills are adequate to the task.
5. A sense of serenity – no worries about oneself, and a feeling of growing beyond the boundaries of the ego.
6. Timelessness – thoroughly focused on the present, hours seem to pass by in minutes.

In a study on computer use and states of ‘flow’, Pilke (2004) found that states of flow can be attained quite frequently during the completion of tasks such as word processing, programming, visual design and information searching. “The idea is, that when any task is demanding enough to be interesting, but not too difficult to cause frustration it offers the possibility for an optimal or flow experience” (p. 347).

5.3.2 Creativity and engagement

Robinson (2001; 2010) and Csikszentmihalyi (1996) both propose a connection between creativity and engagement. Csikszentmihalyi (1996) argues that creativity is a central source of meaning in our lives. He states that when we are involved in creativity, “…we feel that we are living more fully than during the rest of life” (p. 2). He notes that “…creative persons find joy in a job well done…” (p. 5), and that creativity is its own intrinsic reward.

Operating within a domain can become rewarding in and of itself. To find the right words for a poem, the secret of a cell’s behaviour, or a way to make better microchips for less money is an exhilarating experience in its own right, even if no one else knows about it, and no rewards follow (p. 342).

Robinson (2001) holds that “Creativity is not exclusive to particular activities; it’s possible wherever human intelligence is actively engaged” (p. 113). He states that “Being creative involves doing something: it takes place in a medium. Real creativity comes from finding your medium….When people find their medium, they discover their real creative strengths and come into their own” (Robinson, 2001, pp. 129-130). He, too, discusses the state of ‘flow’ to describe peak creative performances. “There are times when we are immersed in something that completely engages our creative capabilities and draws equally from our knowledge, feelings and intuitive powers” (Robinson, 2001, p. 155). He later came to describe this creative state as ‘aesthetic experience’. “…when your senses are operating at their peak, when you are present in the current moment, when you’re resonating
with the excitement of this thing that you’re experiencing, when you are fully alive” (Robinson, 2010, 5:53).

5.3.3 Measures of engagement

Historically, studies on student engagement have utilised ‘time-on-task’ or ‘academic learning time’ as measurements for engagement (Sandholtz, Ringstaff, & Dwyer, 1994). ‘Time-on-task’ refers to the amount of observable time students spend looking at some appropriate instructional object or person during a lesson (Wilson, 1987). ‘Academic learning time’, or ‘ALT’ combines the measurement of time-on-task with student success rate (Sandholtz et al., 1994). In a related measurement of engagement used in museum education, Jones (2003) refers to ‘dwell time’ as an indicator of museum visitors’ level of interest in an exhibition, which can be key to understanding visitors’ levels of interest and motivation (Hall, 2004).

In their study of student engagement with educational technology, Sandholtz, Ringstaff et al (1994) considered evidence of student engagement to include not only time-on-task behaviour in the classroom, but also time spent on projects in and out of the classroom, initiative, self-motivation, independent experimentation, spontaneous collaboration and peer coaching, and enthusiasm or frustration.

Kearsley and Shneiderman’s (Kearsley & Shneiderman, 1999; Shneiderman, 1998) engagement theory provides a conceptual framework for the use of technology to engage learners. They argue that engaged learning prompts active cognitive processes such as creativity, problem-solving, reasoning, decision making and evaluation. They found that “…technology provides an electronic learning milieu that fosters the kind of creativity and communication needed to nourish engagement” (1999, p. 6).

Shneiderman states that memorable educational experiences that engage students

… are enriching, joyful, and transformational. They enrich students with increased knowledge and skills, provide them with a satisfying sense of accomplishment, and reshape their expectations. Students are driven by intense motivation that propels them to solve challenging problems and fills them with the thrill of accomplishment. They are proud of what they
have done, have a clearer sense of who they are, and are ready to take greater responsibility for their education (Shneiderman, 1998, p. 25).

5.3.3.1 Measuring user engagement

O’Brien and Toms (2008) proposed a conceptual, process based model of engagement that was founded on Aesthetic, Flow and Play theories. Drawing from multiple research projects, they identified several core attributes of engaging experiences. Attributes of engagement identified during their study were attention, novelty, interest, control, feedback, and challenge. They found during their study that participants were not always engaged at the same level during the activity, and proposed four levels of engagement. They also found evidence of three threads of experience, “…emotional (affect and motivation), sensory (aesthetics and interactivity), and spatiotemporal (perception of time, and self- and external awareness)…” (O’Brien & Toms, 2008, p. 950). Table 5.2 shows a summary of their engagement attributes according to the threads of experience.

Table 5.2: O’Brien and Toms’ summary of engagement attributes (2008, p. 948) used with permission

<table>
<thead>
<tr>
<th>Threads of experience</th>
<th>Compositional thread</th>
<th>Process of engagement</th>
<th>Disengagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensual</td>
<td>Aesthetic elements are pleasing or attention getting</td>
<td>Graphics that keep attention and interest or evoke realism</td>
<td>Inability to interact with features of the technology or manipulate interface features (usability)</td>
</tr>
<tr>
<td></td>
<td>Novel presentation of information</td>
<td>“Rich” interfaces that promote awareness of others or customized views of information</td>
<td>Lack of/too much challenge</td>
</tr>
<tr>
<td>Emotional</td>
<td>Motivation to accomplish a task or to have an experience</td>
<td>Positive affect: enjoyment, fun, physiological arousal</td>
<td>Negative affect: Uncertainty, information overload, frustration with technology, boredom, guilt</td>
</tr>
<tr>
<td></td>
<td>Interest</td>
<td>Positive affect: Feelings of success and accomplishment</td>
<td></td>
</tr>
<tr>
<td>Spatiotemporal</td>
<td>Becoming situated in the “story” of the application</td>
<td>Perception that time passed very quickly</td>
<td>Not having sufficient time to interact with or time to devote to the application</td>
</tr>
<tr>
<td></td>
<td>Ability to take one’s time in using the application</td>
<td>Lack of awareness of physical surroundings</td>
<td>Interruptions and distractions in physical environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strong awareness of others when the engagement revolved around social interaction</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feedback and control</td>
<td></td>
</tr>
</tbody>
</table>

Based on this research, O’Brien and Toms (2009) developed a multidimensional scale to measure engaging user experiences with technology which they called The User Engagement Scale. They state that,
“The survey instrument itself is a brief, easily administered, and statistically verified tool that may be used by software designers to assess their applications or by researchers for academic purposes” (2009, p. 64). As mentioned in Chapter 4, several of the questions from The User Engagement Scale were included in the post digital storytelling questionnaire, and also informed the collection of qualitative data regarding engagement.

Table 5.3 illustrates the constructs gleaned from the literature on engagement, which could be utilised in the search for evidence of engagement in the DST process.

Table 5.3: Evidence of engagement from the literature

<table>
<thead>
<tr>
<th>Author</th>
<th>Evidence of Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Csikszentmihalyi, 1991)</td>
<td>• Losing track of time when involved in a task</td>
</tr>
<tr>
<td></td>
<td>• Becoming engrossed in a task</td>
</tr>
<tr>
<td></td>
<td>• Intrinsically motivated</td>
</tr>
<tr>
<td></td>
<td>• Challenged by the activity, but not overwhelmed by it</td>
</tr>
<tr>
<td>(Wilson, 1987)</td>
<td>• Time on task</td>
</tr>
<tr>
<td>(Jones, 2003)</td>
<td>• dwell time</td>
</tr>
<tr>
<td>(Sandholtz et al., 1994)</td>
<td>• time spent on projects in and out of the classroom</td>
</tr>
<tr>
<td></td>
<td>• initiative</td>
</tr>
<tr>
<td></td>
<td>• self-motivation</td>
</tr>
<tr>
<td></td>
<td>• independent experimentation</td>
</tr>
<tr>
<td></td>
<td>• spontaneous collaboration and peer coaching</td>
</tr>
<tr>
<td></td>
<td>• enthusiasm or frustration</td>
</tr>
<tr>
<td>(Shneiderman, 1998)</td>
<td>• increased knowledge and skills</td>
</tr>
<tr>
<td></td>
<td>• sense of accomplishment</td>
</tr>
<tr>
<td></td>
<td>• intense motivation that propels them to solve challenging problems</td>
</tr>
<tr>
<td></td>
<td>• pride in what they have done</td>
</tr>
</tbody>
</table>
Evidence of Engagement

- lost track of time
- got lost in the experience
- blocked out other things while involved in the experience
- absorbed by the experience
- drawn in to the experience
- had fun during the experience
- enjoyed the experience
- experience incited curiosity
- interested in the experience
- found the experience rewarding
- would recommend the experience to others
- felt in control of the experience

Evidence of Disengagement

- feelings of frustration, confusion, annoyance, discouragement with the experience
- couldn’t do things necessary for the experience

5.3.4 Engaging adult learners

In working with pre-service teachers, all adult learners, it is important to keep in mind some of the tenets of andragogy, adult learning theory, in relation to their engagement in the learning process. Knowles (1988), a pioneer in the field of adult learning theory, identified four assumptions about the characteristics of learners that are different from the science of teaching children (pedagogy). He notes that as individuals mature:

- they become more self-directed as learners and need to have a say in what they are learning
- they have accumulated a foundation of life experiences and knowledge that new learning can be connected to
- their readiness to learn is related to their social role(s) at their particular stage of life
- their orientation toward learning is performance centred
- they value knowledge that is immediately applicable.

In order to engage adult learners in the learning process, Knowles notes that adults are more deeply motivated to learn those things they see the need to learn. He discusses learning as a process of need-meeting and goal-striving by the learners:

…individuals are motivated to engage in learning to the extent that they feel the need to learn and perceive a personal goal that learning will help to achieve; and they will invest their energy in making use of available resources (including teachers and readings) to the extent that they perceive them as being relevant to their needs and goals (1988, p. 56).
Chapter 5: Theoretical Framework

Allowing adult learners to set their own goals for a course, giving them self-directed learning experiences early on in the course and giving them early success in self-directed learning activities can motivate them and engage them in the course (Knowles, 1988). Providing adult learners with a set of competencies required to achieve a given ideal model of performance, such as a ‘good teacher’ (in a teacher training programme) and then providing them with diagnostic experiences that allow them to see where their own competencies are lacking, can give them a clear sense of direction for self-improvement and a motivation to learn (Knowles, 1988).

Even though Knowles sees adult learners as self-directed learners, he notes that they can experience learning situations where they can become very dependent learners, such as learning a new computer programme. He makes the point that he has come to see the dependent learning of pedagogy and the self-directed learning of andragogy as two ends of a spectrum, with any learning situation as having the possibility of falling somewhere between the two ends. People learn at different speeds and it’s natural for them to be nervous or anxious when faced with a new learning situation (Knowles, 1988).

Leib (1999) notes that proper timing of instruction and positive reinforcement by the instructor can enhance learning for adults.

> If the participant does not recognize the need for the information…all of the instructors effort to assist the participant to learn will be in vain….Adults must see the benefit of learning in order to motivate themselves to learn the subject (Lieb, 1999, p. 3).

Of particular significance to this research in regards to student engagement in the DST process, it is important that students see the value of the digital storytelling assignment. If they do not see the significance of the assignment, and therefore feel that it is not worth their effort, they will not be motivated to immerse themselves in the learning experience or to persevere with the project when it gets difficult. As Knowles (1988) notes above, adults can be very dependant learners in some situations, particularly when dealing with new computer programmes.
In regards to the design of the digital storytelling unit, providing students with the directed learning they need when first being introduced to the new computer programmes, clear hand-outs they can follow when working with the programmes on their own, and assistance throughout the process when needed, is in line with accepted methods for a teaching adults.

…the teacher’s role is redefined as that of a procedural technician, resource person, and co-inquirer; more a catalyst than an instructor, more a guide than a wizard (Knowles, 1988, p. 48).

If the DST unit is presented to the students in a way that helps them to see the benefits it can provide to them as teachers, and in turn, to their students as learners, they will consider it a valuable skill to learn. This, in turn, can enhance their engagement in the process.

5.4 Sociality

…human learning presupposes a specific social nature and a process by which children grow into the intellectual life of those around them” (Vygotsky, 1978, p. 88).

The third major theoretical influence for this thesis was the cultural psychological approach of Vygotsky (1978). His theories have become the premise for much contemporary research relating to the design of educational technologies (Hall, 2004). Vygotsky believed that student’s social interactions strongly influenced their cognitive development (Vygotsky, 1978).

Based on the work of Vygotsky and Piaget among others (Fosnot, 1996), constructivism holds that we build, or construct, knowledge. Knowledge is defined as temporary, developmental, socially and culturally mediated and non-objective (Brooks & Brooks, 1993). Each of us comes to a learning situation with our own pre-conceived notions of the world around us. How we interpret any new knowledge will be coloured by how we already see the world.

Social constructivism holds that there is a social aspect to learning. Communication processes and the influence of social factors on the construction of knowledge are of the utmost importance (McDrury & Alterio, 2002). In understanding the world around us, we do not act alone.
In social situations, including classrooms, we are presented with new ideas for consideration. By working together with the people around us, we incorporate these new ideas into our own understanding (Fosnot, 1996).

### 5.4.1 Zone of proximal development

Vygotsky’s theory has at its heart the idea that human cognition and learning are social and cultural rather than individual phenomena (Kozulin, Gindis, Ageyev, & Miller, 2003). He believed that what a child could do with the help of others today, she would be able to do by herself tomorrow (Vygotsky, 1978).

Vygotsky (1978) felt that there were two distinct levels of learning: the actual development level of the learner, and a potential development level which could be reached with the assistance of adults or capable peers. He described the difference between these two levels as the “zone of proximal development” (ZPD). He felt that in working with others in a social educational setting, learners would be able to achieve goals and tasks that they would not be able to accomplish on their own, and once the learner had reached this new level of development, she would be able to achieve this on her own in the future.

…learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers. Once these processes are internalized, they become part of the child’s independent developmental achievement (Vygotsky, 1978, p. 90).

There is no single ZPD for each individual, and a ZPD can be created for any domain of skill. Whatever the activity is, assistance can be provided by teachers, adults, experts or more capable peers (Tharpe & Gallimore, 1988).

While Vygotsky’s work mainly discusses children, the same processes can be seen operating in the learning adult (Tharpe & Gallimore, 1988). In discussing their work in training teachers, Tharpe and Gallimore state that, “Teachers, like their students, have ZPDs; they, too, require assisted performance” (p. 190).
5.4.1.1 Stages of the ZPD

Learners do not make an abrupt transition from assisted performance to non-assisted performance. Tharpe and Gallimore (1988) present progress through the ZPD in four stages, as shown in Figure 5.2.

In Stage I, performance is assisted by more capable others. This assistance can take the form of modelling, contingency management, feeding back, instructing, questioning and cognitive structuring. In Stage II, performance is assisted by the self. What was guided by the more capable other is now being guided by the self. This stage is exemplified by self-directed speech, such as the learner repeating instructions to himself that were previously stated by the capable other. Tharpe and Gallimore (1988) state that “…when we consider the acquisition of some particular performance capacity, adults during Stage II consistently talk to themselves, and indeed assist themselves in all ways possible” (p. 38).

In Stage III, performance is developed, automatized and ‘fossilized’. Task execution is “smooth and integrated” (p. 38). Assistance is no longer needed from others or the self. In fact, assistance from others is seen as disruptive.
and irritating, and self-consciousness can be detrimental to the smooth integration of the task.

If the learner forgets how to do the task, he can ask for assistance and progress through the ZPD again. This is considered Stage IV, when de-automatization of performance leads to recursion back through the ZPD. Tharpe and Gallimore (1988) state, “The lifelong learning by any individual is made up of these same regulated, ZPD sequences – from other-assistance to self-assistance – recurring over and over again for the development of new capacities” (p. 38). When we forget how to do something we previously knew how to do, one of the first things we usually do is “…retreat to the immediately prior self-regulating phase…” (p. 39). We talk ourselves through the task. “A further retreat, to remembering the voice of the teacher, may be required…Intentionally recurring to that point in the zone – consciously reconjuring the voice of a tutor – is an effective self-control technique” (p. 39).

Tharpe and Gallimore (1988) propose several means of assisting performance in the beginning stage of the ZPD. These are; modelling, contingency management, feeding back, instructing, questioning and cognitive structuring. Many of these means of assistance would need to be incorporated into the design of the digital storytelling unit, with an emphasis on modelling, feeding back and instructing.

**Modelling** is the process of offering behaviour for imitation, and is seen as a powerful means of assisting performance. In addition to learning from watching an activity performed by others, “Modelled activities can be transformed into images and verbal symbols that guide subsequent performances…research has shown that active coding of modelled activities into descriptions or labels or vivid imagery increases learning and retention of complex skills” (p. 48).

**Feeding-back** has to do with giving the learner information on their performance. The feedback provided must be compared to some standard, so it is important for specific performance standards to be established. “Simply providing performance information is insufficient; there will be no
performance assistance unless the information provided is compared to some standard” (p. 55). Learners can provide feedback through self-regulation as well.

**Instructing** in this sense has to do with assisting the performance of the next specific act in order to move through the ZPD. It calls for a specific action to be completed. The instructing voice of the teacher can become “…the self-instructing voice of the learner in the transition from apprentice to self-regulated performer” (p. 57).

### 5.4.1.2 Activity settings

Tharpe and Gallimore (1988) define ‘activity settings’ as contexts in which collaborative interaction, intersubjectivity and assisted performance can occur. Activity settings include cognitive as well as social components. The purpose of these settings is to assist learners through the stages of “…other-regulation to self-regulation…” (p. 80), and on to full development. Activity settings which promote assisted performance include cooperative learning situations, peer and tutor (teacher) feedback, modelling, coaching, workshops and tutorials, to name a few (Tharpe & Gallimore, 1988). The DST classes would need to be designed in a manner so as to provide these types of ‘activity settings’; students would be encouraged to work in pairs or groups and more capable peers would be encouraged to assist their fellow students when needed. In addition, tutor feedback would need to be built into the process.

Wink and Putney (2002) stress that when we create zones of proximal development, we should ensure they are safe, secure environments that allow students to take risks in their problem solving and learn ‘outside the box’, creating zones that encourage performance before competence. The DST lessons would need to be designed to provide a safe atmosphere where students would be encouraged to experiment and play with the software, while still in the presence of more capable others who could assist them if needed.
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5.4.2 Scaffolding

Scaffolding fits in with Tharpe and Gallimore’s first stage of progress through the ZPD. Initially coined as a phrase by Wood, Bruner and Ross (1976), scaffolding has to do with support supplied to the learner to allow him to complete a task or achieve a goal which would be beyond his individual efforts. Scaffolding can go beyond just assisting the learner in completing the task, “…it may result, eventually, in development of task competence by the learner at a pace that would far outstrip his unassisted efforts” (Wood et al., 1976, p. 90).

Dickson, Chard, & Simmons (1993) describe scaffolded instruction as "…the systematic sequencing of prompted content, materials, tasks, and teacher and peer support to optimize learning" (p. 12). Larkin (2001) provides guidelines for effective scaffolding. They are; identify what students should know, begin with what students can do, help students achieve success quickly, help students to ‘be’ like everyone else, know when it’s time to stop and help students to be independent when they have command of the activity. As students internalize the information and become self-regulated independent learners, the scaffolding can lesson and eventually be removed in what is known as ‘fading’ (InformEd, 2013).

The DST unit would need to be designed to make it as supportive as possible for the students and scaffolding would be used throughout, mostly in the form of hand-outs and support materials made available to students on Blackboard. Step-by-step instructions would need to be created for just about every step of the process, and templates would be created to assist students in keeping track of their resources and planning their DST. The ready assistance of tutors and peers would also need to be in place to optimize learning and assist students in becoming independent learners.

5.5 Technology

Teachers will use technology appropriately and effectively in their … classrooms if they are familiar and comfortable with the technology and, especially, if they have had successful experiences with the technology in an instructional environment. Additionally, teachers who are able to use today’s technology in the classroom will be prepared to learn and utilize tomorrow’s technology (Powers & Blubaugh, 2005, p. 259).
The fourth major theoretical influence for this thesis has to do with the use of technology with pre-service teachers. The use of "ICT in teaching and learning" is considered one of the mandatory elements of initial teacher education programmes in Ireland (The Teaching Council, 2011a). Indeed, it is considered one of the key national priority areas in Irish education (The Teaching Council, 2011b, p. 21).

A Department of Education and Science inspectorate report (2008) regarding the use of ICT in Irish schools, found that only 25% of post-primary teachers rated their ability as either “intermediate” or “advanced” with regard to using teaching and learning methods facilitated by ICT. On a positive note, they found that recently qualified teachers had a higher perception of their ICT skills than more experienced teachers. In their recommendations, they state:

There needs to be an increased emphasis on the application of ICT in teaching and learning in teacher education at pre-service, induction and continuing professional development stages. It is recommended that teacher education departments in third-level colleges should provide student teachers with the skills necessary to effectively use ICT in teaching and foster in them a culture of using ICT in their work (Department of Education and Science, 2008, p. xix).

5.5.1 Constructionism

Constructionism, originally proposed by Seymour Papert, is a founding theoretical construct in the use of educational technology for many (Solomon, 1987). Papert has been a pioneer in the use of technology with children since the 1960s. A founding faculty member of MIT’s Media Lab and student of Jean Piaget, he has advocated a very different way to use technology in the classroom.

It is hard to think about computers of the future without projecting onto them the properties and the limitations of those we think we know today. And nowhere is this more true than in imagining how computers can enter the world of education. It is not true to say that the image of a child’s relationship with a computer I shall develop here goes far beyond what is common in today’s schools. My image does not go beyond: It goes in the opposite direction (Papert, 1993, p. 5).
His theory of constructionism, based on his earlier work with Piaget and constructivism, advocates learning through the design and the construction of personally meaningful projects.

We understand “constructionism” as including, but going beyond, what Piaget would call “constructivism.” The word with the v expresses the theory that knowledge is built by the learner, not supplied by the teacher. The word with the n expresses the further idea that this happens especially felicitously when the learner is engaged in the construction of something external or at least shareable—a sand castle, a machine, a computer programme, a book (Papert, 1990, p. 3).

Ackerman (2002) describes Papert’s constructionism as focusing on “…the art of learning, or ‘learning to learn’, and on the significance of making things in learning” (p. 1).

Papert is interested in how learners engage in a conversation with [their own or other people's] artefacts, and how these conversations boost self-directed learning, and ultimately facilitate the construction of new knowledge. He stresses the importance of tools, media, and context in human development (Ackerman, 2002, p. 1).

While his seminal book on the use of computers in education, Mindstorms (1993) was written about children, Papert states that “…most of the ideas expressed are relevant to how people learn at any age” (Papert, 1993, p. 213).

Banaszewski (2005) sees the creation of a digital story as a constructionist learning activity, one that allows students to use technology to construct a personally meaningful project. The theory of constructionism would need to pervade the DST designs in this study. Throughout the process of creating a digital story, the students should be constructing their own meaning, using the technology to “…empower the learner to perform personally meaningful projects that could not be done without it” (Papert, 1993, p. 54). Without the technology; the use of images, music, the audio editing and video editing, students would not be able to create the personally meaningful ‘artefacts’ that their DSTs should be.

### 5.5.2 Learner centred technology

Norman (1998) holds that technology should be eminently usable, unobtrusive, and engaging. It should be task specific, uncomplicated and
cause as little stress as possible to the user. Hall (2012) states that education technology should be learner-centred, and “…should not be difficult to use. It should support engagement, interaction, and learning effectively and intuitively” (p. 107).

The learner-centred principles developed by the American Psychological Association in the 1990s have been used to guide educational practices and reform (Bonk, Cunningham, & King, 1998; McCombs, 2000). These principles have at their heart the learner’s motivation, learning and achievement.

"Learner centred" is the perspective that couples a focus on individual learners - their heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs - with a focus on leaning - the best available knowledge about learning and how it occurs and about teaching practices that are most effective in promoting the highest levels of motivation, learning, and achievement for all learners (McCombs, 2000, p. 4).

Learner-centred technologies are those that “…can offer greater opportunity to experience learning activities that are internally driven and constructed, goal oriented and reflective, personally meaningful and authentic, collaborative and socially negotiated, and adaptive to individual needs and cultural backgrounds” (Bonk et al., 1998, p. 30).

Bruce & Levin (2001) propose a taxonomy of uses of technologies for learning based on a learner-centred approach. In this taxonomy, the diversity of uses of technologies for learning is captured by four different media for learning: inquiry, communication, construction, and expression. They propose that technologies used for inquiry can include web-based portals that are “…set up explicitly to facilitate inquiry processes, including the search of multiple databases and the analysis of retrieved datasets” (p. 4). Technologies used for communication include those that enhance communication for learning such as Virtual Learning Environments like Blackboard and WebCT. Technologies used for construction can aid constructivist and constructionist learning techniques. “Construction (either individually or jointly) plays a major role in learning. Several uses of innovative technologies for learning have taken a "construction set" presentation mode” (2001, p. 4). Finally, Bruce & Levin (2001) describe
technologies that can be used for expression, such as photo, music and video editing applications.

The DST design should therefore incorporate these learner-centred technologies to some degree, especially those used for construction and expression.

5.5.3 Pre-service teachers’ future use of technology

Providing experiences for pre-service teachers in the use of technology during their teaching practice will help them effectively infuse technology into their future classrooms (Arnold & Ducate, 2006; Beaudin & Hadden, 2005; Jacobsen, Clifford, & Friesen, 2001; Rosenfeld, 2008). Giving pre-service teachers a chance to utilise ICTs during their time at university enhances the possibility that they will feel comfortable incorporating this type of technology and pedagogy into their own classrooms of the future (Johnson & Howell, 2005; Shoffner, 2009). “It has been widely recognized that in order to use technology effectively in their own classrooms, pre-service teachers need to experience it in their professional preparation” (Carroll & Carney, 2005, p. 470). Shoffner (2009) encourages teacher educators to “…integrate both familiar and unfamiliar forms of technology into teacher preparation, to support pre-service teachers’ understanding of and comfort with different media suitable for their future classrooms” (p. 9). Therefore, it is important for teacher education programmes to give pre-service teachers positive experiences with different forms of ICT, increasing both their skill levels as well as their belief in their ability to successfully use ICT in their own classrooms of the future.

5.5.4 Barriers to teachers’ use of technology

Much research over the last few decades has investigated the reasons for some teachers’ failure to incorporate technology into their teaching. Both external and internal factors have been identified as having an effect on this (Ertmer, 1999). External factors have to do with environments where teachers work, whereas internal factors have to do with the personal characteristics of the teachers themselves (Chai & Khine, 2006). In a review
of the literature at the time, Mumtaz (2000) noted the following list of external factors inhibiting teachers’ use of technology in the classroom:

- lack of teaching experience with ICT;
- lack of on-site support for teachers using technology;
- lack of help supervising children when using computers;
- lack of ICT specialist teachers to teach students computer skills;
- lack of computer availability;
- lack of time required to successfully integrate technology into the curriculum;
- lack of financial support (p. 320).

Teo et al (2008) note the following internal factors as affecting teachers’ use of technology in the classroom:

- Attitudes towards technology
- Self-efficacy
- Perceived attributes of technology such as perceived usefulness
- Perceived ease of use
- Complexity
- Perceived influence and support from the environment such as facilitating conditions
- Subjective norms
- Teachers’ pedagogical beliefs (p. 164).

In addition to these, a teacher’s perceived risk of the use of technology in their teaching can affect their use of it. Howard (2013) investigated teachers’ risk aversion as an influence on their decision to integrate technology into their teaching. She found that teachers’ “…decisions to integrate technology in teaching are influenced by negative affective responses to technology, general risk-aversion in teaching, and the perceived value of technology in teaching” (p. 1).

While the outside factors still exist as barriers for many, Ertmer (1999) states that, "Even if every first-order [external] barrier were removed, teachers would not automatically use technology to achieve the kind of meaningful outcomes advocated" (p. 51). In the more recent literature (See Butler & Corbeil, 2007; Ertmer, 2005; Ertmer & Ottenbreit-Leftwich, 2010; Howard, 2013; Teo et al., 2008), it has been suggested that a teacher’s beliefs about teaching, learning and technology hold more sway when it comes to affecting their use of technology in the classroom.
Chapter 5: Theoretical Framework

These myriad beliefs are likely to be related to each other and they interact dynamically in influencing teachers’ decisions about the use of technology in the classrooms. Among these factors, Lim and Chan (2007) argue that investigation on teachers’ beliefs about teaching and learning is critical for understanding how teachers use technology in their classrooms (Teo et al., 2008, p. 164).

One of these internal factors affecting teachers’ use of technology in the classroom is their technology self-efficacy (Abbitt & Klett, 2007; Heo, 2009; Teo et al., 2008; Teo & Tan, 2012; Wang et al., 2004).

5.5.5 Pre-service teachers and technology self-efficacy

As discussed briefly in Chapter 3, technology self-efficacy is based on Bandura’s (1997) self-efficacy theory. Technology self-efficacy has to do with peoples’ belief in their ability to use technology effectively (Albion, 2001; Wang et al., 2004). Ertmer and Ottenbreit-Leftwich (2010) state that “…evidence suggests that self-efficacy may be more important than skills and knowledge among teachers who implement technology in their classrooms” (2010, p. 260).

Albion (2001) found several factors that can have an effect on student teachers’ technology self-efficacy: time spent on the computer, personal ownership of a computer and the completion of a computer course. Other studies have confirmed Albion’s original findings. Fleming, Motamedi & May (2007) found that pre-service teachers’ confidence in the use of ICT in their student teaching increased as their hands-on experience with computer technology increased. They found that this hands-on experience was most strongly related to the pre-service teachers’ positive perception of their skills.

Ertmer and Ottenbreit-Leftwich (2010) found a number of suggestions for building teachers’ technology self-efficacy in the literature:

- Giving teachers time to play with the technology
- Focusing new uses on teachers’ immediate needs
- Starting with small successful experiences
- Working with knowledgeable peers
- Providing access to suitable models

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- Participating in a professional learning community
- Situating professional development programmes within the context of teachers’ ongoing work (2010, pp. 261-262)

Albion (2001) stresses that assisting student teachers to increase their technology self-efficacy could be “…an important step towards their learning to use technology effectively in their teaching” (p. 344). Suggestions for improving student teacher’s self-efficacy include increased use of computers in their teacher preparation courses as well as encouraging them to spend more time using computers (Albion, 2001). In addition, giving them successful experiences with technology can also increase their technology self-efficacy.

These findings are consistent with the tenets of self-efficacy theory, which holds that the most powerful influence on self-efficacy is "enactive mastery experience" (Bandura, 1997). From this view, successful experiences, especially if they do not come too easily, are likely to be the strongest influence on self-efficacy (2001, p. 344).

The DST design would need to take into consideration the student teachers’ technology self-efficacy at the beginning of the process, and seek to improve it. The DST design would need to be challenging, yet give students positive experiences with ICT in order to positively affect their technology self-efficacy.

5.5.6 Reducing computer anxiety

5.5.6.1 Hardware & software choice

Computer anxiety is a contributing factor to teacher resistance to using technology (Butler & Corbeil, 2007; Gerard & Sleeth, 1996). Student teachers can experience anxiety when using new technology or new computer applications for the first time. Gilbert (2002) encourages the use of low threshold applications (LTAs), in order to get teachers to incorporate the use of ICT in their teaching. LTAs are teaching and learning ICT applications that are accessible, low in cost or free, easy to learn, non-threatening, and can be relied upon to work as expected. LTAs can be more easily adopted by teachers in that they take little time to learn and are user-friendly (Gilbert, 2002).
Butler and Corbeil (2007) advocate the use of digital storytelling as a ‘low threshold’ application for reducing teachers’ anxiety toward computers. In his study on the use of digital storytelling with pre-service teachers, Kearney (2009) suggests that the software used with student teachers for digital storytelling needs to “…remain ‘open-ended’ and free from software constraints” (p. 1994). To this end, he suggests using video editing software, such as iMovie and Windows Movie Maker, which is either free or relatively cheap and accessible to teachers after graduation.

Following on from these suggestions, the software used for the DST intervention would need to fit within Gilbert’s (2002) description of LTAs: software that was user-friendly; accessible to students; and either came free with the operating system of the computer or was free to use/download from the internet. This would serve to lower students’ computer anxiety, as well as give student teachers access to the software they had learned to use, in their homes or future teaching schools, after finishing the ITE course.

5.5.6.2 Teaching strategies

In dealing with student anxiety towards using computers (i.e. those who call themselves ‘technophobes’) Dorinina (1995) suggests including some play elements in the computer instruction. “The use of computer games and play-type forms of instruction, especially in the initial stages of the training, unleashes creative thinking, stimulates the assimilation of new things, and painlessly fosters the process of instruction” (Dorinina, 1995, p. 90). This too would need to be incorporated into the DST design from the beginning. Throughout the software training part of the process, students would need to be encouraged to play with the software before they actually used it to create their DST. Playing with it and gaining some level of comfort with the software, before having the added stress of using it to complete an assignment, can lessen their anxiety while using the technology (Dorinina, 1995).

5.6 Chapter summary

This chapter summarises the theoretical foundations of the empirical and practical development work undertaken in this thesis. As will be discussed
in the following chapters, the five design themes: (1) reflection; (2) narrative; (3) engagement; (4) sociality; and (5) technology, guided the development and evaluation of the digital storytelling design. Furthermore, combined with the study’s practical findings, the orienting theoretical framework, described in this chapter and Chapter 2, informed the thesis’ design model R-NEST (discussed in Chapter 9). The R-NEST model began with the identification of key issues, or themes, during the review of the literature. These salient, interrelated themes included:

- narrative design, and the potentially important role of storytelling as a medium for identity development in teacher education;
- the central importance of collaborative learning among pre-service teachers, especially in relation to ‘personal stories of change’ (Lambert, 2009), and reflection thereon;
- easy-to-use technology and easy-to-access and use, rich media content;
- and creative engagement in the process.

The next three chapters articulate how the R-NEST model further emerged in the context of iteratively developing and adapting the digital storytelling intervention, informed by key relevant theories in education, namely reflection, narrative, engagement, sociality and technology. As will be presently outlined, this led, by the end of the third DBR cycle, to a robust, adaptable and adoptable design framework, which could be deployed in the development of digital storytelling to enhance reflection in initial teacher education.
Chapter 6: Design Cycle 1 - Initial Experience

6.1 Chapter introduction

…design-based research focuses on understanding the messiness of real-world practice, with context being a core part of the story and not an extraneous variable to be trivialized. Further, design-based research involves flexible design revision, multiple dependent variables, and capturing social interaction (Barab & Squire, 2004, p. 3).

This chapter will discuss the first design cycle which involved a pilot project with 18 students volunteering to complete a digital story. The chapter is structured to present the narrative of how digital storytelling was introduced to and implemented with the students. Both examples of confirming and disconfirming evidence will be discussed to illustrate the impact of the pilot digital storytelling (DST) design. As a very extensive corpus of data was collected over the three years of the DBR process, exemplars of data are employed to show the impact of DST on the reflective process. Both qualitative and quantitative data are discussed to illustrate both the potential and the limitations of the pilot study. Crucially, the R-NEST framework which emerged from the review of the literature, the reflection chapter and the research questions, will be used in this chapter to frame the discussion of the design and the analysis.

6.2 The pilot project

Jakes and Brennan (2005) suggest you “start small” when implementing a digital storytelling unit for the first time. They note that the process of digital storytelling is both support intensive and system intensive, and “…requires a great deal of student support as well as a stable technology infrastructure” (p. 5).

6.2.1 The educational setting

The initial idea of this study was to explore how digital storytelling might be designed and deployed to enhance pre-service teachers’ reflection on practice. A pilot study was launched to establish whether there was potential in DST, as a process of technology-enhanced learning that could be used to enhance pre-service teachers’ engagement in, and understanding of reflective practice.
A basic tenet of design based research is that the researcher works in tandem with practitioners in the educational setting (Bannan-Ritland, 2003; Hoadley, 2004; Kelly, 2003; Reeves et al., 2005) As one of the Education Technologists in the School of Education, the researcher was jointly responsible for designing the education technology section of the course. Getting staff support for the digital storytelling project was an important process. Through a process of dialogue with colleagues in the School of Education, a pilot project was planned for implementation with the 2009-2010 cohort of students. During the planning of the unit, the question of where to fit the digital storytelling assignment into an already demanding course was discussed with staff. It was decided that, as this was an activity that supported reflection, it should be connected with the existing Professional Practice Portfolio assignment. This assignment consisted of four parts; A) an opening section where students articulated and reflected upon their teaching and learning philosophies at the beginning of the course, B) a critical incident analysis essay, C) a reflective essay on catering for diversity issues in their teaching practice, and D) a final closing section to include a re-evaluation of learning goals and teaching philosophies stated at the beginning of the year and what students felt they had learned during the year (Appendix 5).

The broad topics found in the literature on the use of digital storytelling with pre-service teachers ask students to create digital stories on topics like “Why do I want to be a teacher?” (Heo, 2009, p. 414) and “What does it mean to me to be a teacher?” (Kearney, 2009, p. 1989). The closing section of the portfolio asked students to reflect on their educational journey for the year, which fit well with the broad topics used for DST with pre-service teachers in the literature.

In order to expose all of the students to the process of creating a digital story, it was decided by the Ed Tech team to teach the unit to the whole cohort. However, students were given a choice of whether or not to complete a digital story once they had received the training. They had an option; to create the closing section of their Professional Practice Portfolio as a traditional essay, or as a digital story. This was in line with other DST
exploratory projects encountered in the literature review (See Kearney, 2009; Li & Morehead, 2006).

Participants in a ‘Center for Digital Storytelling’ (CDS) workshop create their digital story in three days. With a cohort of 221 students, it was not possible to take our students through the 3 day workshop format. So, it was necessary to redesign the workshop format into a series of lessons that would fit into our existing Educational Technology (Ed Tech) class schedule of one one-hour lesson a week, over several weeks. However, even though the process has been redesigned, it has retained the essential aspects of the CDS’ approach to DST.

6.2.1.1 Education technology

Our Education Technology Centre consists of two PC labs; one lab is equipped with 17 student PC’s and one instructor PC which is connected to a digital projector. The other lab has 30 student PC’s and one instructor PC connected to a digital projector. During the pilot project, the PCs were running Windows XP. There is also an iMac lab in the building, which has 20 student computers and one instructor computer connected to a digital projector. Two education technology instructors, one of whom is the researcher, teach weekly Ed Tech classes to groups of 17 to 25 students over the course of the academic year, from September to March.

Students are organised into small groups of 6-8 by teaching subject area at the beginning of the school year for microteaching, and then two or three of these groups are amalgamated to make up each Ed Tech group. Based on social constructivist principles, this ensures that students can work collaboratively with other students in similar subject areas on Ed Tech projects throughout the year, in small, hands-on, interactive classes. Students are encouraged to provide peer support for each other during the Ed Tech classes as well as outside of class. The Ed Tech class schedule for 2009-2010 is shown in Appendix 6. Each week, the same lesson is taught in all classes.
6.2.2 The digital storytelling design

The Digital Storytelling pilot project with the first cohort of students took place in February and March, 2010. Five one hour lessons on the different components of the digital storytelling process were devised, based on the digital storytelling literature (Banaszewski, 2005; Lambert, 2009; Matthews-DeNatale, 2008; Ohler, 2008; Porter, 2004b). The breakdown of the lessons can be seen in Table 6.1

Table 6.1: Digital storytelling pilot project lessons

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>22/2/10</td>
<td>Introduction to Digital Storytelling, Story structure &amp; Story Map Creation</td>
</tr>
<tr>
<td>Week 2:</td>
<td>1/3/10</td>
<td>Story Circle, Work on Script, Intro to Storyboard Creation</td>
</tr>
<tr>
<td>Week 3</td>
<td>8/3/10</td>
<td>Image sourcing &amp; uploading, Music creation, Voice recording</td>
</tr>
<tr>
<td>Week 4</td>
<td>15/3/10</td>
<td>iMovie or Windows Moviemaker tutorial</td>
</tr>
<tr>
<td>Week 5</td>
<td>22/3/10</td>
<td>Help/Work Session</td>
</tr>
</tbody>
</table>

Six week interval – Block teaching practice/Spring holidays

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/5/10</td>
<td>Help/Work Sessions all week</td>
</tr>
<tr>
<td>10/5/10</td>
<td>Help/Work Sessions all week</td>
</tr>
<tr>
<td>13/5/10</td>
<td>Final Portfolio Due (including Digital Story)</td>
</tr>
</tbody>
</table>

6.2.2.1 Learning aims and outcomes

Learning aims and outcomes were collaboratively devised by the Ed Tech team, based on existing course aims, outcomes and the relevant DST literature (Center for Teaching Excellence, 2009; Maricopa Community Colleges, 2009; National Council for Curriculum and Assessment, 2009). The aims and outcomes for the pilot project DST design were:

Aims:

- Introduce students to creative information and communications technologies (ICTs) for use in the classroom
- Enable students to use digital tools to communicate in a highly engaging manner
- Enable students to gain a deeper understanding of the reflective process
- Enhance students’ reflection on practice through the use of multimedia and storytelling
- Enhance students’ technology self-efficacy
- Enable students to reflect critically on their professional practice
Chapter 6: Design Cycle 1 - Initial Experience

- Enable students to use ICTs effectively to enhance teaching and learning
- Develop student teachers' capacity for reflection through creative ICTs
- Enable students to adopt a critically reflective perspective on issues that arise in the classroom, school and wider society
- Develop students’ capacity to adapt and respond to particular contexts by reflecting critically – before, during and after – on their practice
- Enhance students’ ability to draw connections between different components of the PDE programme (incl. teaching practice) and demonstrate how different elements contribute to their professional practice

Outcomes:

- Identify the elements of storytelling
- Develop a personal narrative story about what they learned on the PGDE course
- Develop writing skills through the creation of a tightly written narrative script
- Create a story map and storyboard for production
- Use audio editing software to record and edit a narrative voiceover
- Use audio editing software to record and edit a soundtrack
- Create photo and music/sound effect lists
- Use internet search tools and public domain websites to gather images for the digital stories
- Demonstrate a clear understanding of copyright issues surrounding the use of images, sound and music in teaching and learning resources, including digital stories
- Enhance information literacy and visually literacy
- Use video editing software to create and edit video utilising still and moving images
- Manage files on a computer for organising and managing digital resources
- Edit images using basic image editing software
- Burn files to a CD or DVD

6.2.2.2 Assessment

Moon (2004) states that assessment criteria should be directly related to learning outcomes, and that we should look at assessment as a basic part of
the design of reflective learning, not as a separate issue. “If the right thinking is done about assessment with assessment criteria properly developed, the right and proper thinking is likely to have been done about the development of the module” (Moon, 2004, p. 151). Both the assessment brief and the assessment rubric were developed with this in mind, before the lessons were designed, to ensure we were covering everything the students would need to know in order to complete successfully the DST assignment.

6.2.2.2.1 The assignment brief

The digital story assignment brief (Appendix 7) was based on the criteria for ‘part D’ of the professional practice portfolio. It asked students to:

… reflect on:

- your educational journey
- re-evaluate learning goals and learning philosophies, evaluate achievement of these learning goals
- trace any transformations in your learning and teaching beliefs, values, attitudes, and assumptions, how these changes have come about
- relate what/why/how different elements of the PGDE programme contributed to your learning and teaching
- highlight significant landmark achievements/improvements you have made to your learning and teaching (can draw from your journal, lesson plans and evaluations…)

It also included guidelines for the technical aspects of the project.

6.2.2.2 Digital storytelling assessment rubric

An assessment rubric was created to assess the completed digital stories. Rubrics are seen as a form of authentic assessment (Picket & Dodge, 2007). They can be used to both assess as well as enhance learning, as suggested by Moon (2004), by providing exemplary criteria for students to use to self- and peer-assess during the production of the assignment. The rubric would serve as a form of feedback, as suggested by Tharpe and Gallimore (1988), to give students performance standards by which they would be able to judge their own progress.
This rubric, which consists of two pages, was based on other digital storytelling rubrics encountered in the literature, specifically rubrics created by Dr. Helen Barrett and Scott County Schools (Barrett, 2005a), Personal Expression Analytical Student Scoring Guide (Porter, 2004a), Western Massachusetts Writing Project (Hodgson, 2010), and the Integrating Digital Storytelling Into Your Classroom Website (2006).

6.2.3 The digital storytelling lessons

6.2.3.1 Lesson 1: Introduction to digital storytelling

Banaszewski (2005) states that, “An engaging digital story successfully combines personal narrative writing with skill in visual representation…” (p. 9) The most powerful digital stories are those written as a personal narrative (Lambert, 2009; Ohler, 2008; Porter, 2004b). Depending on their teaching subject areas, many students had not had to ‘write a story’ for years. For this reason, the first lesson in the DST unit was designed to introduce students to digital storytelling in education, as well as to give them a basic understanding of story structure and the components of personal narrative.

In the Ed Tech lesson prior to the introduction to digital storytelling, students were asked to brainstorm an idea for their digital story as a homework assignment (Appendix 8). They were told that this should be a reflection on what they had learned so far this year, and were asked to write a rough draft of no more than 500 words to bring to the following class in two weeks’ time to share with their peers.

The first lesson on Digital Storytelling introduced students to the idea of DST, gave them information on the use of storytelling and digital storytelling in education, and stressed the technology and literacy skills their students could learn from DST. Adult learners must see the benefit of learning in order to motivate themselves to learn the subject (Lieb, 1999). It was hoped that by introducing the students to the benefits DST could provide for their own students, they would see DST as something useful to their own teaching and would engage more readily with the process.
Chapter 6: Design Cycle 1 - Initial Experience

Students were provided links to examples of digital stories on the lesson’s PowerPoint presentation (Figure 6.1) which they could access on their own computers in class, and were given 10 minutes of class time to look at a few of the examples. This only allowed time to look at 2-3 DSTs, so students were encouraged to explore the links to the rest of the digital stories on their own time.

The class was taken through the steps of the DST process. Our rationale for using digital storytelling with them as pre-service teachers, to enhance their reflection on practice, (based on Barrett, 2006; Li & Morehead, 2006) was explained. Students were informed of the research being done on the use of DST for reflection with them, and volunteers were solicited to complete a digital story as ‘part D’ of their portfolios. Students were informed that if they were interested in completing a digital story, they could sign up on a list that was posted outside the resource library in the Ed Tech building.

The students were introduced to very basic information on story and personal narrative structure, and were taken step-by-step through Ohler’s (2008) story map. Examples of these slides can be seen in Figure 6.2, below.

Figure 6.2: PowerPoint slides introducing story and personal narrative structure

For homework that week, students were given a handout of the story map to help them flesh out the rough draft of their story (Appendix 9). They were asked to rewrite their story drafts, adding in any ideas that arose out of the use of the story map, and were asked to bring these second drafts to class the following week for a peer feedback session. Those who were not planning on creating a digital story were encouraged to use this as a pre-writing activity for their ‘Part D’ essays. Further links to DST websites were
provided at the end of the lesson PowerPoint, as well as links to videos on storytelling and story structure.

Students were provided with a copy of the assessment rubric at the beginning of the project for use both as a means of self-assessment while producing their digital stories and as a guide to what was expected from the assignment. All of the hand-outs and PowerPoint slides were made available to the students through the university’s virtual learning environment, Blackboard.

6.2.3.2 Lesson 2: Story feedback, script creation and storyboarding

The second lesson started with the peer feedback session on the students’ story drafts. Students were given ten minutes to share their story draft with a peer. They were given loose guidelines for the feedback activity, shown in Figure 6.3, based on suggestions from Lambert (2009) and Porter (2004b).

Many students were unprepared for and unenthusiastic about this activity. Many of the students were not planning on completing a digital story, and had not completed the homework from the week before. The closing section for the portfolio was not due for three more months and was not a priority for the students at this time. The tutors were aware of this dynamic, and skimmed over the process instead of strongly encouraging students to participate.

Students were then taken through the process of script creation, based on information from Porter (2004b), and storyboard creation, based on information from the CDS website (http://www.storycenter.org/memvoice/pages/tutorial_3.html) as seen in Figure 6.4.
Students were given a handout of an example storyboard created by a pre-service teacher, sourced from Li and Morehead (2006), and were shown the digital story created from this storyboard. They were also given a storyboard template (Appendix 10) based on a similar design by Porter (2004a), which was used with the author’s permission.

Porter (2004b) recommends the use of Image/Shot lists and Sound/Music lists to keep track of the origin of media used in the digital stories as it’s being collected. These were created, based on Porter’s design, and used with permission. Students were shown where these resources were on Blackboard, but were advised not to use them until they had finalised their script and storyboard.

Students were reminded to use the DST evaluation rubric to self-assess as they put their digital stories together. For homework that week, students were asked to finish their story draft and to start to create their storyboard, thinking about what images and sounds or music they might want to use in their digital stories.

6.2.3.3 Lesson 3: Image sourcing, uploading and music/voice recording

The first part of this lesson was devoted to discussing copyright issues. There is a strict plagiarism policy in place at the university. Students are advised of this at the beginning of the year and are required to sign a student declaration on plagiarism form stating that they understand what plagiarism is and that they agree to cite any source materials used in course projects. In addition to this, the School of Education’s policy is that as pre-service educators, it is an essential part of their educational technology training...
within the PDE that the students are fully apprised of copyright issues regarding materials used in their classrooms. Copyright, fair use policy and creative commons licencing were therefore fully explained in class and links were provided for further information. ‘Royalty free’ resources available on the internet for use in the digital stories were explained, and links to royalty free image and music sites were provided. Many of these were sourced from Porter’s (2004a) and Ohler’s (2007) websites, which offer excellent links to many different kinds of free and royalty free resources available on the Web for DST. Students were also encouraged to use their own photos and other items as image sources, especially any academic images or materials used in their teaching practice that might be relevant to their digital story.

In discussing the possible use of music in their digital stories, students were taken through a particularly powerful activity from Ohler’s (2007) website which investigates “the manipulative power of music”. Students are taken three times through the same 30-second movie of someone getting out of bed in the morning and walking out into the living room, each with a different kind of musical background. With each different kind of music used, a completely different mood and story is suggested (Ohler, 2007). Student reaction to this activity in class was strong, very positive, and a little contemplative as it brought home the realization to many how easily our emotions are manipulated by music in most of the entertainment and advertising we interact with on a daily basis. It turned out to be an excellent activity to use for the purpose of introducing the use of sound in digital stories.

Taking into consideration Tharpe and Gallimore’s (1988) Stage I of the ZPD, students were provided with step-by-step, detailed handouts throughout the DST process. This ensured that the steps of the different software applications were transformed into “…images and verbal symbols that guide subsequent performances…” (Tharpe & Gallimore, 1988, p. 48). Students had the opportunity to learn from the tutor as well as from their peers in class. Using the handouts as guides, students could continue on to Stage II of the ZPD, providing assistance to themselves. In this manner, it
was envisioned that most would be able to successfully use the different software applications without the presence of the tutor.

Students were taken to Magnatune.com, one of the royalty free music sites mentioned in class, and shown how to search for music in a certain genre, as well as how to download the music to their computer. A handout for this was provided.

The last part of this class took students through a step-by-step tutorial on using the free web-based audio editing software, Myna, which was available that year from http://aviary.com/tools/myna. The audio editor on the site allowed users to record their voice and add music or sound effects to multiple audio tracks, and then export the final soundtrack as a single audio file. This allowed users of Windows Movie Maker (WMM), which only has one audio track, to include voice and music or sounds in their digital stories. An added benefit to using Myna for the audio editing was that it included a royalty free music library that allowed students to create their own soundtrack from hundreds of different ‘beginning’, ‘middle’ and ‘end’ pieces of music, in many different genres. We had considered using Audacity for the audio editing (available free from http://audacity.sourceforge.net/) as it was recommended for digital storytelling (Ohler, 2008; Porter, 2004a), but we felt that Myna’s music library offered the students more flexibility in creating their own soundtrack, so it was decided to teach them to use that programme instead.

Five inexpensive USB microphones were purchased by the researcher for students to check out and use to record their voiceovers at home.

6.2.3.3.1 A slight glitch...

Around this time, at a professional practice tutor’s meeting in early March, 2010, the Head of School expressed concern that using the rubric that had been created to assess the DSTs could unfairly advantage, in a positive or a negative way, those students who were creating a digital story for the closing section of their portfolio (Long, 2010). It was therefore decided by the staff, and agreed to by the researcher, that the assessment criteria for the
written essays would be used to assess the digital stories for their summative academic mark. Students who had signed up to create a digital story were informed of this decision via email. At the same time, they were encouraged to continue to use the DST assessment rubric for self-assessment and guidance. The effect of this decision on the impact and quality of the DST results will be discussed below.

6.2.3.4 Lesson 4: Using Windows Movie Maker

The fourth DST lesson took the students through the steps of creating a digital story on WMM. Initially, it was planned to provide instruction on both iMovie and WMM for the compilation of the digital stories in video editing software, allowing students to choose which platform they wanted to receive instruction on. Porter (2004b) warns that it’s more difficult to create a digital story using WMM as it only has one audio track, and suggests using iMovie instead, which has multiple audio tracks, making it easier to add a voiceover, music and sounds to the digital story. It was suggested to the students interested in completing a digital story that we use iMovie for this reason.

By the end of the first week, several students were very interested in creating a digital story, and many had signed up to do so after the first day of class. However, several of the students expressed a desire to use WMM instead of iMovie, as they did not have access to apple Macs outside of the Ed Tech building (Long, 2010). For this reason, it was decided to only teach the students how to use WMM in class for their digital story creation, not iMovie.

While designing the lessons for the technology aspects of the digital storytelling unit, it was important to the researcher that software be used that fit with Gilbert’s (2002) definition of low threshold applications (LTAs). As discussed in Chapter 5, LTAs are teaching and learning ICT applications that are accessible, low in cost or free, easy to learn, non-threatening, and can be relied upon to work as expected. It was felt that students would disengage from the digital storytelling process if they were taught to use expensive software that they couldn’t access outside of the Ed Tech lab.
WMM is provided free with the Windows operating system so is available for students to access on their home or school Windows machines, both during the course and after. It is also very straightforward to use.

Banaszewski (2005) points out that there are three basic tasks that students need to know in order to use video editing software for the creation of digital stories: importing media, dragging and dropping that media on the timeline and aligning items on the timeline. A detailed step-by-step handout was created by the researcher to teach the students the skills needed. Following guidelines suggested by Jones and Bayen (1998), the handout included ample screen shots of tool bars, menus, etc. This was given to the students to use during the lesson and was also available to them to download from Blackboard. Students usually do not rely too much on the handouts for use during class, when they are following along with the skills being modelled by the tutor on the large screen and can ask for assistance when needed. However, when they’re trying to use the programme again a few days or weeks later to complete the assignment on their own, the extra scaffolding supplied by the handouts can provide the support needed to successfully complete the task independently. This can make the difference between students becoming frustrated and giving up on using the software, and feeling that they have the support they need to complete the assignment.

During the WMM lesson, students were supplied with practice image, video, voiceover and sound files through Blackboard. They downloaded these to their own computers and then imported them into WMM. They were shown how to drag the files on to WMM’s timeline, how to change the duration of clips on the screen and how to add narration to the movie. Students were taken through the use of the video editing software’s transitions and special effects, and were taught how to add in title effects. Finally, they were shown how to mix the movie down for publication. Students were encouraged to ‘play’ with these practice files, as suggested by Dorinina (1995), in order to become comfortable with the skills needed to use the programme before trying to produce their real digital stories.
Links to additional support materials for WMM were supplied at the end of the lesson’s PowerPoint presentation, which was available to download from Blackboard. Students were reminded to use the rubric for guidance and self-assessment as they began putting their digital stories together.

The final DST lesson would be held the following week, so students were asked to bring any media they had collected for their digital stories to the final DST class.

6.2.3.5 Lesson 5: DST work session

This was the last scheduled Ed Tech class of the year as the ‘block schedule’ students were going out on their final teaching block until the end of April, and would not be returning to campus until the first week in May.

This lesson was planned as a help session for those students who were completing a digital story. At this point, five weeks into the process, 67 students had volunteered to complete a digital story. It was envisioned that students would have time to work on compiling their digital stories in this class and get help from the tutor or their classmates if they needed it. Unfortunately, a different assignment deadline was looming at the end of that week, an ICT resource for their Methodology class. Attendance at the Ed Tech classes was low that week, and most students who attended the class were looking for assistance with the technology involved in the other assignment. The implementation log for that week states that, “Our work session got ‘hijacked’ by the due date of another assignment!” (Long, 2010, p. 6). We realised when scheduling the class that many students were not planning on completing a digital story, and so offered support for the other assignment during class as well, but we were disappointed by the low numbers working on their digital stories at that point, nonetheless.

After the five weeks of instruction related to the DST ended on the week of 22 March, 2010, students who had volunteered to complete a digital story had an additional 6 weeks to work on their DST on their own. However, in order to decrease student frustration and enhance student engagement with the process, support measures were put in place to provide students with
assistance if it was needed. A discussion group was set up on Blackboard, and drop-in support sessions were held in one of the Ed Tech computer labs over the remaining 6 weeks until the DSTs were due.

Students who had signed up to complete a DST were invited, via email, to join the DST discussion board, and instructions for doing so were provided. It was envisioned that students would post any queries they had regarding the production of their digital stories to the discussion board. These queries could then be answered publicly by the researcher on the discussion board so that all participants could benefit from the answers.

Unfortunately, only two queries regarding the digital stories were posted. Instead of using the discussion board, most of the students just emailed the researcher with any questions they had regarding their DSTs.

Drop-in help sessions for students completing a DST were scheduled in the computer lab on Thursdays during April, 2010. In addition to this, as the due date for the digital stories drew near, the researcher was based in the computer lab every day for the first two weeks of May, to provide drop-in assistance if needed. A log was kept of the number of students who availed of the extra help, which can be seen in Appendix 11. Some students just dropped in to have quick questions answered and left; others sat and worked on their digital stories for the whole day, asking the researcher for assistance when needed.

6.2.3.6 Submission of DSTs

As the due date drew near, many of the students who had signed up to complete a digital story pulled out of the project. Most cited time constraints, conflicting assignments and excessive workloads as reasons for not completing a digital story (Long, 2010).

In the end, 18 students submitted a completed DST as the closing section of their professional practice portfolio. The digital stories were submitted by uploading them to Blackboard. They were also burned to DVDs and submitted with the ‘Working Portfolio’ part of the assignment, which included all of the planning material for the DST.
6.2.3.7 DST assessment

The completed DSTs were assessed by the researcher over the next few weeks, using the essay criteria for the closing section of the portfolio. The original DST assessment rubric was also used by the researcher to assess the digital stories for research purposes. After the assessment of the DSTs, initial findings were that many of the students had created what amounted to ‘essays with pictures’ instead of true digital stories. The researcher noted in her implementation log that, “Those that stuck to the ‘part d’ brief really just did an audio essay with pictures. Those who strayed into creativity, and away from the constraints of the assignment brief, showed more depth of reflection” (Long, 2010, p. 12).

6.2.3.8 Data analysis:

As discussed in Chapter 4, items used for data analysis included the students’ completed digital stories, their ‘working portfolios’, the online discussion board, student emails and a post digital storytelling questionnaire (Appendix 28). Students were given a research permission form to submit with their digital stories (Appendix 12). Sixteen of the eighteen students who submitted a digital story gave permission for their DST materials to be included in this research. Only their materials were used in the analysis of the pilot project digital stories. In addition, students were given a choice of participating or not participating in the questionnaire. Their informed consent was sought, and anonymity, confidentiality and non-traceability were assured. The questionnaire was left open for a month, to give students plenty of time to participate. In the end, 12 students completed the questionnaire.

The questionnaire was designed to obtain feedback from the students on their experiences while creating their digital stories. Analysis of student responses to the questionnaire was used to revise the unit for the following year. Questionnaire data were downloaded from the online survey site and imported into MS Excel for analysis. As the sample size was very small (N=12), it was felt that the use of specialist data analysis software such as SPSS or NVivo was not necessary.
6.3 Pilot study findings

Results were examined to explore the impact of DST on students’ reflection on practice. In addition, the R-NEST framework which emerged from the review of the literature, and was expanded upon in Chapter 5, has been used to frame the discussion of the data analysis and findings.

6.3.1 Depth of reflection

While assessing the DSTs with the rubric, the researcher realised that adequate criteria for reflection had not been included in the rubric. In fact, only one criterion out of the seven on the rubric dealt with reflection. The rubric had been created based on DST rubrics sourced from the literature. As in the model rubrics, our assessment rubric included criteria for assessing the technical and mechanical aspects of the digital stories, and included only three criteria regarding the actual content of the digital stories. Only one of these criteria dealt with the amount of reflection evident in the digital story. In order to assess reliably the digital stories for depth of reflection for research purposes, the researcher realised she needed to devise a separate rubric dealing specifically with levels of reflection.

The literature dealing with depth of reflection (Boud et al., 1985a; Hatton & Smith, 1995; Moon, 2004) was revisited, and the researcher decided to incorporate Moon’s (2004, pp. 214-216) framework for reflective writing into a rubric (Appendix 4). Moon’s (2004) descriptions of the most reflective writing, ‘Reflective (2)’, served as examples of the criteria that showed the highest levels of reflection. Labels for the criteria were devised from the ‘Reflective (2)’ descriptors, and Moon’s descriptions for each level were used to describe the gradients of levels of reflection, from highest, ‘Reflective (2)’, to lowest, ‘Descriptive’. Not all aspects were evident at all levels, so in these instances, the researcher filled in the lesser levels of the rubric with ‘no evidence of’ (e.g. evidence of critical reflection, which Moon notes is only evident in the Reflective (2) level). For others, the descriptor of the highest level of reflection was used, and lesser levels of reflection were evidenced by changing the language to ‘some evidence’, ‘little evidence’ and ‘no evidence’.
The digital stories (N=16) were assessed using this rubric for depth of reflection. The results can be seen in Figure 6.5.

![Depth of Reflection Results](image)

**Figure 6.5: Pilot project depth of reflection rubric assessment results**

The scale ranged from the lowest level of “Descriptive” to the highest level of “Reflective (2)”. While none of the digital stories received the lowest “Descriptive” rating, the majority of digital stories were rated as only “Descriptive with some reflection” (n=8). Five of the digital stories showed “Reflective (1)” levels, and only three of the digital stories were rated as showing the highest level of reflection, “Reflective (2)”.

While this rubric (Appendix 4) served to give a better gauge of the depth of reflection evident in the digital stories, it was not a perfect “fit” for the purpose. Notes from the researcher’s implementation journal state that the rubric:

- Fits really well with some DSTs, but not others. (Moon’s descriptors are dealing with reflecting on a specific event)

- I think this has to do with the brief given to students, not really asked to describe an ‘event’ that they can delve into. Brief asked them to sum up what they learned this year, and to tie this into part D of the portfolio. (Long, 2010, p. 14)

It was very interesting to discover, after assessing the digital stories with the depth of reflection rubric, that the one student who completely disregarded the essay assignment brief created the most deeply reflective digital story.
The topic of his story dealt with his coming from a ‘teaching’ family, with his grandfather, father, uncle, and sister all being teachers, and how he rebelled against that career path as a young man, only giving in to the calling he felt to teach later in his life. This led to a discussion of his teacher identity, moving from the ‘cool Hollywood style of teacher’, to what he realised all of his best teachers had been, firm but fair disciplinarians who controlled their classes well. His use of many metaphorical images was deeply reflective as well, one example being his use of images of shadows to represent the teaching tradition that haunted him in his younger life (Figure 6.6).

Another student created a digital story about his journey from ‘student’ on the PGDE course, to becoming a ‘Teacher’, and how he saw his own attitudes as a student reflected in his students as he got to know them. Most of the images used in his digital story were composite images of him illustrating the different attitudes of students he encountered in his classes (Figure 6.7).
This digital story too dealt with the student teacher’s developing teacher identity, only sticking to the essay assignment brief slightly, instead telling the story of his development from student to full-fledged teacher. Both of these students told ‘stories’ instead of writing essays. In comparison to the students who strayed from the brief were those students who diligently stuck to the essay brief, one so much so that his digital story took the form of an essay read out loud, including reading out the assignment brief headings at the start of each section.

After a good deal of reflection on the relationship between sticking to the assignment brief and depth of reflection, the researcher realised that the task that had been set for the students did not match the desired outcome of deep reflection. The ‘Part D’ brief asked for a summing up of the year, looking back at original goals and teaching philosophies, and assessing whether or not these goals were met. While this allowed for some reflection, the task required a broad assessment of the year. If we wanted students to produce something that was deeply reflective, we needed to set a task that would allow them to delve more deeply into an experience; into the thoughts, feelings, and motivations, that led to and emerged from the experience. We needed to provide students with a task that was more closely aligned to the types of reflective tasks suggested by Moon (2004).

6.3.2 Narrative

The most powerful digital stories are those written as a personal narrative (Lambert, 2009; Ohler, 2008; Porter, 2004b). Students were encouraged to
write their digital story in the format of a personal narrative that told the story of what they had learned as a student teacher.

Students were very positive about the narrative format of digital storytelling in their questionnaire answers. Several students felt that the digital story format was a better way of expressing themselves, in comparison to writing essays. Student 7 noted, “I…come from a science background and found writing essays reflectively more difficult so I thought this would be a better way of expressing myself.”

Putting their thoughts into a story format helped some students to better articulate what they had learned: “Because the story is quite short, I had to think about what was important to me over the PGDE and what I felt I had learned. It cut out a lot of waffle and was right to the point” (Student 10).

Graphic organizers in the form of a concept map for brainstorming story ideas, the story map and the storyboard were provided for the students to use in the creation of their digital stories. It was hoped that these would assist students in creating a ‘story’ in the personal narrative genre. Students were asked about the usefulness of these in the survey. Results can be seen in Figure 6.8.
Figure 6.8: Survey results regarding the 'story' graphic organizers

Most students found these helpful, with the majority of respondents either strongly agreeing or agreeing with this statement. However, as can be seen in the chart, a few of the students did not find them helpful.

As the digital stories were being assessed and analysed, it became apparent that the students had been constrained to the essay format by the ’Part D’ essay assignment brief that was used to formally assess them in the end. Two students mentioned in their planning materials that they had originally written a story, but had changed to more of an essay to include all the criteria that would be used to mark the digital stories. One student stated,

My initial story reflected my personal philosophy well and how I still retain this philosophy of teaching. However, like my original brainstorm sheet, it is not aligned with the criteria for successful completion of Part D of my portfolio. I have written a new updated story, entitled “my Teaching Story” following the [final professional practice] tutorial in an attempt to meet the standards as set out on blackboard (Working Portfolio, Student 16).

This was echoed by student statements in the survey:

I felt restricted by the assignment brief as it was difficult to address the brief set out for a 1500 word essay in the same detail in a 3-5 minute digital storybook. I would have preferred a different brief more focussed on the storybook (Student 7).
The researcher was curious to see how many DSTs could be classed as ‘stories’, and the students’ DST scripts were analysed for this purpose. The results of this analysis can be seen in Figure 6.9.

![Structure of Pilot Project DSTs](image)

Figure 6.9: Structure of pilot project DSTs

While ten students used the story map in their planning, the resulting digital stories did not reflect this. Of the eight students that followed the story structure outlined by the story map, two did not include a story map as part of their planning materials, so it is not clear if they used one for planning.

While students were encouraged to continue to use the assessment rubric as a guide for producing their digital stories after being told that the essay criteria would be used for assessment, the results indicate that most placed an emphasis on meeting the essay criteria, knowing that this would be used to mark their digital story. The researcher found this to be consistent with a ‘strategic’ approach to learning, as outlined by Moon (1999), where students’ intention is to achieve the highest grade possible, by among other things, “…being alert to assessment requirements and criteria” (Moon, 1999, p. 122). This resulted in many students creating what could best be described as ‘essays with pictures’ instead of true digital stories.

There wasn’t a lot of evidence in the survey results to back up the claims from the literature that the narrative structure of the digital story was more helpful to the students in making sense of their experiences as pre-service
teachers. However, as noted in the results from assessing the digital stories, many of the students did not actually use the personal narrative structure when writing their digital stories. This caused the researcher to think that this structure needed to be better explained and stressed in the format of the stories in the next iteration of the DST design.

6.3.2.1 Teacher identity creation

As discussed in Chapter 5, the use of self-narrative has been used extensively with pre-service teachers in the area of teacher identity development (See Anspal et al., 2011; Austin & Hickey, 2007; Draper et al., 2001; Gaudelli & Ousley, 2009; MacLeod & Cowieson, 2001; Schultz & Ravitch, 2013). Banaszewski (2005) notes that “…authoring a digital story is a powerful form of identity construction” (p. 17).

In an analysis of the topics of students’ DSTs, shown in Figure 6.10, four of the DSTs were found to have dealt specifically with the topic of their teacher identity, but all of them dealt in some way with describing the type of teacher the students wanted to be, or hoped to become.

![Pilot Study DST Topics](Image)

**Figure 6.10: Pilot study DST topics**

An example of a DST which deals exclusively with developing teacher identity is entitled, 'Growing as a Teacher'. In it, Student 6 discusses her initial struggles in the classroom when the reality of teaching did not match her expectations, and how she was overwhelmed with information at the
beginning of the year. She then goes on to explain how, as time passed, things started to “click into place” and she was able to put the theories into practice. At this point she says, “I began to see myself as a teacher.” She explains the kind of teacher she has become; one who believes in a learner centred education, and who is a lifelong learner herself, an “eternal student.” She ends her story with the line, “Through working in the classroom, my learning will never stop, but grow every day.” Screen shots from this DST can be seen in Table 6.2.

Table 6.2: Screen shots and dialogue from the digital story “Growing as a Teacher”

<table>
<thead>
<tr>
<th>Image</th>
<th>Dialogue</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.jpg" alt="Image 1" /></td>
<td>“…I was overwhelmed with new theories, lesson plans, aims, learning outcomes, philosophies, History…” (2009-2010 Student 6, 1:00)</td>
</tr>
<tr>
<td><img src="image2.jpg" alt="Image 2" /></td>
<td>“The first few months were a whirlwind of information and emotions.” (2009-2010 Student 6, 1:11)</td>
</tr>
<tr>
<td><img src="image3.jpg" alt="Image 3" /></td>
<td>Time passed, and everything began to click into place.” (2009-2010 Student 6, 1:13)</td>
</tr>
</tbody>
</table>
“I began to see the bigger picture.” (2009-2010 Student 6, 1:26)

“I began to see myself as a teacher.” (2009-2010 Student 6, 1:36)

“Through working in the classroom, my learning will never stop, but grow every day.” (2009-2010 Student 6, 4:00)

In the DST survey, students were asked questions about how they felt DST helped them to make sense of their development as a teacher. These were based on the literature dealing with pre-service teachers, DST and identity development (See, Morehead, LaBeau, & Li, 2007; Tendero, 2006). The questions and results can be seen in Figure 6.11.
Almost all students agreed or strongly agreed with the statements regarding digital storytelling and teacher identity development. The option to include additional comments was not included for these questions, so student answers cannot be elaborated on.

### 6.3.3 Engagement

Much of the literature on the use of DST with pre-service teachers states that it is engaging, motivating, and a creative way for students to evidence their reflection on practice. Measures to test for levels of these attributes were included in the survey. Student responses to the post-digital storytelling questionnaire showed that all were pleased with the outcome of their digital story. Students enjoyed creating their digital stories, and all found the creation of their digital story a rewarding experience.

Engagement can be evidenced by the amount of time and effort spent on a task (Jones, 2003; Sandholtz et al., 1994). The amount of time and effort put into the creation of the digital stories showed a high degree of engagement in the process of creating the digital stories. Evidence from the students’

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**Figure 6.11: Pilot project results regarding teacher identity questions from the survey**

Almost all students agreed or strongly agreed with the statements regarding digital storytelling and teacher identity development. The option to include additional comments was not included for these questions, so student answers cannot be elaborated on.

Completing a digital story gave me a chance to make sense of my development as a teacher.

Creating my digital story helped me to better articulate what I've learned this year as a pre-service teacher.

Completing a digital story helped me to bring what I have learned about teaching to a conscious level.

Creating a digital story really helped me to make sense of my experience as a pre-service teacher this year.

(N=12)
working portfolios showed that students spent a great deal of time planning, sourcing materials and creating their digital stories.

In an effort to find out how much time was spent by students in the creation of their digital stories, they were asked to estimate the amount of time they spent on the different tasks associated with the process. This was done to gain insight into their level of engagement in the activity, as well as to find out how long it actually took them to complete the assignment. The results of this question can be seen in Figure 6.12.

Eleven students answered this question. Most students only spent 1-2 hours on brainstorming ideas for their digital stories. All of them reported only spending 1-2 hours on their story map. The writing of the script took more time, with students reporting that they spent from 1-2 hours, up to some students spending 7-8 hours on their story script. Students spent the most time sourcing the images used in their digital stories, and compiling the components of their digital stories in the video editing software. When the amount of time spent by students was totalled and averaged, it was found that students spent an average of 30 hours completing their digital stories. This constitutes much more time spent working and reflecting on the topic than they would have done had they simply written an essay.
6.3.3.1 Levels of engagement

Eight items on the survey dealt with assessing students’ level of engagement in the creation of their digital stories. These items were modified from *The User Engagement Scale*, which was based on the theoretical frameworks of Aesthetic, Play, and Flow Theories, created by O’Brien & Toms (2009). Engagement level was assessed using a five point Likert type scale. Higher scores indicate a higher level of engagement. Figure 6.13 shows the results of student scores on the engagement section of the survey. Several students show high levels of engagement.

![Results of Engagement Scale Items](image)

Figure 6.13: Results of engagement scale items from Pilot project questionnaire

Several comments made by the students in the survey also showed how engaged they were in the process of creating their DSTs. Students made comments such as:

Loved it. It took me a long time but I really enjoyed it and I didn't dread it the way I do assignments. I did it because I wanted to see the movie unfold. (Student 10).
You become engrossed in every little detail and become a perfectionist. It ended up taking a lot longer than planned but it was worth it (Student 11).

Really enjoyed it. I would recommend it to anyone. Should be made a permanent choice on the PGDE and maybe even compulsory. Great learning experience (Student 11).

Really enjoyed it. I feel confident I will use it again in the future for teaching purposes…I enjoyed learning new skills in Microsoft Media Player and an Audio software (Student 12).

I really enjoyed it and was delighted to have completed it (Student 2).

Enjoyed using the computer to put together the story and come up with ideas to make it fun and interesting (Student 4).

I enjoyed learning how to use the Movie Maker software and Myna. These are definitely things I would like to use in the future (Student 7).

It was very enjoyable, and a process that I could see real use in, this is something I will use again… (Student 9).

6.3.3.2 Intrinsic motivation

Intrinsic motivation is seen as a subset of engagement (O'Brien & Toms, 2008). When students were asked on the survey why they chose to create a digital story, they overwhelmingly answered that they were interested in doing a different type of assignment. Perhaps surprisingly, the majority of the students who chose to complete a digital story were from a Science or Maths background. Several of these students noted in the survey that, coming from a non-humanities background, they felt disadvantaged on the course by the amount of essays used for assessment purposes. This can be seen in Student 9’s statement, “As a science graduate (Degree and Masters in Science) I felt very limited in my ability to express myself through the English composition style of the rest of the portfolio.” It is important to keep in mind that, as these students all volunteered to complete a digital story, they began the project with a good deal of personal motivation. For many, this stemmed from the fact that they were eager to be assessed in an alternative way.

Other students were excited about the chance to be creative in one of their assignments, and many were aware of the additional ICT skills they could attain and use in their teaching by completing the project. “As so much of today's youth are very familiar with technology and seem to like it as a way
of learning, I thought that this was a great way to learn how to do something that I could use to catch their attention and create a vivid memory for them to remember a topic or concept by” (Student 10).

Eight items were included on the survey to measure students’ levels of intrinsic motivation in relation to the creation of their digital stories. This was done to give a general idea of student levels of intrinsic motivation at the end of the DST experience. The items were taken from the Intrinsic Motivation subset of the Intrinsic Motivation Instrument (IMI), developed by the Self Determination Theory group (1982). As suggested by the authors of the instrument, the questions were modified to reflect the digital storytelling task. On a scale of 1 to 7, 1 being ‘not at all true’, and 7 being ‘very true’, students were asked to state how true they felt each statement was. Each student’s score was totalled and averaged for a final intrinsic motivation score, the results of which can be seen below in Figure 6.14.

Figure 6.14: Pilot project respondents' individual intrinsic motivation scores

All students except two showed very high motivation levels of 5 or more, and the two students whose motivation levels were below five would still be considered to exhibit a high level of motivation (Self Determination Theory Group, 1982).

Figure 6.15 shows the questions asked and scores for each question dealing with intrinsic motivation.
As previously discussed in Chapter 5, the researcher holds to the view put forward by Robinson (2010) that creativity is not the exclusive domain of an educational elite. Robinson’s profound view is that everyone has a talent, and that education should fundamentally be concerned with helping each and every learner to realise their respective talents. Furthermore, creativity has also been shown to be related to engagement (Csikszentmihalyi, 1996). The literature on digital storytelling suggests that students will be more engaged in the process when they are allowed to express their creativity (Nilsson, 2010; Ohler, 2008). Inspired by Robinson and Csikszentmihalyi, an aim of the DST intervention was to try to afford the pre-service teachers a more inclusive array of opportunities for creativity, which were not writing-based only. All the students enjoyed the wider set of possibilities - to be creative through the DST process. Several questions were asked of the students to judge their feelings on the creative aspects of composing their
digital story. All were positively answered as either Strongly Agree or Agree by all 12 students, as can be seen in Figure 6.16.

![Results for Creativity Questions](image)

**Figure 6.16: Pilot project survey creativity results**

In the open-ended answers on the survey, students also mentioned creativity as something that both interested them in the project and engaged them in the process. Some of their comments were:

- I enjoy the creative side and wanted a break from the monotony and repetitive nature of the written assignments (Student 4).

- I really enjoyed it as something new and creative - it fitted into the Philosophy we were being encouraged to use in our own classrooms. There should be more assignments like that. Well done! (Student 6)

- A chance to be creative. Do something different and learn a lot about new ICT software at same time (Student 11).

- It was fun and allowed for more creativity (Student 8).

### 6.3.3.4 Multimedia and engagement

Many of the students were engaged by the use of multimedia in their digital stories, describing the use of these elements as ‘fun’, ‘enjoyable’, and something they willingly devoted a lot of time to. Some of the student
comments that indicate being engaged by the use of the multimedia elements include:

The process of writing the story first and then the script and choosing the images was very straightforward and was fun to do (Student 10).

The digital story was a lot more fun to complete and create. I enjoy using technology and I felt that I would be able to use what I have learned about creating it in the future (Student 2).

Creating the soundtrack was a lot of fun. As was taking photographs to accompany my story (Student 2).

I liked choosing images, and getting to use some of my own personal images…Choosing suitable music to accompany my story was also a good experience… (Student 7).

…putting the pictures, music and voiceover all together using windows movie maker, it was exciting to see the project coming together (Student 1).

I liked the way I could see the story unfolding as I worked on it and that I could express myself through pictures and images without having to say everything. I sometimes find it hard to say exactly what I want to convey and this provided an alternative method for me to work with (Student 10).

Almost all students felt that the use of multimedia in their digital stories allowed them to express themselves better, as shown in Figure 6.17.
6.3.3.5 Disengagement

There was also evidence of students becoming disengaged in the process, usually when they ran into frustration with the technology or image selection. Sources of frustration noted by the students were:

- Recording their voiceover in Myna or using it for soundtrack creation. In an open-ended question that asked what part of the process of creating their digital story gave them the most trouble, 9 out of 12 students noted Myna, or the voiceover recording process.
- Windows Movie Maker caused problems for students in two main ways: matching the timing of their images to the voiceover, and moving their movie project from one computer to another without moving the multimedia files as well. This latter issue made them think they had lost the whole project and had to start over.
- Two students noted that finding suitable images for their DST caused them the most trouble.

Even though many expressed frustration with certain parts of the process, this was usually negated by the fact that support was close at hand in the form of the handouts provided, tutor assistance, or peer assistance. A few of the comments made by the students in this regard were:

We did have great technical support however, the handouts prepared helped with minor difficulties and it was always easy to get hold of Bonnie if there was something more difficult (Student 1).

…any problems were very quickly sorted out as Bonnie was available continuously throughout the last few weeks of our assignments (Student 10).

6.3.4 Sociality

6.3.4.1 Scaffolding and support

Many support mechanisms were built into the digital storytelling unit, such as the step-by-step process, clear guidelines for the digital story in the assignment brief and the assessment rubric, as well as the peer feedback session and ample support from the Ed Tech tutors. Students were asked what they felt helped them most in putting their digital stories together.
Students’ open-ended responses were imported into MS Excel where they were analysed and coded. The results of this question can be seen in Figure 6.18 below. (Some of the students mentioned more than one thing.)

![Figura 6.18: Pilot project results regarding what students found most helpful in completing their DSTs](image)

Three students mentioned assistance available from the tutor as being very helpful to them. Interestingly, three students also mentioned the story structure as helping them to write and complete their digital story, and one student specifically mentioned the story map as being helpful. Students also found the step-by-step handouts and the step-by-step process of putting their digital stories together very helpful.

An online discussion board was set up for the students to answer questions they might have about the digital story assignment when they were not on campus to get help from the tutors. When asked if they used the discussion board, only two students said they did. Students were asked why they did or did not use the discussion board. Several students stated that they did not need to use the discussion board as the tutor was so readily available to help them. This made the researcher realise she needed to encourage use of the discussion board as a form of support for the next iteration of the DST unit.
Only one question on the survey instrument dealt with the story sharing activity. Student responses can be seen in Figure 6.19 below.

![Survey Responses on Story Sharing Activity](image)

**Figure 6.19: Pilot project survey responses on the story circle activity**

Seven out of the twelve students responded that they were ‘neutral’ about this statement, neither agreeing nor disagreeing with it. Only three students agreed with the statement and two disagreed. The researcher realised that this part of the process needed to be designed more for the purpose of peer support and story sharing, and felt that the students would have gotten significantly more out of the activity if it had been more structured. She realised that more research needed to go into the design of this activity for the next iteration of the DST unit design.

### 6.3.5 Technology

Several questions were asked on the survey in relation to what the students thought of the software used in their digital stories. As this was the first time we had used these software applications with the students, we wanted to get their opinion on them, and find out how easy or difficult they thought they were.

#### 6.3.5.1 Video editing software:

Windows Movie Maker (WMM) was taught to the students in the Ed Tech classes as one type of video editing software they could use to create their
digital story. However students were free to use any video editing software they were comfortable with. All but one of the students used WMM to create their digital story, the other choosing to use Adobe Flash to create his DST. Figure 6.20 shows student feelings on the ease of use of their chosen video editing software. The one student who said he found the video editing software difficult to use was the student who used Flash instead of WMM.

![Figure 6.20](image)

**Figure 6.20: Student rating of the video editing software during the pilot project**

While most of the students found WMM easy to use, not all of them saw using it as a straightforward process (Figure 6.21).
As noted above, several students ran into trouble when they moved their WMM project file from one computer to another without also moving the image and sound files that went with the project. Two students reported having to start their project over a few times because of this. This was noted by the researcher and instructions to ensure that future students did not run into this problem were incorporated into lesson plans for the following iteration of the design. Some students also reported problems with WMM not saving properly. This was traced back to a lack of storage on the computers they were using, and plans to warn students of this possible problem were incorporated into the subsequent DST design. Finally, students complained of having trouble with matching the timing of their images to the voiceover. This part of the WMM lesson was expanded and revised in the hope of avoiding this problem with students in the future.

6.3.5.2 Audio editing

Students were taught how to use Aviary’s online audio editing software, ‘Myna’ to record their voiceover and create their soundtrack. Unfortunately, this programme caused a great deal of difficulty for most students who used it. When asked how straightforward they felt it was to use Myna, student responses were quite negative, as can be seen in Figure 6.22 below.
While several students found Myna easy to use, many were frustrated by the programme continually crashing and causing them to lose hours of work. Students overwhelmingly named Myna as the thing that caused them the most problems in the creation of their digital story. Figure 6.23 shows students’ feelings on the ease of use of Myna as an audio editing software.

**Figure 6.22: Pilot project survey result for narration process**

![Bar chart showing Likert scale responses for Myna's ease of use.](image)

- **Recording the narration for my digital story was a straightforward process.**
- **Likert Response**
- **Count**
- **Strongly Agree**
- **Agree**
- **Neutral**
- **Disagree**
- **Strongly Disagree**

(N=12)
Due to the student dissatisfaction with the unreliability of the Myna software, it was decided to source different software to use for audio editing in the DST design the following year.

6.3.5.3 Technology self-efficacy

Despite several problems reported by students regarding the use of the recommended software, almost all students showed high degrees of technology self-efficacy at the end of the DST process. Many students stated that even though they had difficulty at times with the software, the ready availability of support meant that they did not get overwhelmed by the technical difficulties they encountered.

Several items on the survey dealt with student levels of technology self-efficacy, derived from an instrument developed and validated by Torkzadeh and van Dyke (2001), which deals with internet self-efficacy. Students were asked five questions dealing with their technology self-efficacy, based on a five point Likert type scale, where 5 is Strongly Agree and 1 is Strongly Disagree. The questions and student responses can be seen in Figure 6.24.
While Student 2 answered ‘neutral’ to two questions and Student 8 does not envision using DST with her future students, all other students either agreed or strongly agreed with these statements dealing with their technology self-efficacy.

Eleven out of the twelve students had envisioned ways they might use DST with their own students. Some of their ideas included:

I thought of allowing students to take pictures of each step of an experiment and then putting them together on the computer using their voiceover to narrate the steps taken and any additional information (Student 1).

…using it with biology curriculum to develop a story as how an ecosystem works and survives (Student 5).

I thought I might ask students to create a Science experiment report in the form of a digital story. I would like to build up a portfolio of them to show to future classes and to use as revision of experiments (Student 12)
6.3.5.4 ICT skills

Heo (2009, p. 423) notes that when pre-service teachers become more competent in educational technology, “…their likelihood of integrating technology in classrooms naturally increases.” As can be seen in Figure 6.25 below, all of the students that completed a DST felt it improved their ICT skills.

![My ICT skills improved while creating my own digital story.](image)

**Figure 6.25: Pilot study students feelings on DST improving their ICT skills**

Eight of the twelve students said that they had already used some of the ICT skills learned while creating their DSTs in their teaching. Several students also mentioned the improvement of their ICT skills in the open ended questions on the survey, one student stating that “…the skills I learned will be very helpful in the future, I will definitely use this process in my teaching” (Student 7).

6.4 Changes for design cycle 2

6.4.1 Reflection

Although the majority of students who completed a digital story during the pilot project felt that the use of DST enhanced reflection on their practice, the depth of reflection evidenced in the completed digital stories did not reflect this. The need to create a separate rubric for analysing depth of reflection in the DSTs made it apparent to the researcher that more
Chapter 6: Design Cycle 1 - Initial Experience

reflection criteria needed to be included in the assessment rubric. In addition to this, the task itself needed to be completely redesigned. Students needed a task that would allow them to delve deeply into an experience and explore their own motivations, feelings and emotions, as suggested by Moon (2004). Different types of story prompts were investigated in the literature, but none of them seemed appropriate to the task.

The researcher discussed this with colleagues during a meeting of the Ed Tech team that summer while planning for the next school year. After much discussion of possible story prompts that could be used as the DST topic, the different parts of the professional practice portfolio were revisited and evaluated for use as the topic of the digital story. We realised that the ‘Critical Incident’ analysis section of the portfolio lent itself very well to the task at hand.

The assignment brief for this section of the portfolio defined a critical incident as “…a happening, an incident or an event involving you and that has made you subsequently think and/or act differently about that particular issue” (NUI Galway School of Education, 2010b). The critical incident analysis required students to pick an incident from their reflective journal and tell a story about the incident that took place. They had to discuss why this was a defining moment for them. They had to critically reflect on the incident; discuss emotions, feelings and reactions related to it. It also asked them to draw on academic literature that related to the subject of the incident.

The use of the critical incident as the topic of the digital stories was examined a few weeks later with the rest of the School of Education staff, and after thorough discussion, it was agreed to make this change to the DST design for the following year. A new assignment brief and rubric were thus developed, based on the critical incident assignment brief.

6.4.1.1 Process vs. product

While assessing the digital stories for levels of reflection, the researcher found that perhaps the depth of reflection evident in the final digital stories
was not of paramount importance. This direction of thinking was caused by the fact that most of the students who took the survey felt that the DST process had enhanced their reflection on practice, even though many of them did not create digital stories that evidenced deep reflection. This prompted a return to the relevant research literature where it was noted by a few researchers (See Gravestock & Jenkins, 2009; Sandars, Murray, & Pellow, 2008) that reflection can take place at all stages of the creation of a digital story. These authors place the emphasis on the process, not necessarily on the product.

The researcher felt that more information was needed from the students regarding what they thought they gained from the process of creating their digital stories. The possibility of adding questions dealing with this to the questionnaire was considered. But as these anonymous data could not be linked back to the students and the DSTs they created, another form of feedback was sought. Gravestock and Jenkins (2009) suggest the use of additional evidence outlining the steps taken to create the digital story to show evidence of deeper learning, “…as it may be possible for a student to engage in quite high levels of learning and reflection…but for this not to be manifest within the final digital story” (p. 269). It was decided, therefore, to ask students to include an 800-1000 word reflective feedback piece that explained both the process of making their digital story and how they felt about the product as part of their DST ‘working portfolio’.

6.4.2 Narrative

6.4.2.1 Story structure

In the creation of their DSTs, many students did not follow the story structure suggested to them in the form of the story map, nor did many follow the format of a personal narrative. It was thought that there were two main reasons for this: 1) the essay criteria ultimately used to assess the digital stories led students to revert to an essay type format, and 2) not enough time was spent in the initial DST lessons on story structure. The criteria for personal narrative, and story structure in general, were glossed over in the introductory DST lesson. It was felt that more time needed to be
devoted to teaching this aspect in the second iteration of the DST unit if students were to create actual digital ‘stories’ (Long, 2010).

### 6.4.2.2 Timing

The researcher identified several problems with the actual timing of the DST unit. Firstly, it was felt by the researcher that students were not given enough time to finalise their stories before being asked to create their storyboard and look for multimedia. Students were then given one week after the introductory lesson to write their first story draft before the ‘story circle’ session the next week. Many showed up to the ‘story circle’ feedback session without a story to share, which could have been due to lack of time to work on the story. In the second iteration of the DST design, it was planned to schedule the unit so that students would have more time to develop their story.

Another possible reason for this lack of preparation for the ‘story circle’ could have been the position of the DST unit in the academic calendar. Constrained by the Ed Tech course only running until March, students were asked to write a story to sum up their year of practice teaching in February. This was a full three months before the course was finished, when they would have been in a better position to write a concluding piece. Placement of the DST unit in relation to the timing of the course would need to be reviewed for the following iteration of the design.

### 6.4.3 Engagement

The timing of the DST unit in the course calendar could have also had an impact upon students’ level of engagement in the process. Moon (1999) notes that strategic learners support their intentions to achieve the highest grades possible by managing their time and effort effectively. Knowing that the DST wasn’t due for several months resulted in many students putting off working on it until much closer to the due date. Not only did this result in many students not having a story draft completed for the ‘story circle’ part of the process, but many also did not adhere to the ‘suggested’ timeline for finishing the different aspects of their digital story, especially the final draft of the script for voiceover recording. This resulted in many students rushing
to put their digital stories together at the last minute. In order to counteract this, it was decided to incorporate due dates throughout the DST process, to keep students on task in the second iteration of the design.

6.4.3.1 Support

It was felt by the researcher that adequate supports were put in place for the students to keep them engaged in the process even when they ran into technical difficulties. Similar support measures were planned again for the second iteration of the unit. However, one support mechanism that needed revision was the online discussion board. The researcher felt more emphasis needed to be placed on this as a way of getting help from the tutor and peers while working on the digital story. As the whole cohort was going to be completing a digital story in the second design iteration, a more practical means of providing assistance to students than answering individual email queries was needed.

6.4.4 Sociality

6.4.4.1 Peer feedback: The story circle

During the pilot project, many students were unprepared for and unenthusiastic about the ‘story circle’ stage of the digital storytelling process. The researcher felt that they did not get as much out of the ‘story circle’ process as they could have. A return to the literature on story sharing for learning purposes was undertaken and answers were found in the form of McDrury and Alterio’s (2002) book, *Learning through Storytelling in Higher Education*. The authors, both working in the professional education of nurses, emphasise the importance of providing students with opportunities to share their practice stories as this “…encourages a reflective process, especially when storytelling is accompanied by dialogue and occurs in formalised settings” (p. 111). As discussed in Chapter 2, they suggest a formal, structured story sharing session, where tellers share a pre-determined story and listeners engage tellers in reflective dialogue. This is in contrast to informal story sharing situations where significant learning may be more limited. The researcher felt that a structured ‘story circle’ activity, such as the one outlined by McDrury and Alterio’s (2002)
‘pathway 8’ in Figure 2.7, would benefit the students greatly in the process of creating their digital stories in the second DST design iteration.

6.4.4.2 Peer feedback: Sharing the completed digital stories

Lambert (2009) notes that one of the most powerful stages of the digital storytelling process is the sharing of the completed digital stories among DST workshop participants. The reflective portfolios and digital stories were submitted at the end of the course in May, which did not leave any time for students to share their completed digital stories with each other. It was decided to include an additional peer feedback session at the end of the DST process for the second iteration of the DST design, before the final submission of the DSTs. It was also decided to set up a private online DST sharing website for the students in the second design iteration to see each other’s completed digital stories.

6.4.4.3 Tutor feedback

Moon (1999, 2004) suggests providing tutor feedback on early attempts at reflective writing to let students know if they are on the right track. She notes that in the early stages, learners often ask if they “…are doing it right...Starting with short exercises on which feedback is given from a tutor, mentor or peers will circumvent some of the insecurities…” (Moon, 1999, pp. 173-174).

A chance for tutor feedback on the story was not built into the pilot project DST design. It was therefore felt that including a chance for students to get tutor feedback on the story before recording the voiceover would help them to better meet the criteria for story structure as well as depth of reflection.

6.4.5 Technology

6.4.5.1 Voiceover recording

Most of the students noted difficulties with the technical aspects of recording their voiceovers and creating their soundtracks. During the pilot project, image sourcing and voice recording/soundtrack creation were taught in one lesson. It was felt by the researcher and the other Ed Tech tutor that this lesson was too rushed and students did not have enough time to learn
the technical skills needed (Long, 2010). It was decided to break this lesson into two separate lessons. This would allow more time to be spent on teaching the technical aspects of image sourcing, voice recording and soundtrack creation, while at the same time, it would give the students more time to experiment with the software in class.

Many students reported difficulties with the Myna programme itself. They felt it was a good programme for creating the soundtrack; however it did not turn out to be very user friendly for students when they were trying to record their voiceover on it. Many reported problems with it crashing before they could save what they had recorded, and many were frustrated with only being able to record one minute of voice at a time. For these reasons, it was decided that another programme should be taught to the students for voiceover recording.

The quality of the recorded voiceovers was also potentially a significant problem. The quality of the voiceover on many digital stories was poor, and detracted from the effectiveness of some of the stories. It was therefore decided to source two high-quality microphones for students to use to record their voiceovers for their DSTs the following year.

6.4.5.2 Additional training

Banaszewski (2005) states that

> The single most important step a teacher can take in planning a digital storytelling project is to complete a digital story herself. This will provide first-hand experience in exactly what the students will be expected to complete, both in terms of the personal writing and the computer skills (p. 61).

After stumbling through the first implementation of the Digital Storytelling unit using only the literature as a guide, the researcher knew she needed to go through the process of creating a digital story herself. She received funding for and attended an Educator’s Workshop at the Center for Digital Storytelling in Berkeley, CA in July, 2010. The experience of creating her own digital story gave her a deeper insight into the difficulties students might encounter while creating their own digital stories, as well as access to additional materials to use in the second implementation of the DST design.
Chapter 6: Design Cycle 1 - Initial Experience

6.5 Chapter summary

This chapter has discussed the first design cycle which involved a pilot project with 18 students completing a digital story. The chapter explained how the DST experience was designed and implemented with the students. The R-NEST framework was utilised to frame the discussion of findings, and both confirming and disconfirming evidence was presented in order to illustrate the impact of the pilot DST design on students’ reflective practice. Many positive findings emerged from the pilot project. Students spent much more time engaging in the process of reflection than they would have done simply writing an essay on the topic, and they enjoyed themselves in the process. All of the students found DST a motivating and worthwhile experience, and evidenced high technology self-efficacy at the end of the project.

Importantly, the pilot demonstrated and established the potential of DST as a technology-enhanced learning process for supporting reflective practice in initial teacher education. It illustrated that DST could be used to support reflection by novice teachers. The pilot also indicated and suggested important changes that would need to be made to extend the impact of DST on pre-service teachers’ engagement in, and understanding of reflective practice. Many of these changes were implemented in the DST design for the second iteration phase. These changes and their resultant impact on pre-service teachers’ engagement in reflective practice will be outlined and discussed in the next chapter.
Chapter 7: Design Cycle 2 – Pilot to Mainstream

7.1 Chapter introduction

This chapter will discuss the second DST design cycle in which the digital story became mainstream; when the whole cohort of students on the PGDE course completed a digital story. The chapter is structured to present the narrative of how the digital storytelling design was changed for the second iteration of the design, how it was implemented with the students and what the findings were. Both examples of confirming and disconfirming evidence will be discussed to illustrate the impact of the digital storytelling (DST) design. Exemplars of data will be employed to show the impact of DST on students’ reflective processes in the second iteration of the design. Both qualitative and quantitative data are discussed. The R-NEST framework has been used to frame both the discussion of the design and the analysis of the data.

7.2 The second implementation

7.2.1 The educational setting

The digital storytelling innovation was further deployed, in the second year, as a mainstream activity within the PDE programme. The rationale for the mainstreaming of the digital storytelling activity was its potential to help achieve the aims of the PDE. The pilot had demonstrated the potential, formative and positive impact of digital storytelling within initial teacher education, particularly in enhancing the pre-service teachers’ capacity to reflect critically on their professional development and practice learning. As discussed in Chapter 6, those students who participated in the pilot seemed more engaged in reflection. The pilot participants also potentially demonstrated greater creativity in the reflective parts of the PDE, benefitting from the multimedia aspects of the process. In the second year, the focus became how the pilot DST innovation could be scaled up for the benefit of the PDE cohort as a whole. Furthermore, the pilot involved students who self-selected into the pilot, and who were enthusiastic about the process and the PDE programme in general. A related, key concern of the second design cycle was to explore the question: does DST have potential wider impact,
amongst pre-service teachers in general, including those who may be ‘innovation averse’, and with that, less enthusiastic about educational technology and reflective practice? This was an especially important question considering the significance of innovation, reflective practice and educational technology in education and teaching today (European Commission, 2005; Livingstone, Haddon, Görzig, & Ólafsson, 2011; Moon, 2004; Organisation for Economic Co-operation and Development, 2005; The Teaching Council, 2012).

The School of Education staff was pleased with the outcome of the pilot DST project, and agreed unanimously to have all students on the course complete a digital story during the second year of the project.

During the 2010-2011 academic year, the structure of teaching practice on the PGDE changed. Traditionally, 100 of the roughly 230 students were ‘block’ students who completed their teaching practice in ‘blocks’ of several weeks duration, during which time they did not attend lectures on campus. The remainder of the students were ‘sequential’ students, who taught in their schools for a few hours during the day and attended their college lectures in the evenings throughout the year. In 2010-2011, all PGDE students became ‘block’ TP students. Their teaching practice was completed in two ‘blocks’ of teaching, lasting several weeks each. The first block of five weeks took place in November, 2010. The second block of seven weeks took place in February and March, 2011. During this time, students were not on campus. This had an impact on the timing and placement of the DST design. DST lessons had to be devised around the new course schedule.

### 7.2.2 Design changes

#### 7.2.2.1 DST design structure

Table 7.1 below shows the changes made to the structure of the DST design in the second implementation, in comparison with the pilot design.
Table 7.1: Comparison of the DST pilot project and second iteration designs

<table>
<thead>
<tr>
<th>First Design, Pilot Project, 2009-2010</th>
<th>2nd Design Implementation, 2010-2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Week</strong></td>
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<tr>
<td>Week 1</td>
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<td>Week 2</td>
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<td>Week 3</td>
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<td>Week 4</td>
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<td>Week 5</td>
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<tr>
<td>6 week interval</td>
<td>29/3/10 to 26/4/10</td>
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<td>3/5/10</td>
<td>Help/Work Session</td>
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<td>10/5/10 to 13/5/10</td>
<td>Help/Work Sessions</td>
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<tr>
<td>13/5/10</td>
<td>Final Portfolio Due (including Digital Story)</td>
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<td>Week 8</td>
<td>2/5/11</td>
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<td>Week 9</td>
<td>9/5/11</td>
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7.2.2.2 Timing

The DST design was implemented much earlier in the year, being introduced to students in early December, 2010, before they went out on their winter break. Additional time was added for story creation in the
second DST design through integration with the professional practice tutorials. Students were introduced to the ideas of critical incident (CI) analysis and digital storytelling in their Professional Practice tutorials and again in their Ed Tech class a week later. There was also additional time given to work on completing the digital stories at the end of the design, when students were off campus for 11 weeks on teaching practice and holidays.

Several ‘due dates’ for the DST project were highlighted in the Ed Tech calendar in an attempt to keep students on track with the project. These due dates are in **bold** in Table 7.1 above.

Changes for the second implementation of the DST design will be discussed below, under the R-NEST model headings of reflection, narrative, engagement, sociality and technology. While R-NEST was used to frame the discussion of the second implementation, there were important interactions and interdependencies between the five components of the model, as will be presently discussed. However, in an attempt to show how these different theories have influenced the second design iteration, the information has been presented in this way.

### 7.2.3 Reflection

#### 7.2.3.1 Critical incident analysis

The most significant design change for the second iteration of the DST project was a total redesign of the task students were asked to complete in the creation of their DSTs. In the search for a DST topic that would allow students to delve deeply into an experience from their teaching practice, it was decided to use the existing critical incident analysis section of the professional practice portfolio as the basis for the DSTs. The structure of a critical incident analysis fit the DST format and story structure very well. Students were asked to tell the story of a particular incident from their teaching practice that led them to change their practice.

Moon (2004) suggests the use of critical incidents as a form of second order reflection that can focus reflection. She defines second order reflection as
any reflective activity that requires a learner to look through previously written reflective work and to “…write a deeper reflective overview” (p. 148). This ‘reprocessed’ material is more valuable as students are allowed the chance to reflect on their primary reflections, which can lead to deeper levels of reflection and improved learning (Moon, 2004).

Tripp (1993) advocates the use of critical incidents in teaching as an excellent way of developing an understanding of and control over professional judgement and practice. Critical incidents in teaching can come from ‘out of the ordinary’, highly significant events, but they can also come from ordinary routine events in a teacher’s practice. Through critical reflection on the incident, the wider implications or wider context of the incident, such as that of the school or the community, can be brought to the surface. Tripp sees everything that happens in a classroom as a potential critical incident, “…we just need to analyse it critically to make it one” (1993, p. 28). Interpretation of the incident can lead to a transformation of experience, which Tripp feels happens “…when one renders teaching practices into discourse” (p. 28).

The critical incident analysis section of the professional practice portfolio was traditionally a written assignment that had been developed collaboratively by the School of Education staff in the 2008-2009 school year. The definition of a critical incident devised by the staff was “…a happening, an incident or an event, either observed by you or involving you that has made you subsequently think and/or act differently about that particular issue” (School of Education, 2010b).

7.2.3.2 The revised DST brief

The existing critical incident analysis assignment brief was fully incorporated into the DST brief for the second design iteration (Appendix 13). In the DST brief, students were asked to choose an incident from their reflective journal to expand upon. They were instructed to present this in the structure of a personal narrative. One of the easiest ways to get learners started on a reflective writing activity is to use a series of questions that can lead them into it (Moon, 2004). Students were provided questions in the
DST brief to help them to include all aspects of the critical incident analysis. These questions were structured in a way to emphasise the reflective elements of the critical incident, and to illustrate for the students what reflective writing should include.

Students were also given directions to incorporate at least three references to the academic literature related to their incident, in an effort to encourage them to consider the relevance of theory in their own practice.

7.2.3.3 The revised DST rubric

The DST rubric was also changed completely (Appendix 14), both to include assessment elements for the critical incident /reflective content, and in order to incorporate elements of the DST rubric devised by the CDS, which is based on their seven elements of an effective digital story (Center for Digital Storytelling, 2010a). Table 7.2 shows the revised rubric sections and criteria, and the provenance of each section.

Table 7.2: Revised rubric sections, criteria and origin

<table>
<thead>
<tr>
<th>Revised Rubric Sections, Criteria and Origin</th>
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<tr>
<td><strong>Content (Critical Incident)</strong></td>
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<td><strong>Planning</strong></td>
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<td><strong>Mechanics</strong></td>
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<td><strong>Story Structure</strong></td>
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<td></td>
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<td><strong>Use of Technology</strong></td>
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In design-based research, a tight relationship between the researcher and teachers or implementers in the educational setting is the norm (Bannan-Ritland, 2003; Hoadley, 2004; Kelly, 2003; Reeves et al., 2005). The revised DST rubric was developed by the researcher in collaboration with the other Professional Practice module co-coordinator. The completed rubric was then presented to the other professional practice tutors at a planning meeting, and their comments and suggestions were incorporated into the final version of the rubric (Long, 2011).

7.2.4 Narrative

In the second DST design, a great deal more time was built into the story development process. This started the week before students were formally introduced to digital storytelling in their Ed Tech classes. A few days before the tutorial, students were sent an email requesting them to bring a one page written description of a significant incident from their first teaching block to the professional practice tutorial. This was to be taken from their reflective journal. During the tutorial, students were introduced to the concept of critical incident (CI) analysis, through several activities, as shown in Figure 7.1 below.
These activities gave students a chance to reflect on their chosen CI collaboratively with their peers, and to receive reflective feedback from each other.

7.2.4.1 The seven elements of an effective digital story

The ‘seven elements of an effective digital story’ (Lambert, 2007) made up a large part of the revised DST rubric in the second design. While having read about these prior to the pilot project, the researcher had not included them in the original DST design. However, after attending the training session at the Center for Digital Storytelling the summer after the pilot project, the researcher realised that the seven elements should be an integral part of the introduction to the DST unit as
they more thoroughly explained the important elements in the process. Therefore, it was important to incorporate them into the introduction to digital storytelling lesson (Figure 7.2).

Along with discussing the seven elements in detail in the introductory DST lesson, a CDS handout on the topic was revised (Appendix 15) and given to the students to use as a guide for creating their digital stories.

7.2.4.2 Story format

The introduction of story format in the first lesson was expanded from the previous year. The criteria for personal narrative, and story structure in general, were glossed over in the introductory DST lesson during the pilot project. It was felt that more time needed to be devoted to teaching this aspect in the second iteration of the DST unit if students were to create actual digital ‘stories’. Students were given more of a background on basic story format and the story map, based on information from Ohler (2008). In addition, the ‘Four Important Story Elements’, taken from Haven (1999) were discussed. The slides used to present this information can be seen in Figure 7.3.

![Figure 7.3: Slides showing introduction to story format in the second design iteration](image)

Finally, students were taken through Ohler’s story map and the elements of a critical incident were mapped to this, as can be seen in Figure 7.4.
For homework that week, students were asked to map their critical incident to the story map and to incorporate any relevant ideas that came from this activity into further drafts of their story. They were given a due date of the next Ed Tech class, after the winter break, to have a rough draft of their story completed to share with their classmates in small groups.

The expansion of the story circle activity in the second DST design, while an integral part of the ‘narrative’ aspect of the design, is more heavily based on peer feedback, so is expanded upon in the Sociality section, 7.2.6, below.

7.2.4.3 Tutor feedback on final story draft

Many of the pilot project students did not follow the suggested story structure for their digital stories. The researcher felt that for the second iteration of the design, students would benefit from tutor feedback on their penultimate story drafts to ensure they were meeting the requirements of the assignment brief for story structure and reflective elements, as suggested by Moon (1999). Students were asked to hand in their DST drafts in their Ed Tech class during the 5th week of the process, before recording their voiceovers. Drafts with feedback were returned to students as quickly as possible, as many had signed up to record their voiceovers within the next few days.
7.2.5 Engagement

When introducing digital storytelling to the students in the pilot DST design, all of our evidence about the benefits of DST for themselves and their students came through secondary research, from the literature. In the second iteration of the design, we were able to include comments from the pilot project students about their experiences with DST to inspire interest in the students. Hearing that previous students on the programme had completed a DST and enjoyed it seemed to capture the attention of many students. In addition, it could help them to feel a difficult task was accomplishable, as well as possibly give them ideas for their own stories.

The aspects that students found helpful in the pilot project were emphasised in the second iteration of the design in an attempt to help students to engage with the lengthy process of creating their DSTs. Delivering the DST lessons in an easy-to-follow, step-by-step progression was one way of doing this. Students were encouraged to complete each section of the process before their next Ed Tech class so they wouldn’t fall behind and become overwhelmed with the amount of work that needed to be done.

Due dates for each step of the DST were built into the Ed Tech calendar. Students were aware of these dates, and were reminded of upcoming deadlines each week in Ed Tech. When students were away from campus on Teaching Practice, email reminders about what was due next were sent to all students through Blackboard (Bb) before they returned to campus.

Areas that caused disengagement in the students during the pilot project were either taken out, or more support in these areas was added in the second iteration of the design. Most of these had to do with the technology used. These will be discussed in the Technology section, 7.2.6, below.

7.2.6 Sociality

7.2.6.1 Collaborative reflection

Moon (2004) states that “…some of the best methods of deepening reflection involve working with others” (p. 147). Groups of peers can help each other to reflect through verbal interaction with trusted others (Hatton &
Smith, 1995), prompting and asking questions and querying frames of reference, among other things (Moon, 2004).

A great deal more time was devoted to collaborative reflection between students in the second iteration of the DST design. Students were given a chance to discuss the initial idea for their critical incident with peers in their professional practice tutorial. Several weeks later, they were given the chance to share a second draft of their critical incident in the expanded ‘story circle’ step of the digital storytelling process. Towards the end of the process, students were given a chance to share their nearly completed ‘rough cut’ DSTs in a peer feedback session one week before the DSTs were due. Finally, students had a chance to share their completed DSTs, if they wanted to, through the online sharing website created for the class, using the online photo sharing website, phanfare.com.

7.2.6.2 Storytelling pathways for learning

McDrury and Alterio’s (2002) book, Learning Through Storytelling in Higher Education had a significant impact on the processes of using storytelling for learning in the second DST design. Dissatisfied with the results of the ‘story circle’ activity in the pilot project, the researcher returned to the literature in an effort to create a peer feedback activity that would be more beneficial to the students.

The researcher felt that the collaborative, formal structure shown in McDrury and Alterio’s (2002) storytelling pathway 8 (see Figure 2.7 in Chapter 2); a formal setting, with multiple listeners and a pre-determined story, was the most appropriate to use for the story circle process. Students had a pre-determined story to tell; the rough draft of their critical incident. They had had some time to reflect on this story in their pre-writing activities, both in the professional practice tutorial and as they re-wrote their original draft between classes.

A structured process for sharing these rough draft stories was devised for the story circle activity, based on suggestions for expanding stories of practice in McDrury and Alterio (2002). They state that “Storytelling
opportunities at this stage are primarily to encourage tellers and listeners to begin reflecting on practice” (p. 91). Listeners can ask questions and seek clarification to help the tellers expand their stories. They stress that,

The purpose of these discussions is to expand stories, facilitate articulation of feelings and to enable tellers to engage in some form of reflection. This is not the time for listeners to offer similar stories or share their ideas about how it could have been different. Focus is on examination of the teller’s story, enabling it to be developed and understood as fully as possible (McDrury & Alterio, 2002, p. 91).

Students were introduced to the story circle activity using the following slides, shown in Figure 7.5, which explained the reasoning behind the activity and incorporated quotes from (McDrury & Alterio, 2002).

Figure 7.5: Slides used to introduce the story circle activity in design two

A ‘Story Circle Feedback Form’ (Appendix 16) was created to assist tellers and listeners to stay on task during the story sharing process. This form
included questions for listeners to ask of tellers. It also included questions from the DST assignment brief to encourage tellers and listeners to reflect on these aspects as well. In addition, a few questions dealing with story structure were also included, to ensure students were telling a ‘story’ at this point. The instructions for the story circle activity can be seen in Figure 7.6.

Students were asked to work in groups of three. Each teller was given ten minutes to share their story and to receive feedback from the listeners. ‘Story hijacking’ was discussed, and students were asked not to respond with their own stories, but to remain focussed on the teller’s story for the full ten minutes. They were asked not to move on to the next teller until the ten minutes was up. A timer was set and time was called at the end of every ten minutes. At the end of the activity, tellers were given their feedback forms to take home with them so they had a written reminder of their peers’ feedback.

Notes from the researcher’s implementation log (Long, 2011) for year two indicate that the activity went according to plan, and the feedback form was useful in keeping students on task.

McDrury and Alterio (2002) note that through this collaborative process of story sharing and story expanding, students can learn from and support each other in a way that is consistent with working in a bi-directional zone of proximal development:

> Information is shared, questions that extend comprehension are asked and together this facilitates framing and re-framing of knowledge in ways that are mutually beneficial. While one student is being introduced to new knowledge, another may be gaining new insights, and having understanding refined or deepened (McDrury & Alterio, 2002, p. 141).

This bi-directional zone of proximal development was very apparent during observations of the story circle activity (Long, 2011). Students were
observed asking and answering questions of each other, as well as suggesting alternative perspectives or possible solutions.

7.2.6.3 Online discussion board

A DST online discussion board was set up on Blackboard, and students were emailed instructions for using it to post queries they might have about their DST. Students made very good use of this throughout the DST process. The researcher was much more diligent in checking the discussion board for queries on a daily basis than she had been during the pilot project. She used the discussion board to answer any email queries that came to her personally by posting the emailed questions and answers on the discussion board so all students could benefit from the answer. Whenever a question was answered in this way on the discussion board, the researcher emailed the whole group to let them know new information had been posted. This encouraged greater use of the discussion board for support in the second design iteration.

7.2.6.4 Peer assessment session

A formative peer assessment session was scheduled for the week before the final digital stories were due (Figure 7.7). Students were asked to share their DSTs in ‘rough cut’ format to get feedback from their peers before they finalised their DSTs for submission, as suggested by Porter (2004b). This allowed the students a chance to see each other’s digital stories, and to receive feedback from each other in case anything needed to be changed before the final digital stories were submitted the following week. A formal feedback form was created (Appendix 17) and students were instructed to use the DST rubric to assess formatively each other’s DSTs.
Figure 7.7: DTS formative peer assessment session, second design

Not all students were at the ‘rough cut’ stage by this point, but all were encouraged to share what they had completed so far on the day.

7.2.6.5 Tutor assistance

The researcher was available in the computer lab every day the week the DSTs were due. Students could drop in at any time of the day, between 8:30a.m. and 6:00p.m., for assistance. Many students just dropped in to ask a question and then left. Others camped out in the computer lab for the day, or several days, getting help when they needed it. There was evidence of extensive peer support in the computer lab that week. Many students who had mastered the skills needed in the different software applications acted as expert helpers with the others who were having difficulties. The researcher found that when she was helping one student and couldn’t get to others that needed assistance, students would try to assist each other if they were able.
7.2.6.6 Class DST sharing website

Due to the new PDGE course design, where all students completed their teaching practice in two large ‘blocks’, the due date for the DSTs fell once again at the end of the academic year. Because of this, students did not get a chance to see each other’s finished DSTs in the second design iteration. In order to provide a forum where the students could see each other’s finished DSTs, a sharing website was created. This website was a private, password protected site (Figure 7.8), created using the photo/video sharing website http://www.phanfare.com.

7.2.6.6.1 Permission forms

Students were given a permission form to submit with their digital stories (Appendix 18). There were two parts to the form, one asking for permission to use the digital story and planning materials for research purposes, and the other for students to state whether or not they wanted their completed DST to be uploaded to the class sharing website. The slides used to explain the forms and the website can be seen in Figure 7.9.

Figure 7.8: Screen shot of the private class DST sharing website, design 2

Figure 7.9: Slides explaining consent forms and sharing website to students, DST design 2

Ninety five students agreed to share their completed digital stories on the private class website. All students on the course, regardless of whether they agreed to share their DST or not, were sent the URL and password to access the digital stories on the website.
7.2.7 Technology

7.2.7.1 Voiceover software

As mentioned previously, one of the areas that caused frustration and possible disengagement for students in the pilot project was some of the software we had chosen to use. Many students had difficulty with Myna, the free online software used for recording students’ voiceovers. For this reason, we chose to teach students to use Audacity for recording their voiceovers in the second iteration of the design. Audacity is free to download from [http://audacity.sourceforge.net/](http://audacity.sourceforge.net/), and is a relatively simple programme to use. Students could record using Audacity on campus, or, if they preferred, could download the programme for free to their own computer and record their voiceover at home. We still introduced the students to Myna to create their soundtrack, but we warned them of the problems with saving, and encouraged them to save often if they did use it.

The lessons on voiceover recording and image sourcing, which were taught in one lesson during the pilot project, were separated into two lessons during the second iteration. This worked very well as students had more time to ‘play’ with the software in class during both lessons.

7.2.7.2 Windows Movie Maker

Some of the students on the pilot project reported difficulties with using Windows Movie Maker (WMM), so this lesson was updated to avoid similar problems for the students in the second design. We also decided to teach the students WMM earlier in the DST process. This idea came from the other Ed Tech tutor who felt that the students would have a better idea of how the whole project fit together if they learned to use WMM earlier in the process. For this reason, the WMM lesson happened before the voice recording lesson in the second iteration.

7.2.7.3 Image sourcing

Soon into the DST project, many students contacted the researcher about the use of images with watermarks on them. Many were finding images from Getty Images and
other image sites in their search for images, but these had watermarks on them, as shown in Figure 7.10, and students were unsure if they could use them. The researcher contacted Getty Images (www.gettyimages.ie) directly through their online chat feature, and was told that as students and educators, we could access the images without watermarks for free, to use in school projects, once we had signed up on the site with an educator’s account (Appendix 19). The only caveat was that the finished digital stories containing these images could not be put on the Internet. During the image sourcing lesson, we taught students how to sign up for Getty Images as educators, and how to download the images without watermarks on them.

7.2.7.4 Quality of voiceover recording

Some of the pilot project DSTs had very poor quality voiceovers. It was thought that this was due to students recording using the built-in microphone in their laptops or PCs. It was also thought to be due to the inexpensive microphones purchased by the researcher for students to check out and use to record at home. The researcher was able to purchase one high-quality USB microphone and to borrow another one, for students to use to record their DSTs on campus in the ‘recording studio’ we devised for the students. It was hoped that this would improve the quality of voiceover recording on the DSTs.

7.2.7.5 Voiceover recording logistics

One of the biggest logistical problems facing the researcher when we decided to ask all students to complete a digital story was where and how they were going to record their voiceovers. The literature suggests a quiet room with a computer, easy-to-use software, and a good quality microphone be provided for students to use (Lambert, 2007; Ohler, 2008; Porter, 2004a). Unfortunately, we did not have a room like this for our students. The researcher contacted other departments on campus with their own recording facilities, but we were not given permission to use these.

Eventually, two recording stations, one of which can be seen in Figure 7.11, were set up in the Mac lab classroom in the Ed Tech building. They were set up at opposite ends of the room so two students could record at the same
time. Padded module dividers were used to create a quiet recording space. The room was block booked over a 2½ week period so others would not have access to the room. Students were able to sign up to record in one hour slots. This created 214 one hour recording slots. In the end, 161 students used the recording facilities set up for them on campus. Other students checked out microphones to record at home. Those students who had recording facilities at their disposal were encouraged to use them. Other students used their smart phones for recording their voiceovers.

Students were encouraged to have their voiceover recorded before they went out on their second teaching block. It was felt that if they had this much done before going out on teaching practice, they would be able to continue to work on their digital stories in an unrushed manner over the next several weeks.

### 7.2.7.6 Submission to blackboard

A few weeks before the digital stories were due; the researcher found out that students would not be able to submit their digital stories to Blackboard (Bb) as they had done the previous year. Due to limitations in submission storage space allotted to each module, the Bb system was unable to accommodate submission of the DSTs. Therefore, we were asked to have students submit their DSTs on a CD or a DVD. Students were asked to upload their reflective feedback essay to Bb instead of the finished DST, as proof of submission.

Students submitted their digital stories and their working portfolios on 12 May, 2011. The researcher assessed the digital stories using the updated assessment rubric. Marks were then awarded to students for the DST section of their professional practice portfolio.
7.3  Data analysis

7.3.1  Working portfolio

As in the pilot project, items used for data analysis included the students’ completed digital stories, their ‘working portfolios’, the online discussion board and a post digital storytelling questionnaire. In addition, for design two, students were asked to complete an 800 to 1000 word reflective feedback essay on what they thought of the DST process and the product they created. These essays were coded and analysed using the qualitative data analysis software NVivo, as discussed in Chapter 4.

Of the 208 students who submitted a DST during design two, 142 gave permission for their materials to be used in the data analysis. Ten students returned a permission slip stating that they did not want their DST materials included in the research. Forty-eight students did not return a permission slip, so their material was not included for data analysis. Nine students who agreed to participate in the research did not upload a reflective feedback essay to Bb, so their material could not be used. This left 133 reflective feedback essays available for analysis in NVivo.

7.3.2  Post DST questionnaire

The post digital storytelling questionnaire was updated before administering it to the year two group. Some questions that were repetitive were deleted, and some questions were added to it, relevant to changes that had been made to the DST design for the second iteration. These included questions on:

- the use of Audacity for voiceover recording
- the use of multimedia aspects such as music and images in the DST, and
- additional questions about peer and tutor feedback.

The questionnaire was administered to students via the online survey website Kwik Surveys (https://www.kwiksurveys.com/). All students on the course were emailed a link to the survey. Participation was voluntary, as was stated in the email with the link sent to students. Of the 213 students on the course, 55 took the post digital storytelling questionnaire, but only 49
answered it completely. The questionnaire was left open for 5 ½ weeks, from 12 May, 2011 to 20 June, 2011. Results were downloaded from the survey website as excel files after the survey was closed. Questionnaire data were analysed using the quantitative data analysis software, SPSS.

7.4 Design two findings

Findings from the completed digital stories, working portfolios, reflective feedback essays and the questionnaire are presented here. Again, the R-NEST framework is used to present the data.

7.4.1 Questionnaire descriptive statistics

Forty-nine respondents answered the survey completely. The questionnaire data were coded numerically and imported into SPSS for analysis. Frequency tables were run to derive descriptive statistics for the questionnaire participants. These can be seen in Appendix 20.

7.4.2 Depth of reflection

7.4.2.1 Levels of reflection

The researcher found the updated and revised DST assessment rubric a much better instrument to use to assess the digital stories in the second iteration of the design. This was especially true when it came to assessing the DSTs for levels of reflection, as indicators for depth of reflection, suggested by Moon (2004), were now incorporated in the critical incident criteria. While using the ‘Depth of Reflection’ rubric with the pilot student projects, the researcher felt that it did not quite ‘fit’ the digital stories, as it did not include the reflection that took place with the inclusion of multimedia aspects of the DST process, or the reflection students went through as they framed and re-framed their stories. Therefore, it was decided to use several different parts of the DST rubric to devise a depth of reflection score for the students for the second design.

These included the criteria for the critical incident, planning materials including the reflective feedback essay, and the use of multimedia in a reflective manner. These scores from the assessment rubric were totalled up and a ‘reflective score’ was given. Based on the marking scheme used by
the university, a rating of high, medium or low levels of reflection were assigned, as shown in Table 7.3. (Only those students who gave permission for their materials to be used for this research (N=133) were included in the analysis.)
Table 7.3: 2010-2011 Levels of reflection grades

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<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Percent</th>
<th>Level of Reflection</th>
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<tr>
<td>H1</td>
<td>Maximum</td>
<td>100%</td>
<td>High Level of Reflection</td>
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<td></td>
<td>Supreme</td>
<td>90%</td>
<td></td>
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<tr>
<td></td>
<td>Exceptional</td>
<td>80%</td>
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<tr>
<td></td>
<td>Excellent</td>
<td>70%</td>
<td></td>
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<tr>
<td>H2.1</td>
<td>Very good</td>
<td>65%</td>
<td>Medium Level of Reflection</td>
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<td></td>
<td>60%</td>
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<td>55%</td>
<td>Low Level of Reflection</td>
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<tr>
<td>Pass</td>
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<td>40%</td>
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<td>Fail</td>
<td>Unacceptable</td>
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<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wholly unacceptable</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

Figure 7.12 shows the results of the level of reflection scores attained by the students, based on their rubric scores.

![2010-2011 Level of Reflection Scores](image.png)

Figure 7.12: 2010-2011 Student levels of reflection achieved

7.4.2.2 Questionnaire response regarding reflection

On the questionnaire, students were asked if they thought creating a DST was a reflective process. The results from this question can be seen in Figure 7.13.
More than four-fifths of students who took the questionnaire (86%) did feel that creating a DST was a reflective process. Some, however, did not.

7.4.2.3 Reflective feedback essays

Students were very positive about the use of digital storytelling for reflection in their reflective feedback essays. They described DST as a different and engaging way of reflecting. Similar to the pilot project, many students described the reflective writing that they were asked to do on the course as a ‘chore’. Several commented on the refreshing alternative that reflecting through the DST brought:

I feel that of all personal reflections during the PGDE this one has been the most productive and worthwhile as the process was different, creative, clear, and enjoyable. Throughout the year it seems that all of us have become sick of the word “reflection”. In being asked to reflect constantly it becomes a chore and the benefits are harder to see. This task proved to be an enjoyable alternative to writing page after page of personal reflections (2010-2011 Student 103).

DST is definitely an excellent way to get PGDE students to reflect. I found that writing in my Reflective Journal was akin to a chore and that what I was writing was more like a diary entry than a critical reflection. I did not deeply engage with that particular process all of the time – some nights I was more motivated to reflect than others. Whereas with the DST, I know I have reflected comprehensively on my critical incident (2010-2011 Student 12).

Several students described DST as an innovative form of reflection:
As the PGDE emphasizes the importance of student teachers engaging in critical reflection throughout their training and in their subsequent careers, digital storytelling offers an opportunity to do just this but in a new and innovative way (2010-2011 Student 109).

Most students enjoyed this different form of reflection that allowed them to utilise multimedia and really delve into the topic at hand.

7.4.2.3.1 DST deepened their reflection:

Over one third of the students noted in their feedback essays that the DST enabled them to reflect more deeply than they had done in other reflective assignments on the course. The students noted many different reasons for this additional depth to their reflection, such as:

- Taking more time to reflect on the incident
- The self-questioning required during the process
- Reflecting on the incident as a whole; stepping back, seeing the bigger picture
- Looking at the incident from different time frames and from different perspectives
- Learning from listening to their own story over and over again
- Creating multiple story drafts
- Bringing up hidden themes, issues
- Assessing personal beliefs
- Connecting theory to practice
- Causing a deeper assessment of their own actions

Many of these can be found in Moon’s (2004) description of the processes of deeper reflection, as discussed in Chapter 2.

The DST process gave students a chance for second order reflection, taking an incident from their reflective journal and delving deeper into it:

I had already reflected on the bullying ‘critical incident’ in my reflective journal and 3rd weekly reflection, but making the DS made me look at it from a whole other angle. I had to look much deeper at the feelings behind
my reactions and made the connections to my own past experiences with bullying (2010-2011 Student 10).

It also gave them time to stand back from the incident, and come back to it later to reflect on it in a more in-depth manner, as explained by 2010-2011 Student 33, below:

I have found the process of choosing one incident to reflect upon over a period that involved great personal growth extremely useful. When I originally sat down to write about my incident I believed the area I was highlighting was breaking the cycle of illiteracy and I was unable to connect it with how it affected me as a teacher. I was intent on blaming the student, his parents, the school, the educational system; somebody had to take the blame!

As time progressed and I recorded my script I still had no definite plan of action for myself as a result of this critical incident, as I had passed the buck on, but it just did not sit well. As teaching practice progressed and I began to see more issues in the classroom, I began to see the incident in a different light and realised that blaming others was not going to change anything for either the student in question or me.

I had a light bulb experience at a Catering for Diversity lecture and realised what I was doing was differentiating and further alienating students, and far from the ideal of including all students in my class. It was at that moment that I realised my challenge and the real message of my digital story, and that was one of inclusion.

For many, it brought to the fore preconceived ideas and their own cultural perceptions:

The process encouraged me to delve deeper into the incident and into myself. As I listened to my own voice and observed the type of images I was drawn to, I began to learn more about my perception of the world and how, really when we see, we see it through our own cultural blindfolds. It seemed the more I reflected on the incident, added pictures, heard the story repeated over and over, the more it taught me (2010-2011 Student 126).

Not only did students feel that the DST process added to the depth of their reflection, but they also felt it helped them to understand the reflective process better. Many felt that it gave them the skills needed to be reflective practitioners in the future.

I have realised, through my reflection, that I will be able to change situations that I feel are not going well. What I can now do is reflect fully, contemplate and decide on change, and carry out those changes. These skills of reflection will be vital throughout my teaching career (2010-2011 Student 131).
Overall, I think this assignment accomplished its aims. It got me to reflect in greater depth about a certain incident, it got me to think about what my beliefs were prior to the event, how I reacted to the incident and how I’ve come to a resolution. It got me to actually relate what I do in the classroom to the theory that we received in the lecture hall. I compared the theoretical best practice to my practice and compared and contrasted and identified where I can improve or change in future (2010-2011 Student 49).

Many students discussed the manner in which the digital storytelling process caused them to be more critical of their own actions. Through the creation of their DST, many realised how they could have done things differently, and that their teaching changed because of this realisation. A few students commented on how this was a very uncomfortable realisation for them. Many questioned their own actions, and were finally able to see the incident from other points of view:

The critical incident story along with the visual representation of the story demanded that I completely immerse myself in the moment all over again. I felt I had to give everything - honesty, emotion, humiliation and criticism. Only by opening up in such a manner was I able to see the opportunity for personal and professional development. Rewriting the incident, taking the time to think of my actions and question them, reconsidering the position of the other person in the story, all helped me to see the situation from multiple viewpoints. While I was still writing the story and producing the video, I feel that I truly stepped into my student’s shoes. His situation and my behaviour played out before my eyes each time I read the script or watched the movie play. Feeling a genuine connection with the incident is what I believe genuinely helped me to engage with this experience (2010-2011 Student 94).

Some students discussed the realization of the effect their own educational experiences had on the way they were teaching in that first teaching block. For some, this only became apparent to them through the deeper reflection engendered by the DST process:

I was able to create a link between this critical incident and my own teaching and learning beliefs. I was able to see that yes things have changed since I went to school but it’s the way I perceive these changes that is more important than the changes themselves. I was, to a certain extent fixated on recreating a teaching and learning environment that I had experienced when I went to school. Through reflection I was able to see the cause of my difficult students’ actions and through reflection I was able to see the impact of my own reactions to this incident (2010-2011 Student 18).
For many of the students, the thing that really added to the depth of their reflection was the multimedia aspect of the process:

Making my digital story has allowed me to look at the process of critical reflection in a different way – firstly through writing the script as a story and secondly by sourcing images and music that convey exactly what I am feeling and thinking/saying. It allowed for a much deeper type of reflection to that carried out previously through my Weekly Reflections and Post Lesson Evaluations (2010-2011 Student 109).

I feel that the process of constructing the digital story provided a much more conducive method for reflection than any other form of assessment on the PGDE. I had to fully engage with my emotions and my experience of the critical incident when I was writing the personal narrative, choosing words, images and music, deciding on the special effects and the pace, even the inflection of the voice. These aspects of the digital story were all influenced by my reflection on the critical incident as I wanted the digital story to be in every way sensory to how I experienced the incident (2010-2011 Student 127).

The choice of multimedia such as images, music and sound, as well as the recording of their own voice, added significantly to students’ reflection. In describing the different way they reflected while incorporating multimedia into their DST, students used terms such as ‘focused’, ‘intensified’, ‘greater clarification’ and ‘greater insight’. 2010-2011 Student 131, explains how the multimedia added to her reflection in the following excerpt:

…throughout the entire year, doing all of the hundreds of reflections we have done, I have used written words to reflect. Yes, I had to think about what happened, and what would happen, etc. but I did these using words. In this way, I could write down the words, and that would be the reflection done. However, with doing the Digital Story I went deeper into the reflection than I think I ever have done, not just in the PGDE, but in general. For each picture that I was looking for I went deeper into my thoughts and, more importantly, my emotions. Instead of simply writing down the words ‘that made me feel lost’, as I would have done in previous reflections, I went deeper and deeper into how I really felt, and what exactly made me feel this way. This was not difficult; however, as I searched and searched through pictures I could measure my emotions by them. For example, I would see a picture portraying anger and think that I felt angrier than that depicted, or perhaps felt less angry than it portrays. Therefore, I was not only reflecting on the emotion of anger, but I was also able to contemplate the extent to which I felt this (2010-2011 Student 131).

The most prevalent form of multimedia that students discussed was the choice of imagery for use in their digital stories. Many noted that they were constantly thinking about images to use in their DST, and constantly
Chapter 7: Design Cycle 2 – Pilot to Mainstream

reflecting on the incident while doing this. Image choice clarified emotions for many of the students, as described in the quote directly above.

Selecting images to use in their DST brought up hidden themes and alternative viewpoints for some students:

Additionally, I found that the saying ‘A picture tells a thousand words’ to be quite accurate. The adding of images to my accompanying voice over, added numerous layers to the previously hidden themes, concealed within the text; some of these included loneliness and solitude. It wasn’t until I was forced to graphical display these themes, that the full relevance of their relationship to the critical incident, came to light… I have developed a greater clarification and insight into my own attitudes and beliefs towards this critical incident. For example, in relation to the student I was discussing; while detailing the difficulties and isolation he must have been facing, the idea of loneliness within a crowded school yard, only came across once I had applied imagery to my voiceover. Once I had done this, the realisation that this student was a lonely silent voice, within a bustling school yard became quite starkly obvious. As a consequence, I have been able to develop a greater empathy for this student, by delving further into his personal problems, and seeing more of this student’s situation, rather than what is presented in my classroom (2010-2011 Student 16)

7.4.2.4 Metaphorical imagery

In the DST lesson on image selection (week 6), students were introduced to the idea of using explicit (literal) and implicit (metaphorical) imagery in their DST, as discussed in Lambert (2009). The importance of using both explicit and implicit imagery in the DST was also included in the DST rubric. It calls for the use of images that “…convey information that is not contained in the script but that adds to storyline and sense of satisfaction with the story” (Appendix 14, p. 4).

Many students discussed the use of metaphorical images in their DSTs. While some found this difficult due to their self-reported ‘lack of creativity’, many relished the use of metaphorical imagery, and felt that it added greatly to their reflection on their critical incident. While many students discussed interleaving metaphorical images throughout their DST, a few went with a metaphorical theme for their whole DST. One student discussed how she chose the metaphor of a female soldier to represent the story of her initial struggles as a student teacher:
I pondered on what comparison could be made between the struggles of a student teacher becoming established within the school. It was then that the image of a female soldier came forth. I decided to let the pictures tell the tale of two stories playing out side-by-side; firstly, of a young teacher encountering a disrespectful student and providing suitable punishment which had positive effects for the future relationship between teacher and student. Secondly, the digital story portrayed the sketch of a young female soldier going into battle, also feeling the nervousness and feelings of inadequacy as they attempt to make their mark (2010-2011 Student 141).

Examples of the imagery used by this student can be seen in Figure 7.14.

![Image Used to Depict the Class as Described to Her](Image1.png)
![Image Used to Depict Herself upon Hearing about the Difficult Class](Image2.png)
![Image Used to Depict Herself as a Student Teacher](Image3.png)

**Figure 7.14: Examples of metaphorical imagery used by 2010-2011 Student 141**

Another student used images of weather throughout her DST, as shown in Figure 7.15.

The reoccurring metaphor I incorporated was that of weather. For positive elements I used sunshine, clouds and darkness represented negative aspects. I used weather as it is an unpredictable and turbulent element; this echoes the nature of teenagers and their journey (2010-2011 Student 27).

![Image Used to Depict the Classroom She Was about to Enter](Image4.png)
![Image Used to Depict a Positive Interaction with a Formerly Difficult Student](Image5.png)
![Image Used to Depict a Calmer Classroom after the Incident](Image6.png)

**Figure 7.15: Examples of metaphorical imagery used by 2010-2011 Student 27**

Some students described the use of metaphorical imagery as difficult at first, but something that became easier as they got further into the creation of their DST:
...as I progressed through the exercise, I became more aware in myself of images I would like to use to convey what I was saying. By this I mean it came to the point that I didn’t have to strain to consider an image, rather a representation came to mind and the search became easier. The exploration and discovery was as much within me and how I think, as it was in the production and completion of this project (2010-2011 Student 94).

Most students commented on how the choice of images added to their reflection. But some students also commented on the use of their voice, and the inclusion of music and sounds in their digital stories. Several students noted that listening to their voiceover repetitively during the production process added to their own reflection; allowing them to step back from the incident and listen to it as if it was someone else’s story. “…the movie took on a life of its own that was somewhat separate from me, it was like the incident had occurred to someone else and I was documenting it” (2010-2011 Student 70).

The inclusion of music or sound effects in the DST was optional. For many students, including the use of music or sound, and the technical ability that this entailed, would probably have proven too difficult technologically. In fact, most student comments about the use of music in their digital stories had to do with their attempts to incorporate it, but being unable to do so. For those students who did use music, many found that the sourcing of the music further enhanced their reflection on the critical incident, and helped to convey the emotional tone of the story they were telling.

The music represents normal life and during the story it vanishes, hopefully representing and emphasising how my normal morning was disrupted when the critical incident occurred, and resumes again afterwards-just like normal life continued (2010-2011 Student 128).

I spent a lot of time choosing the music to accompany my voiceover. I knew I wanted music throughout my digital story instead of just at the beginning and the end and I had an idea that I wanted something classic and easy-listening because I didn’t want the music to overpower the story. I think I have achieved my aims in choosing the music because I feel it complements the story beautifully (2010-2011 Student 136).

7.4.2.4.1 Critical incident as topic of DST

Requiring students to focus their reflections on a critical incident from their teaching practice gave them a chance to look back over their previously
written reflections in search of an incident to use for the assignment. This looking back is something that many said they would not have done were it not for the DST assignment. As Moon (2004) notes, this form of second order reflection can be very powerful for students.

For many students, the incident they chose for the topic of their DST was instantly clear; it was something they had struggled with during teaching practice, or something that had caused an epiphany moment for them in regards to teaching or dealing with students.

For others, the choice was not so clear. Many students described looking back through their reflections to find one that they could use, and not finding anything appropriate at first. From the essays it was clear that there was some misunderstanding among students as to what a ‘critical incident’ entailed, many thinking it had to be some major event including ambulances and fire brigades. But after discussing the misunderstanding with their peers or tutors, most were able to choose an appropriate incident. For these students, once they got past the misunderstanding and realised they could look more deeply at just about any incident from their teaching practice and make it a ‘critical incident’, the choice was then clear.

I rolled my eyes slightly at the notion of a ‘critical incident’. It seemed to me to be a very ‘madey-upey’ [contrived] type of thing and my initial reaction was that I might have to imagine a critical incident up out of fresh air. Hypothetical scenarios such as me rescuing a group of students from a burning building, or me convincing a troubled kid that their future did indeed lay in school, raced through my mind. It was only when I took a few moments to properly reflect upon my teaching experience that I realised that there was no need to make a story up. I had had numerous critical incidents, but had never taken the time to appreciate their true significance. This is not to be overly critical of myself: teaching practice is time consuming and it is tough going; taking the time to properly reflect is not as straightforward as it might sound (2010-2011 Student 115).

Some students chose to reflect on a certain incident because it had not been resolved at the time of its occurrence, and they saw this assignment as an opportunity to learn from as well as bring closure to, the incident.

I settled on another incident, which seemed more meaningful to me. In this case I had almost immediately realised I had done something wrong, and had seen what I should have done instead. After mentioning it to a friend though, I realised there was more to it than just my initial analysis. This
'digging deeper' was one of the things that had been suggested in the lecture about the critical incident, so I decided to use this story. I discussed the incident with more colleagues, and tried to come up with more ideas around the learning involved (2010-2011 Student 81).

While a very few students did not feel that completing a DST added to their reflection, the majority of students did feel this way, and were able to explain in depth how it did so. Most benefitted significantly from the use of multimedia to make better sense of an experience from their first foray into teaching, and a better understanding of the process one needs to go through when reflecting on an incident.

7.4.3 **Narrative**

The digital stories resulting from the second iteration were really *stories*. Most students were very successful in taking the critical incident idea from their reflective journal and refining it to create a story about what they learned from the incident.

7.4.3.1 **Rubric narrative scores**

As with the ‘reflective scores’ from the DST rubric discussed above, the story format scores from the assessment rubric were totalled up and a ‘narrative score’ was given, to see how well students were able to adhere to the story format of the DST. Based on the university marking scheme, as shown in Table 7.3 above, a narrative score of high, medium or low was assigned for each student. The results can be seen in Figure 7.16.
Nearly two-thirds of the students met the narrative criteria at the highest level, while a further one-third scored in the medium level. Only four percent of students scored in the lowest band. It was felt that the extra instruction on story format at the beginning of the process, the use of the critical incident as the basis of the story, and the extended use of the graphic organizers, all contributed to the exceptionally high numbers of students utilising the story format for their digital stories. Students’ thoughts on these topics from their reflective feedback essays are outlined and discussed in the following sections.

**7.4.3.2 Graphic organizers: Story map**

The students found the story map very useful in helping them to turn their critical incident into a story. Many expressed a lack of confidence in writing a story, noting that this type of writing had not been required of them for a long time:

> The story map highlighted the need for a beginning middle and end to my story and I found it very helpful, as it relieved some of the stress that had developed as a result of not being a confident story teller. Specifically, I have spent so much time writing using a scientific approach that I felt I didn’t know how to tell an interesting story (2010-2011 Student 34).

Using the story map also helped them in the reflection process, in that it encouraged them to think about the other characters involved, alternative
viewpoints, conflicts encountered as well as what they learned from their critical incident:

Once I had written out what had happened in my incident I then tried to put it into a story format using a Visual Portrait of a Story [the story map]. This helped me transform what happened into an actual story format, with a start middle and end. It made me think about the critical issues involved, the conflicts, the characters and what growth happened before a resolution was reached. This tool made it much easier for me to transfer my incident into a story format (2010-2011 Student 49).

7.4.3.3 Graphic organizers: Storyboard

Those that followed the suggested process of breaking up their finished story into sections in the storyboard template, and then searching for images to match each section, felt that this process was extremely helpful. Many students stated that it helped to keep them organised, helped them to visualise the story, and helped greatly with the selection of images:

While I was tempted to move directly onto sourcing images to use in the digital story, I grudgingly decided to brainstorm for ideas, and write down my ideas onto a storyboard. I was really pleased with this process, as I found the storyboards invaluable in structuring and sequencing the story. It also made me more aware of the reflection process, and focus on possible ways that I could use images and metaphors in my story. Without this preparation, I feel that I would have been researching images aimlessly (2010-2011 Student 106).

Some students misunderstood the planning purpose of the storyboard, and did not use it in this manner. Rather, they realised at the end of the process that the storyboard was required, and only created one at the end because the rubric called for it. These students did not avail of the planning benefits of the storyboard, and therefore did not find it useful. As several students mentioned this misunderstanding in their essays, we realised that we needed to clarify the purpose of the storyboard at the beginning of the DST process for the next iteration.

One student, who did not use the storyboard at first, explained how helpful he found it when he decided to backtrack and use the storyboard to organise his search for images:

One thing that I didn’t like about creating this story was the rather unstructured approach that I took. I recognise now that I should have planned and storyboarded the story from the start, but I just went straight
for searching images and sounds. I quickly got bogged down and went back to the storyboard template. I would recommend in future that students are encouraged to storyboard earlier, perhaps making it a submission requirement early on in the process. Knowing students, this is the only way that some people will discover the benefits of properly storyboarding this project (2010-2011 Student 73).

7.4.3.4 Story/script writing

For some, the script creation was enjoyable and easy, the story just “flowed” out of them (2010-2011 Student 141). Others students found it difficult to keep to the five minute time limit for their DST scripts. Despite the difficulty posed by the five limit time limit, several students commented that the limit, and the small word count necessitated by it, helped to deepen their reflection on the incident through repeated editing of their story:

Because I was forced to break the story down and literally analyse each sentence of my script, it compelled me to scrutinize my thoughts and explore various dimensions of the incident I otherwise would not have explored (2010-2011 Student 125).

Having to hone the story down to the required time limit also helped them to clarify the message they were trying to convey. Many students noted that it forced them to get straight to the point in their story:

…writing the script required several attempts. The low word count necessitated a clear and concise articulation of the critical incident, and my own reflection and reaction. I found this editing very frustrating. However, it did make me reflect on the event, and identify the really important elements of the story (2010-2011 Student 106).

Several students noted that once they started planning the images they wanted to use, they were able to cut out some parts of their script and use images instead to get their message across.

The first step of scripting the story proved most difficult. It took me several drafts to cut the word-count down to meet the requirements of the voice-over script. It was a real challenge to judiciously select which parts of the script to keep and which parts to cut without taking away from the overall flow of the story. I soon realised that ‘a picture can speak a thousand words’ and this helped me reduce the script significantly (2010-2011 Student 137).

Others noted that they re-wrote their scripts after recording them, realising that more, or less, was needed in the story after hearing the recording the first time.
I chopped and changed quite a bit during the course of making the digital story. I would record a sentence, listen back, if it didn’t sound right I would re-phrase it and then record again. It was a process of trial and error you might say (2010-2011 Student 36).

Creating the story as a script also added to reflection on the incident for students in that it encouraged them to include other points of view in their story, helping them to see the story from alternative perspectives. A few students noted that writing their script helped them to move beyond merely descriptive writing, into reflection on the incident:

> In the initial drafting stages of my voiceover script, I found that I was being very descriptive in an effort to include all the information I felt was necessary to explaining my critical incident. In these early stages, I found it hard to look beyond the descriptive element of the story. However the most important bit of advice was staring me in the face. I needed to reflect on this more (2010-2011 Student 18).

### 7.4.3.5 Tutor feedback on scripts

Students who mentioned receiving tutor feedback on their script found it very helpful. They noted that tutors were able to assist them with the timing of their script, letting them know which parts could be cut back, and which needed to be fleshed out. Others said that the feedback from the tutor helped them to focus the story, cutting out unneeded information. A few mentioned that the positive feedback from their tutor added to their confidence in the story, helping them to know that they were making progress.

As tutors giving feedback, we found that in general, students had spent too much time describing the incident, and not enough time reflecting on it. A common occurrence noted by the tutors was that students used up about ¾ of their word count on description and roughly only ¼ on reflection. We were able to explain to them in feedback to the whole group that the content of their stories should really be closer to ¼ description and ¾ reflection. Catching this at the early stages of story creation helped students to devote more of their story to reflecting on their critical incident.

### 7.4.3.6 Teacher identity creation

In telling the stories of their critical incidents and in figuring out what their thoughts and beliefs related to the incident meant to them, DST creation
allowed students to tease out their developing teacher identities. Students discussed how working through their story for the DST helped them to develop as teachers. Some described how it changed their teaching, and that it gave them more confidence as a teacher:

It most definitely changed me as a teacher, and it most definitely changed the way I approach the start of classes. The thing is – I never realised this until I started writing and preparing for my digital story! Now, I wouldn’t necessarily say that the digital story has made me a better teacher, but the fact that we had to do it (meaning that we were forced to reflect and think about an incident that shaped our view of something to do with education) has undoubtedly instilled a breed of confidence in me. So, whilst we may have grumbled about ‘making a bloody movie’, the fact remains that it actually contributed to my belief and confidence as a teacher. And that can be no bad thing (2010-2011 Student 108).

Others also mentioned the connection they developed between the theories they were being introduced to in lectures and their own practice:

However, most importantly I believe that my completed digital story shows the journey I have travelled, my development of classroom management skills, my ability to link theory with practice and implement theory into practice. I am happy that I was presented with the opportunity to reflect through the creation of a digital story, however daunting it first appeared. I believe that the experience has added to my reflective and ICT abilities and subsequently created an accomplished teacher (2010-2011 Student 9).

This feedback from 2010-2011 Student 9 exemplified the overall positive response by the PDE cohort to the second design cycle. It illustrated how the digital storytelling was contributing formatively to the achievement of the learning outcomes for the programme, in particular: in supporting links between practice and theory; enhancing reflection; and the development of the pre-service teachers’ ICT capability.

Many felt the DST assignment helped them to articulate their developing teaching and learning beliefs, and their teaching philosophies:

The incident took me on an emotional journey at the time and I feel that by reflecting on that journey in the process of making the digital story the life lesson which I learned from the incident has been embedded in my beliefs about teaching and learning (2010-2011 Student 127).

I got a number of things out of this story making process. Firstly, I reflected a lot on the incident and this allowed me to realise how different incidents can affect my teaching and learning. I learnt something about
myself also, about how I teach, how I interact with students and it made me reflect more on how students interact with me (2010-2011 Student 36).

… looking back at the movie I can see how my philosophy was challenged and how it did change my teaching. I feel this project helped me to see that more clearly (2010-2011 Student 70).

Several students saw their completed DST as evidence of their growth as teachers over the year:

By the time it came to making the digital story, I could see a marked improvement in my discipline skills and in my overall attitude to teaching and towards the students. I have grown as a teacher - I am more competent, more confident and more knowledgeable. Without the critical incident embedded in my mind, I probably would not have been able to make this comparison and see the incredible journey I have been on (2010-2011 Student 109).

Overall, students found the narrative aspect of the DST process quite helpful in adding to their reflection on their critical incident. The changes made to the second design iteration in this area proved very successful, and helped students to achieve the learning outcomes for pre-service teachers engaged in initial teacher education, especially in terms of their capacity for reflection on practice and their ICT self-efficacy.

### 7.4.4 Engagement

#### 7.4.4.1 Evidence of engagement in the questionnaire results

Students in the pilot study had volunteered to complete a DST for various reasons. None of them felt ‘forced’ to complete it. When the completion of the DST became a mandatory assignment in the second year of the project, there was concern that students would not be as engaged in the process as those in the pilot study had been. However, as the data show, this did not turn out to be the case. Evidence from both the post DST questionnaire and the student reflective feedback essays showed high levels of engagement in the process.

As discussed in Chapter 6, several questions on the post DST questionnaire dealt with assessing students’ levels of engagement and intrinsic motivation at the end of the DST process. For the second design iteration, when the questionnaire data was analysed in SPSS, the raw scores for these attributes were recoded to give engagement scores and an intrinsic motivation score of
High, Medium or Low. The students’ scores for both engagement and motivation show that most students who participated in the questionnaire felt highly motivated and engaged with the DST process on completion of their digital stories, as can be seen in Figures 7.17 and 7.18.

![2010-2011 Levels of Engagement](image)

Figure 7.17: Level of engagement scores from the 2010-2011 post DST questionnaire data

![2010-2011 Levels of Motivation/Enjoyment](image)

Figure 7.18: Level of motivation scores from the 2010-2011 post DST questionnaire data

One of the first questions on the questionnaire asked students what they liked most about the digital storytelling process. Some students gave more than one answer. Students’ open-ended responses were imported into MS
Excel where they were analysed and coded. Figure 7.19 below shows the results of this question.

![Bar chart showing Liked Most About the DST Process](image)

**Figure 7.19: Student responses to what they liked most about the DST Process**

Gaining ICT skills, which was the most prevalent answer, was mentioned 19 times by students in their response to this question, showing that improving their ICT skills for future use in the classroom was very important to the students. One student stated, "The ICT skills which I have learned as part of the process will be hugely beneficial in future" (Q2, Student 33).

Sixteen students mentioned that they liked the alternative form of assessment that this assignment provided. The assessment on the course is heavily essay based, and as in the pilot project, many students enjoyed the fact that this assignment was not presented as an essay. One student remarked, "It lifted the constraints of a traditional written assignment and gave me freedom to express my thoughts and experiences in a more interesting way. It also allowed for more detailed reflection on my topic" (Q2, Student 44). While not one of the principal aims of the digital
storytelling design, providing an alternative form of assessment seems to be an aspect that engaged many of the students in the process.

Thirteen students cited the chance to reflect more deeply on an incident as the thing they liked most about the DST process, as exemplified by one student’s response below:

I enjoyed most of the process but especially how much this assignment made me reflect on my critical incident. Searching for images made me more aware of the emotions of all involved. I definitely reflected more on this assignment than I would have if we had just had to write an essay (Q2, Student 35).

On the questionnaire, students were asked what they thought about the DST process overall. Overwhelmingly, students responded positively, as can be seen in Figure 7.20.

![Figure 7.20: Students overall feelings about the DST project, design two](image)

Most felt it was a worthwhile project and many described it as enjoyable. One student summed up the positive statements of the others by answering the question, “Creative…Liberating…Different…Enjoyable” (Q24, Student 41). The three students who answered negatively cited frustration with technical difficulties or lack of technical skills as the reason for their dissatisfaction.

I did not enjoy it. I think it is unfair to be graded on this as some people are much better with computers and there was not enough time devoted to teaching us the skills before beginning… (Q24, Student 52)
7.4.4.1.1 Time spent:
Engagement can be evidenced by the amount of time and effort spent on a task (Jones, 2003; Sandholtz et al., 1994). As in the pilot project, the amount of time and effort put into the creation of the digital stories showed a high degree of engagement in the process of creating the digital stories. Evidence from the students’ working portfolios also showed that students spent a great deal of time planning, sourcing materials and creating their digital stories. In the second iteration of the design, students reported spending an average of 31 hours on the creation of their DSTs. This is one hour more than the average reported by students in the pilot project. Figure 7.21 shows the breakdown of time spent on the different aspects of the DST process during the second design iteration.

![2010-2011 Hours spent on DST Creation](image)

**Figure 7.21: 2010-2011 Hours spent on DST creation**

7.4.4.2 Evidence of engagement in the reflective feedback essays
As noted previously, engagement can be evidenced by the amount of time and effort spent on a task or by ‘dwell time’ (Jones, 2003). It is also evidenced by losing track of time spent on the task and enjoyment in the task; especially when it is a difficult or challenging task (Csikszentmihalyi,
1991), as the digital storytelling process was for many of the pre-service teachers.

The reflective feedback essays were coded in NVivo for statements that showed that students were engaged with the DST process. In their feedback essays, many students mentioned they had spent much more time on the project than they expected to; that they had become engrossed in the process or lost track of time while working on it, as evidenced in the following quote:

> When I got stuck into the project I really enjoyed it. I did not feel the time passing which was a great sign. I found it the most pleasurable and satisfying assignment throughout the PGDE. It gave me a great sense of achievement and accomplishment when listening to the finished product (2010-2011 Student 4).

Overall students described the DST process as enjoyable; many noting that it did not feel like hard work, and that they looked forward to the time and effort they could put into it:

> … when I was actually doing it, I began to take pride in it and enjoyed the experience. I found myself eager to work on it and improve it regularly (2010-2011 Student 25).

> I really enjoyed working on my movie as it did not feel like an assignment, it felt like a fun activity and it was completely different to normal college course work. It was fun to work on and much more interesting than an essay assignment (2010-2011 Student 118).

As in the quote above, students also discussed having fun while working on their digital stories. Two even stated that it was their favourite project on the course:

> This has definitely been my favourite assignment in the whole PGDE course. It did take a lot of time with brainstorming, planning and numerous drafts of the story and the script but I thoroughly enjoyed the whole experience (2010-2011 Student 88).

Many were very engaged in the search for images or music to use in their DSTs, several stating that these steps were their favourite part of the process, even if they were time consuming. While most students talked about how time consuming the process was, all but a few felt it was worth the time spent in the end:
Chapter 7: Design Cycle 2 – Pilot to Mainstream

Unquestionably it was a task that was time consuming and at times stressful. However overall I did enjoy doing it, given that I got to utilise my creative skills. This feeling was compounded when the final product complete [sic]. I really believed that this product showed more of me, and gave a greater insight into my feelings, than any written piece could have (2010-2011 Student 37).

Nearly all of the students discussed a sense of accomplishment, or feeling proud of their final product:

I wasn’t too happy with the prospect of creating a digital story and I thought that I wouldn’t really do a great job of it. However, I have to say that I am very proud of the end result and the effort I have put into making it. While it did take up a lot of my time, it didn’t feel like hard work and I believe this was because I was learning so much, really growing as a teacher and enjoying it at the same time (2010-2011 Student 88).

As in the pilot project, many students were engaged by the alternative form of assessment. While some students were worried about the different form of assessment, most were very excited about the possibility of being assessed in a different way:

It is a completely original way of being assessed and in many ways this makes it a very rewarding experience. It is the opportunity to experiment with a completely new way of documenting an experience. In many ways we have written too many essays to the point that they can become quite stale and quite tired. However when you have the opportunity to create something totally different and original, it can really make what you have created very rewarding (2010-2011 Student 112).

Many students used the word ‘challenge’ in describing their digital stories. For a few, this had to do with negative aspects of the DST process, usually having to do with image sourcing or voiceover recording. However, the majority of students used the word ‘challenge’ in a positive way. They were excited about the new challenge the DST assignment presented, or they were proud of overcoming the challenge set by this very different type of assignment:

After the initial shock and with closer reflection and thought I began to think of this assignment as more of a learning curve than a hindrance. This digital story was a new challenge, a new area of development and possibly something I could even use with my own students in the years to come. I began to get excited about this aspect of my course (2010-2011, Student 20).
The ability to be creative really engaged the students. The majority of students were extremely positive about the chance to be creative in an assignment:

When I first saw the brief for Portfolio Part B, I was really excited and it was the only assignment this year that I have genuinely looked forward to doing. It was something different, out of the ordinary, which would give me the chance to flex my creative muscles which have been atrophying for the past few years of my science-focused college career (2010-2011 Student 10).

There were very few negative comments in the feedback essays about the use of creativity in the DSTs. In fact, there were only 4 negative comments; three of these coming from one student, who described herself as “not a naturally creative person”, who struggled with the assignment because of this (2010-2011 Student11). Other students who did not see themselves as creative people were surprised that they enjoyed the process, and felt it helped them to be more creative:

…overall, I felt it was a job well done for someone who knew very little about computers, and who had little creative skills (Students 2010-2011 13).

During the PGDE I have learned many things but my creative side has really expressed itself. A skill I once thought I lacked (2010-2011 Student 3).

Students mentioned many aspects of the design that helped them to engage, such as the rubric, the step-by-step process and the tutor support. Those students who mentioned the rubric found it very helpful. They used it as a guide for completing the digital story, and many used it to self-assess as they worked through the process:

In addition, when we were first given the digital story assignment, we also received the assessment rubric which I found particularly helpful during the completion of my digital story. It acted as a guide of what I needed to include during the making of my digital story and thus kept me on the right track (2010-2011 Student 77).

During the pilot project, students who chose to complete a DST all described themselves as either intermediate or advanced computer users. Even though many of them had not used video or audio editing software before, their belief in their ability to use new software was quite high. In the
second year of the project, when all students on the course had to complete a DST, it was very important to the researcher that these students did not get lost in the technical side of creating their DST and become disengaged with the process. Many students described themselves in their reflective feedback essays as beginners when it came to technology, as shown in Figure 7.22.

![2010-2011 Research Participants Self Reported ICT Skills Level](image)

**Figure 7.22: 2010-2011 research participants self-reported ICT skills level**

Therefore, students were constantly encouraged to seek help, from their peers or their tutors, when they needed it, and not to try to struggle through something on their own to the point of frustration.

Nearly all the students who described themselves as beginning computer users availed of help during the process. Many noted that this helped them to complete a DST that they were proud of, and most really enjoyed the process. The following excerpts, from 2010-2011 Student 135’s reflective feedback essay shown in Table 7.4, epitomizes the process described by many of the less technically skilled students:
Table 7.4: Excerpts from a beginning computer user’s essay

<table>
<thead>
<tr>
<th>At the beginning of the process:</th>
<th>When I heard the words Digital Story that Wednesday morning in Ed Tec class... I felt like screaming!!!! I was just getting the hang of power-point, and making hand outs and acetates, now I had to push the boat out further!!...</th>
</tr>
</thead>
<tbody>
<tr>
<td>While receiving help towards the end of the process:</td>
<td>This was the moment where I wasn’t afraid anymore. I was working in the computer lab where the teacher was offering necessary support to students. I then realised that other students needed similar support that I needed. I felt like I was diving in the deep ocean but my instructor was beside me!!</td>
</tr>
<tr>
<td>Once the process was finished:</td>
<td>After I had completed my story I asked my teacher to briefly look at it. She did and thought it was very good!! I was so happy I had achieved this. I even shed a tear! I am so proud of my story I have shown several members of my family!! I have learnt so much during this process. One important lesson is not to go into denial when something is daunting. I also am not afraid of computer projects any more. If I apply myself and follow the instructions I can do it!!</td>
</tr>
</tbody>
</table>

Several students mentioned the fact that the step-by-step process made a seemingly difficult task much easier to accomplish:

With the aid of the ICT tutorials and in the manner it was broken down every week; from the initial incident to the story circle, script, storyboards, introduction to movie maker, voice recording, music sourcing and uploading, image sourcing, editing, copyright issues to voice recording, it all appeared do-able (2010-2011 Student 33).

7.4.4.3 Timing

Extra time was built into the second design iteration, which worked well at the beginning of the process for story development. None of the students cited a lack of time for story creation in either the questionnaire or the feedback essays.

However, the additional time built into the end of the process did not benefit the students. Most of the suggestions made by students for changes in the process had to do with the timing at the end. Several suggested that the DSTs should be due before going out onto the second teaching block, something that the researcher had also considered at the end of the Ed Tech DST classes (Long, 2011). One student noted:
In future, I would recommend that an earlier deadline be given for the submission of the Digital Story. The gap between January and May is too long. I do not think there is any benefit in giving students time over their teaching practice to complete the project (2010-2011 Student 48).

Several students mentioned being too busy while out on teaching practice, and not being able to work on their digital story during this hectic time. This led once again to many students rushing to put their DSTs together over the last two weeks before the due date. It also led to additional frustration with the process in that many students stated that they had forgotten how to use the necessary software by the time they finished their teaching practice block and returned to complete the project. One student’s quote sums up the comments of many of the students in this regard:

I regret not finishing my Digital Story prior to recommencing Teaching Practice as I had forgotten most of what I had learned in our Ed Tech sessions and was heavily reliant on the notes given to us by Bonnie. The notes were clear and easy to follow but it would have made life so much easier if I had completed the entire process back in February (2010-2011 Student 12).

7.4.4.4 Disengagement

While many students expressed a sense of excitement upon learning about the DST assignment, other students expressed a sense of dread; unsure of their technical skills or just put off by the amount of work they envisioned having to put into the process. All but a very few found these worries unfounded:

Initially, I was absolutely dreading undertaking this particular assignment. I felt I had just got comfortable with the basics of Ed. Tech (making handouts and PowerPoints) and did not fancy trying to master a whole other range of technologies in a short space of time. I expected I would find the technical side to this assignment difficult and possibly frustrating. When I got stuck into it however, I found that this was not the case at all. First off I’ll say that the process of making the digital story was not half as bad as I expected once I got started (2010-2011 Student 36).

Several mentioned feeling that the amount of marks going for the project (25) compared to the amount of work they thought they might have to put into it, was not worth it.

When I first saw the brief for the Digital Story assignment, I thought ‘Oh no, this is going to be a nightmare!’ It seemed like there was so much
work involved in it and the allocated marks were relatively small (2010-2011 Student 118).

This sentiment was also noted in some of the students’ comments in the questionnaire. Question 3 asked students, “What did you like least about the digital storytelling process?” Students’ open-ended responses were imported into MS Excel where they were analysed and coded. These responses can be seen in Figure 7.23.

![Figure 7.23: 2010-2011 questionnaire response to, “What did you like least about the DST process?”](image)

One student stated, “…the time invested in the process was completely disproportionate to the marks received/value I gained from it” (Q3, Student 2). Another student said, “The number of marks allocated to the finished
product doesn’t really reflect the time that goes into making the digital story” (Q3, Student 33).

For the many students who stated that they were disengaged at the beginning of the process, in the end, most of them felt that the hard work and time spent was well worth the effort, as shown in the quotes above. Of the students who gave permission for their materials to be used for research, only two were negative toward the DST process at the end, stating:

On completing the digital story I must admit that most of my original fears were founded. I spent more time on it than any other part of the Professional Practice portfolio, and this does not reflect the weighting of the marks. I felt it was quite a stressful task to complete as I was very busy with other assignments (2010-2011 Student 91).

Creating the digital story was something that I did not enjoy. I found it very difficult and more time consuming than many other assignments on the PGDE (2010-2011 Student 102).

Notwithstanding, both of these students found some good in the process, and did feel that they benefited from the experience:

I struggled with the technical side of the project mostly however I felt that it had many benefits in the reflection side of the task. I enjoyed getting to the root of my critical incident and felt the reflection on it was very beneficial…In the end while the process was quite trying, the finished product was a success (2010-2011 Student 91).

But that is what I found most useful about creating the digital story, it allowed me to realise how much I have progressed and developed as an effective teacher over the past year (2010-2011 Student 102).

7.4.5 Sociality

7.4.5.1 Peer feedback

The story circle part of the DST process was changed a great deal for the second iteration. A structured process for sharing students’ rough draft stories was devised for the story circle activity, based on suggestions for expanding stories of practice in McDrury and Alterio (2002). It was hoped that students would benefit more from this structured peer feedback experience.

On the questionnaire, students were asked if they participated in the story circle activity. The results can be seen in Figure 7.24.
Of the 49 students who completed the questionnaire, 80% said that they did participate in the story circle process. Those who did not participate were asked why they did not. Their responses were analysed and coded. These fell under three categories, which are illustrated in Figure 7.25.

Students were asked if they felt the feedback received from their peers during the story circle session was helpful. Student responses can be seen in Figure 7.26.
Most students who completed the questionnaire and attended the story circle session agreed that it was helpful. Several however were either neutral on the topic or disagreed with the statement. (The ten students who did not attend the story circle activity chose ‘not applicable’.) An analysis was made of the student responses to this question and students’ additional comments, which were coded into three categories, shown in Figure 7.27.
It was found from the students’ comments that those who did not feel that the story circle session was very helpful mostly cited their peers not feeling comfortable critiquing each other’s drafts. One student who did not feel the story circle was helpful stated:

Didn’t get too much feedback for some reason, people didn’t really feel comfortable giving advice I think. Also I was sitting beside my friends and maybe they didn’t want to seem critical (Q26, Student 39).

Student comments on the story circle were much more positive in the reflective feedback essays. All of those who commented on the story circle were very positive about it and felt that they got high quality feedback from their peers. Most found it a beneficial exercise that gave them access to others’ perspectives on the topic and helped them to improve their story drafts.

I remember one of my group members saying to me that something must have happened during my teaching practice that was worth speaking about, even if it was only small. I began to think back over my teaching practice and really scrutinise my memories. With the help of my group I found that I had actually encountered a lot of critical incidences, most of which I thought were too minute to discuss or reflect upon. The group helped me see my experiences in a different light and pointed out the significance of some things that I had taken for granted (2010-2011 Student 97).
While a few mentioned being hesitant at the beginning of the process, once they started sharing they enjoyed discussing and hearing about each other’s critical incidents. Many students noted that it was good to hear others had experienced similar things in their teaching practice, and many felt that they learned from the process, which added depth to their reflection:

…we looked at each other’s critical incidents in groups and shared our thoughts/opinions on the relevance of the story. I found this class very useful as I got honest feedback from my group and they gave me a fresh perspective on some elements of my story allowing me to add further dimensions to my reflection (2010-2011 Student 125).

In discussing the course overall, some students noted a sense of camaraderie that began during the story circle session and continued throughout the process:

While working on the digital story I felt that there was a great sense of camaraderie within the PGDE group. At first people were shy sharing their experiences but the class facilitated being able to discuss your ideas without being ridiculed. By doing this, I was able to build good friendships with other people doing the course and it allowed me to find a common ground to chat to people and approach them on a level that we both understood. I also found their feedback useful and encouraging. I got ideas from people that I would never have come up with (2010-2011 Student 87).

I believe that the communication encouraged by this project was the most beneficial aspect of the whole process. The way the assignment was organised guaranteed that we would have to speak to our peers about our experiences. I really learned a lot by listening to other students. I don’t believe I would have discussed some of these problems with any of my peers if it hadn’t been for this assignment (2010-2011 Student 97).

A few students mentioned the peer assessment aspect of the process as being very helpful in keeping them on track and on top of the project. In particular, one student noted:

The peer-assessment component of the task at the early stage of the production was a powerful motivational strategy in my opinion. Seeing that other learners were in the same boat as me provided me with reassurance, while the constructive feedback received allowed me to progress in the process. It empowered me to collaborate with and learn from my peers, which are not always components of traditional approaches to assessment. It truly was an assessment for learning technique (2010-2011 Student 92).
7.4.5.2 Scaffolding and support

On the questionnaire, students were asked what they found most helpful when completing their DST. This was an open ended question which was coded and analysed in SPSS. Some students mentioned more than one thing. The results of this question can be seen in Figure 7.28.

![Bar chart showing the most helpful things in the DST process]

**Figure 7.28: What students found most helpful in the DST process**

Students most often mentioned the clear, detailed handouts as helping them to successfully complete their DST. One student said:

> [The]…detailed, comprehensive notes were extremely helpful and useful to me when making my project. I could refer to then when I had difficulty, and without them I do not think I would have been able to complete the finished product (Q4, Student 13).

Many students also mentioned the Ed Tech classes as being helpful to them in that they were easy to follow and explained the process clearly. Tutor
support provided was mentioned 11 times by students. Several students also mentioned the storyboard as being helpful in the creation of their DST. One student stated, “When I actually sat down to do the story, I found the storyboarding process to be of most help in helping me to visualise my final product” (Q4, Student 3).

Many students found the resources provided for them on Blackboard as being very helpful. These resources included things like sample DSTs, the handouts on how to use the different software applications, PowerPoints from the DST lessons, articles on DST, links to royalty free image and music sites and templates for the storyboard and resource lists. One student said:

Bonnie- her notes, enthusiasm and motivation. Even though I went to do my Digital Story telling a few months after we studied it in class her notes were so clear, accessible and useful. The sites she gave us for free pictures and music were great too (Q4, Student 39).

Peer assistance was mentioned five times as being the most helpful aspect of the process. Many students found getting help from each other invaluable.

While only one student mentioned the discussion board as being the most helpful aspect of the DST process in Q4, students were asked a specific question about this on the questionnaire. When asked if they used the discussion board for support, 52% said yes, while 48% said no, as shown in Figure 7.29.
Some of the student comments regarding the discussion board were very positive. Many students noted that when they went to post a question to the discussion board, they found the question had already been answered as someone had asked the same question. Most of those who did use it found it very helpful. One student commented that:

It created a great network of support between students and lecturers, very helpful and less time-consuming than everyone emailing individually. Most of my questions were answered on the discussion board (Q 20, Student 34).

7.4.5.3 Ed Tech classes

In Figure 7.28 above, many students noted that the Ed Tech classes were very helpful in completing their DSTs. Students’ positive feelings about the Ed Tech classes were echoed in the reflective feedback essays. Students described the Ed Tech classes as well organised, well prepared and relevant to the task at hand. The step-by-step process, broken down class-by-class, made the process one that most felt they could accomplish, and assuaged most of the fears students felt when they first heard about the DST assignment. Most students felt that there were enough classes on the process to allow them to complete their DSTs successfully. However, two students felt that more classes were needed to cover all the skills necessary. Upon further analysis of other responses made by these students, it was found that
both stated that they received extra help from their tutor which enabled them to complete their DST successfully.

7.4.5.4 Tutor support

Tutor support featured high on the list of things that students found helpful in the DST process in the questionnaire data. This viewpoint was represented in the reflective feedback essays as well. Students mentioned tutor feedback on the story drafts as being very helpful, as well as the support provided for technical difficulties experienced. Students mentioned that the tutor’s availability and approachability made asking for help less stressful. This was especially important to those students with less technical competence. One student, a self-professed ‘technophobe’ noted:

…next week I was dreading class but I pulled myself out of the denial stage and tried to embrace the thought of completing this project. I left class this week a little more assured as my teacher understood I was ‘terrified’. I sat beside her as we slowly went through the process. She was very patient and had to prompt me on my computer several times (2010-2011 Student 135).

Students’ comments make it abundantly clear that the amount of new technology that they have to master in order to complete a DST can be overwhelming for some. Because of this, it is extremely important that students have access to support for the process, as and when they need it.

7.4.6 Technology

7.4.6.1 Technical difficulties

On the post DST questionnaire, students were asked what they liked least about the DST process (Figure 7.23 above). This was asked in an attempt to discover what parts of the DST process created the most trouble or frustration for the students. The predominant aspects that students liked least were the technical difficulties they encountered.

The most prominent technical difficulty students mentioned had to do with file management. For the most part, this had to do with moving image and/or sound files on the hard drive after they had been imported into Windows Movie Maker (WMM). If the files used in the creation of the movie are moved on the hard drive after being imported into WMM, the
programme cannot locate them when the video project file is opened the next time. The students were informed of this in class, and taken through the steps at the beginning of the unit to set up a folder system for their DST project. However, many students did not follow this procedure and several had file management problems as a result.

7.4.6.2 Video editing software

On the questionnaire, students were asked which video editing software they used, as they did not have to use WMM if they were more familiar with a different application (Figure 7.30).

![Figure 7.30: Video editing software used by the students in design two](image)

The majority of the students reported using WMM. Three Mac users used iMovie, and three students reported using a different video editing software package.

When asked if they thought the video editing software they used was straightforward, most students felt that it was, as shown in Figure 7.31.
However, some students did not see it as a very straightforward process.

Students were asked to rate the ease of use of the video software they chose to use. This was crosstabulated, in SPSS, with the video editing software they reported using. From the results of the crosstabulation (Figure 7.32), it is evident that the majority of students found WMM easy to use in spite of some difficulties encountered, as mentioned above.
Student comments in the reflective feedback essays regarding WMM were quite positive. Many noted that the programme was user friendly and easy to use. They enjoyed using the transitions and effects to add to their story. Many who struggled with it in the beginning stated that they very quickly got the hang of it and enjoyed using the programme in the end.

However, many did mention problems with using the software, echoing comments expressed above by the students who took the questionnaire. Additional difficulties noted in the essays had to do with frustration with the amount of time it took to align the images in WMM with the voiceover. While not having too much difficulty with this, many described it as ‘tedious.’

A final frustration with WMM noted in the students’ essays was the fact that adding in transitions between images changed the timing of images in relation to the voiceover. Many students reported lining up all their images with the voiceover BEFORE they added transitions. While students were informed that transitions affected the timing of the images in the WMM tutorial, it was not stressed as the potential problem it turned out to be for many of them.
7.4.6.3 Audio editing software

During the second design iteration, students were taught to use Audacity to record their DST voiceover. We also introduced them to Myna, but warned them of the difficulties encountered with saving by the previous year’s students. On the questionnaire, students were asked which audio editing software they used, the results of which are shown in Figure 7.33.

Figure 7.33: Audio editing software used by students in design two

The majority of students used only Audacity, a few used only Myna, and some used both. A few students chose to use other audio editing software that they had access to. A crosstabulation of the audio editing software used and how easy the students felt the software was to use can be seen in Figure 7.34.
Figure 7.34: crosstabulation of audio editing software and ease of use in design two

Student feelings on the audio editing software ease of use range from very easy to difficult across the board, no matter which programme was used. For the most part, students found Audacity easy to use, and most felt that they had time to become accustomed to it in class before they had to use it on their own.

The majority of problems for the students in regards to using the audio editing software, no matter which programme they were using, arose when they tried to save their recordings and export them to use in the video editing software. This was discussed quite a bit in the students’ reflective feedback essays. Many mentioned how they forgot to export the finished file as an MP3 or .WAV file so they could import it into WMM. Many also had issues when saving due to lack of memory on their user drives on the lab computers, or on their own removable flash drives. As the Audacity project files are quite large, it’s important that students have enough disk space before trying to save.

Several students mentioned that they did not like recording with someone else in the room when using the recording facilities we set up for their use on campus. Many complained about the noise levels outside the recording
room, such as people walking up and down the stairs or talking outside the
rooms, and old windows rattling on stormy days, which could be heard on
their voiceover recordings. Others were frustrated with recording on campus
as they were not used to using Apple computers, and their unfamiliarity with
this operating system led to additional frustration when trying to save their
recordings. This was something that the researcher had not taken into
consideration when deciding to use the Apple computers for recording
voiceovers.

One more issue that caused a lot of frustration for the students when using
Audacity was the use of different versions of the programmes. The software
version on the lab computers was older than the version the students were
downloading to their own computers from the Audacity website. When they
moved the files from one computer to another, they couldn’t open the files
created with the newer version on their own computers, in the labs. This
problem could have been avoided by exporting the finished recording as a
.WAV file and then opening the .WAV file in the different version of
Audacity, but many students left this last step out.

While many of these are practical problems dealing with technical issues,
avoiding them can mean the difference between a student who is
wholeheartedly engaged in the process and gets the most out of it, or one
who is frustrated by technical difficulties and loses out on the possible
benefits. As Student 41 noted on the questionnaire, “It’s the small things that
trip you up…” (Q3) This frustration can lead to the loss of technology self-
efficacy when students lose faith in their ability to work successfully with
technology.

7.4.6.4 Technology Self-efficacy

Several items on the survey dealt with student levels of technology self-
efficacy, derived from an instrument developed and validated by Torkzadeh
and van Dyke (2001). Students were asked five questions dealing with their
technology self-efficacy, based on a five point Likert type scale, where 5 is
Strongly Agree and 1 is Strongly Disagree. These items were presented as a
Likert scale. The results of the Likert scores were summed up to obtain an
overall technology self-efficacy score for each respondent. These were then coded as high, medium and low levels of technology self-efficacy for each respondent. Torkzadeh & van Dyke (2001) note that individuals with moderate to high self-efficacy tend to engage more frequently in task-related activities and persist longer in coping efforts, while those with low self-efficacy tend to engage in fewer challenging efforts, give up more easily under adversity and evidence less mastery.

The resultant scores, seen in Figure 7.35, show that students finished the DST process with quite high levels of technology self-efficacy.

Figure 7.35: Questionnaire respondents technology self-efficacy scores, design two

Similar to the pilot project results, despite many technical problems reported by students, the majority of students showed high to medium degrees of technology self-efficacy at the end of the DST process. Many students stated that even though they had difficulty at times with the software, the ready availability of support meant that they did not get overwhelmed by the technical difficulties they encountered.

Questionnaire respondents were asked to rate their computer skill as either beginner, intermediate or advanced. Figure 7.36 below shows the results of the students’ self-reported computer skills.
Figure 7.36: Self-reported skill as a computer user from questionnaire

Of the 49 respondents to the survey, 24 (49%) saw themselves as intermediate users, 23 (47%) saw themselves as advanced users, and only 2 (4%) saw themselves as beginner computer users. A crosstabulation was run in SPSS to compare respondents reported computer skill level with their technology self-efficacy scores. The results of this crosstabulation can be seen in Figure 7.37.

Figure 7.37: Crosstabsulation of level of technology self-efficacy with computer skill level

In some ways the results were expected; most of the advanced and intermediate computer users expressed high to medium levels of technology
self-efficacy. What the researcher found interesting were the two seeming anomalies – an advanced user with low technology self-efficacy and a beginner user with high technology self-efficacy. The questionnaire answers for both were looked at across the board, and it was found that the advanced user was unhappy with the DST assignment throughout, and answered most questions negatively. When asked what he liked least about the DST process, he answered:

I found the lectures to be valueless (not Bonnie's lectures!) and the time invested in the process was completely disproportionate to the marks received/value I gained from it (Q3 Student 2).

From his comments, it seemed that he felt that as an advanced computer user he did not need to learn any new technology from the course, and that it was a waste of his time to ask him to do something like this. On the other hand, the beginning computer user loved the assignment and answered positively throughout the questionnaire. Their comments on the DST process overall sum up their attitudes very well:

I found it to be a lengthy process which ultimately helped my development as a teacher in a limited way (Student 2, advanced computer user).

I found it to be one of the most useful and thought provoking exercises on the course (Student 8, Beginner computer user).

So what does this mean? It could mean that the technology aspects of the assignment did not have anything to do with these respondents’ attitudes toward the DST assignment, or towards their levels of technology self-efficacy evident at the end of the project. The factor that could have had the most effect on how these students saw the DST assignment was their attitude to doing something different as an assignment; and, more generally, their level of ‘risk aversion’ (Howard, 2013; Kirkland & Sutch, 2009; Wagner, 2013) as an educator, who is open (or not) to innovative ways of teaching and learning, as discussed in Chapter 5.

A crosstab was also run to discern the relationship between students’ skill as a computer user and their level of engagement in the DST process. Results can be seen in Figure 7.38.
Again, most advanced and intermediate users showed high or medium levels of engagement. The one advanced user with a low level of engagement is the same advanced user discussed above. Interestingly, there are no beginner level computer users with low levels of engagement. However, there are a few intermediate level computer users with low levels of engagement.

The reflective feedback essays written by the students gave very good indications of improved technology self-efficacy. Overwhelmingly the DST improved students’ confidence in using ICT skills in the classroom. Most students were very happy with the new skills they had acquired and many students commented on the use of these skills for their future teaching.

I am fully aware that my Digital Story contains many flaws, but this is ME we are talking about! Eight months ago I was struggling with the updated version of Microsoft Word! …On the whole, Part B of the Portfolio was an enormously beneficial experience: both in terms of forcing me to critically reflect upon my experiences during the first block of Teaching Practice and in terms of improving my capacity to use technology effectively – something that gives me great confidence as I embark on what will hopefully be a long and fulfilling career in the teaching profession (2010-2011 Student 115).

Several students described themselves as ‘technophobes’ before they started the DST project, but said that they were no longer afraid of technology after
Many commented that their DST experience had ‘opened their eyes’ to the use of ICT for teaching and learning.

I find technology complicated so if we had an option to do this I would not have chosen it. The idea of digital storytelling scared me. Upon reflection, I am contented that I did complete it because I believe the finished product to be a big achievement. I figured it out for myself and learned a lot on the way and now that I have acquired the skills to complete a digital story I feel it is something that I will implement in my future career (2010-2011 Student 47).

Many students described themselves in their essays as having low technology skills to begin with, and for many of these students, the DST assignment scared them, or filled them with ‘trepidation’ or ‘dread’. Many were unsure of their ability to successfully complete the DST assignment. An analysis was made of those students who reported low technology skills and confidence to see if they felt more confident in their ICT skills at the completion of the DST project. Of the forty-six students who were coded as having low technology skills/confidence before completing their DST assignment, forty-three reported improved ICT skills and confidence in using ICT due to the DST project. One student, who described herself as ‘not very computer literate’ to begin with, stated:

When I got stuck into the project I really enjoyed it. I did not feel the time passing which was a great sign. I found it the most pleasurable and satisfying assignment throughout the PGDE. It gave me a great sense of achievement and accomplishment when listening to the finished product…. Overall, I am very happy with my digital story. I surprised myself with my capability and it has encouraged me to get involved in such projects in the future (2010-2011 Student 4).

The three students who did not show an improvement in their technology self-efficacy all mentioned being overwhelmed at times by the technology and not getting as much help as they could have. While all three felt proud of their finished DST, and all saw benefits in the assignment, they all felt let down by their lack of technical skills in the end.

7.5 Changes for design cycle 3

7.5.1 Reflection

After analysis of the questionnaire results and feedback essays, it was felt that the use of the critical incident as the topic for the DST was successful.
The critical incident worked very well in conjunction with the narrative elements of the DST process, and allowed students to reflect deeply on their chosen incident. The events which can be the focus of a critical incident analysis are similar to Bruner’s (2002) use of the idea of ‘peripeteia’, a turning point in one’s life, and have the potential to change fundamentally the student teacher’s view of themselves and their profession. It was therefore decided that this aspect of the DST design should remain the same for the third iteration of the design.

One aspect that the researcher found lacking in the DSTs during assessment were the required quotes from the academic literature on the students’ chosen DST topic. In an effort to encourage students to consult the academic literature as part of the reflective process, the 2010-2011 DST assignment brief (Appendix 13) calls for the inclusion of “…at least three quotations from academic literature about teaching and learning that hold significant meaning for you in relation to this incident” (p.1).

Instead of quoting relevant academic literature, many students used generic education quotes from Dewey, Einstein or Aristotle, to name just a few, which they sourced from online quote websites such as www.brainyquotes.com.

This did not meet the purpose of including the requirement for the quotes in the DSTs. The researcher felt that acceptable types of academic literature would need to be pointed out to students when discussing the assignment brief in the third iteration of the design.

### 7.5.2 Narrative

For the most part, the additional emphasis on story format, and the graphic organizers provided, enabled students to produce real stories for the narrative of their DSTs during the second iteration of the design. However, it was felt that one area needed a bit more emphasis at the beginning of the process, and that was the storyboard. Some students, eager to get on with image selection, skipped this step. However, once they realised it was a
required part of the process, they went back after the DST was finished and created one.

Others simply misunderstood the purpose of using the storyboard as a planning tool. In assessing the working portfolios, the researcher found that many students had put a great deal of time into creating storyboards that were exactly the same as their finished DSTs, inserting the actual images used into the document, thinking the two had to match perfectly. It was felt that we needed to emphasise that it was perfectly acceptable to have a ‘messy’ storyboard, one that was scribbled all over, showing the early planning stages of the process, and that the plan and the final product did not have to match exactly.

For the third iteration of the design, we needed to make sure the planning purpose of the storyboard was emphasised. It was decided to include examples of storyboards in the initial DST lessons, from students who had given permission for the use of their materials, to show how other students had used the storyboard for their planning of this project.

7.5.3 Engagement

Many students who demonstrated possible disengagement with the DST process were unhappy with the amount of marks allocated to the project. They felt the time and effort necessitated by the project was not supported by the 25 marks given to it. The researcher and her fellow Ed Tech tutor presented their case to the Director of the course, requesting more marks for the project, and this request was granted. It was decided to allocate 40 marks to the digital storytelling assignment for the 3rd iteration of the project. The Director of the course also decided to make the DST a stand-alone assignment within the Professional Practice module, taking it out of the portfolio assignment altogether.

Another area where it was felt that students could become disengaged with the DST process had to do with the timing of the project in relation to the academic year. This affected students in three ways: first, there was no chance to share the finished DSTs with each other, outside of the sharing
website; second, the long break between the DST instruction and due date meant many students put off completing their DST until just before the deadline, forgetting what they had learned about the software and struggling more with it than they would have had the assignment been due earlier; and third, there were conflicting assignment deadlines, meaning students could not devote the time necessary to the respective assignments.

Moving the placement of the DST unit to earlier in the year was discussed with the Director of the course and it was decided to start the DST unit just before students went out on their first teaching block, at the end of September, for the third iteration of the design. Once students returned from teaching practice in November, Ed Tech would be devoted to creating their DSTs, and the DSTs would be due when they returned from Christmas break. This would give students the time needed to finalise their DSTs over the winter break, but not give them so much of a time gap that they would forget the skills needed. In addition, the new due date did not clash with any other assignment deadlines. Finally, because of the new DST schedule, students would be able to share their finished DSTs with each other after they returned from their second teaching practice block.

### 7.5.4 Sociality

Results from the questionnaire and the student feedback essays were very positive regarding the supportive social aspects of the DST process. Most students found the peer and tutor feedback on their stories very helpful, and it was felt that this in turn added to the depth of reflection students experienced in the creation of their DSTs. The formal structured process implemented for the story circle session was very successful, and it was decided to continue with this format of peer feedback for the third iteration of the DST design.

One change that was needed for the third iteration was a formal process for sharing the finished digital stories, as there would now be time for this after the DSTs were completed.
7.5.5 Technology

With the second iteration, as with the pilot project, difficulties with the technology aspects of the DST process caused the most problems for students. Considering the change in magnitude of students completing the DST, from 18 in the pilot project, to over 200 in the second design iteration, the technology problems were not as disruptive as they could have been. Still, there were things that needed to be addressed in order for the process to run more smoothly with the whole group the following year.

7.5.5.1 File Management

Many students reported difficulties with file management aspects of the process, particularly in relation to moving their files once they had been imported into Windows Movie Maker. Directions for this needed to be included in the lessons for the digital storytelling unit in the third iteration, and emphasised repeatedly, to impress on students the importance of correct file management.

7.5.5.2 Hard drive space

Many students expressed difficulties with saving the Audacity and WMM files, due to a lack of space on their on-campus user drives or on the memory sticks they used for saving their DST project. In the third iteration, we needed to get students to request additional storage space from computer services early on in the process in order to avoid this problem. Students would also need to be advised to use memory sticks that had enough storage space on them.

7.5.5.3 Windows movie maker

Many students reported high levels of frustration when trying to align their images to their voiceover in WMM. For the third iteration, a certain sequence would need to be formulated and emphasised with students to avoid this type of frustration.

Several students also noted frustration with the different versions of WMM being used in the labs and on their own computers. WMM 2.6 was installed on the lab computers, and was our preferred version for its ease of use,
compared to versions that came with the newer operating systems. A version of WMM 2.6 for newer operating systems would need to be sourced for the students to download and use on their own computers.

7.5.5.4 Voiceover recording

From the student comments on their trials and tribulations of voice recording and editing, several changes needed to be made:

- A single recording room would need to be found so students could record on their own in a nice quiet, private place.

- The recording station needed to be set-up on a PC, to eliminate the extra problems created when students tried to record and save on the Apple machines that they were not accustomed to using.

- The instructions for saving and exporting the audio files for use in the video editing software needed to be clarified.

- Audacity needed to be upgraded to the latest version on the lab computers. Students would be instructed to download the same version to their own computer, using a link provided to them.

7.5.5.5 Update WMM and Audacity lessons

After teaching the WMM and Audacity lessons during the second iteration, the researcher felt that there was some ‘disconnect’ evident in the student’s understanding of the software applications and how they should be used for the creation of their DST. She thought it would be more beneficial to the students if the two lessons were designed in a way that simulated the creation of a mini-DST. Plans were made to revamp the lessons so that at the end of these classes, students would have gone through the process of editing a real voiceover in Audacity, and then putting this together with images in WMM to create an example DST.

7.5.5.6 Additional assistance

The majority of students felt that there was ample assistance, from both peers and tutors, to help them successfully complete their DST. However,
although there was a very extensive support structure in place for the second design cycle, a few students still did not avail of the support available. As a result, for the third iteration of the design, it was felt that even more emphasis should be placed on reaching out to students and letting them know that assistance was available if needed, so that they did not become overwhelmed by the technology. This could be done through email reminders and invitations to attend help sessions, checking on student progress in class, and keeping a close eye on those students we knew had ICT skills at the beginner level.

7.6 Further feedback

Further feedback on the intervention was provided by the external examiner (Watts, 2011) for the PGDE who observed in his official report to the University:

The range of assessment techniques is broad and effective, being particularly creative around the use of IT for the ‘story-boards’ [digital storytelling] where there was truly some excellent practice in operation. This arose as part of the ED218 Professional Practice elements, inviting the students to be reflective practitioners, and was a first-rate means of underscoring the integration of philosophy of education in tackling a ‘critical classroom incident or issue’ so that personal reflection and action came to the fore, and illuminating the important integrative thread through the processes of professional reflection. The vehicle for this, through IT competency and skill, also underscored the team’s emphasis on the marriage of process and product.

7.7 Chapter summary

This chapter has discussed the second design cycle when the DST intervention progressed from pilot to a mainstream technology enhanced reflective process within the PGDE. The chapter explained how the DST experience was designed and implemented for the first time with the whole cohort of students. The R-NEST framework was utilised to frame the discussion of findings, and both confirming and disconfirming evidence was presented in order to illustrate the impact of the now mainstream DST design on students’ reflective practice.

The next chapter outlines the third design cycle and its impact on novice teachers’ capacity for reflection on their practice learning.
Chapter 8: Design Cycle 3 - Capstone

8.1 Chapter introduction

This chapter will discuss the third and final digital storytelling (DST) design cycle. The digital storytelling innovation was further deployed, in the third year, as a mainstream activity within the graduate teacher education programme, now known as the Professional Diploma in Education (PDE) programme. The rationale for the mainstreaming of the digital storytelling activity, mainly its potential to help achieve the aims of the PDE, was borne out during the second implementation of the design. Similar to the pilot implementation, the second implementation demonstrated the potential, formative and positive impact of digital storytelling within initial teacher education, particularly in enhancing the pre-service teachers’ capacity to reflect critically on their professional development and practice learning. As discussed in Chapter 7, the majority of students seemed more engaged in reflection through the completion of their DSTs. The students also potentially demonstrated greater creativity in the reflective parts of the PDE, benefitting from the multimedia aspects of the process.

This chapter is structured to present the narrative of how the digital storytelling design was changed for the third iteration of the design, how it was implemented with the students and what the findings were. Both examples of confirming and disconfirming evidence will be discussed to illustrate the impact of the DST design. Exemplars of data will be employed to show the impact of DST on the reflective process in the third iteration of the design. Both qualitative and quantitative data are discussed. The R-NEST framework has been used to frame both the discussion of the design and the analysis of the data.

8.2 The third implementation

8.2.1 Educational setting

As a result of its enhancement of students’ reflective practice in the PDE, the School of Education staff, important informants in the design of the PDE programme, were pleased with the results of the implementation of the DST
unit with the whole cohort during the second iteration of the design. Owing to the success of the DST innovation, the decision was made to continue to include the DST unit in the Professional Practice module, and furthermore, to incorporate it as a stand-alone and significant credit-bearing assignment worth 40 marks. In the third year, the focus became fine-tuning the innovation, in particular, addressing the timing of the DST unit within the academic calendar, such that students could optimally benefit from, and engage with, the DST process.

During this third iteration, the Postgraduate Diploma in Education (PGDE) programme was renamed the Professional Diploma in Education (PDE) country wide. The block teaching schedule for all students on the course was revamped to include four teaching blocks; the first two blocks being five weeks in duration, and the second two blocks being three weeks in duration. Once again, the DST unit needed to be reorganised around the times when students were on campus. This new schedule fit very well with the revised DST schedule, discussed below, and allowed for a change in the project timing, similar to that which was suggested by students at the end of the second year of the design.

In future, I would recommend that an earlier deadline be given for the submission of the Digital Story. The gap between January and May is too long. I do not think there is any benefit in giving students time over their teaching practice to complete the project (2010-2011 Student 48).

8.2.2 Design changes

The most significant change to the DST design in the third iteration was the timing. The unit was started much earlier in the academic year to in order to introduce students to the critical incident and DST concepts before they went out on their first teaching practice block. Table 8.1 below shows a comparison of the DST design between the second and third design iterations.
### Table 8.1: Comparison of second and third DST design iterations

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Week 1</strong> 6/12/10</td>
<td><strong>Week 1</strong> 26/9/11</td>
</tr>
<tr>
<td>Students are introduced to the</td>
<td>Intro to DST and CI</td>
</tr>
<tr>
<td>Critical Incident (CI) assignment</td>
<td>Assignment Brief. CI</td>
</tr>
<tr>
<td>Students introduced in their</td>
<td>also discussed in Professional</td>
</tr>
<tr>
<td>Professional Practice tutorials.</td>
<td>Practice Tutorials.</td>
</tr>
<tr>
<td><strong>Week 2</strong> 13/12/10</td>
<td><strong>Week 2</strong> 3/10/11</td>
</tr>
<tr>
<td>Intro to Digital Storytelling,</td>
<td>7 Elements of an Effective DST,</td>
</tr>
<tr>
<td>Critical Incident &amp; Story</td>
<td>Story structure, Copyright, Image</td>
</tr>
<tr>
<td>structure</td>
<td>sourcing and editing.</td>
</tr>
<tr>
<td><strong>3 week interval</strong> 20/12/10 to</td>
<td><strong>6 week interval</strong> 10/10/11 to</td>
</tr>
<tr>
<td>3/1/11</td>
<td>14/11/11</td>
</tr>
<tr>
<td>Christmas Holidays: Students</td>
<td>First Teaching Block. Students</td>
</tr>
<tr>
<td>asked to write rough draft of</td>
<td>choose an incident from TP and</td>
</tr>
<tr>
<td>critical incident over the break.</td>
<td>write rough draft of</td>
</tr>
<tr>
<td></td>
<td>critical incident before</td>
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<tr>
<td></td>
<td>returning to college.</td>
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<tr>
<td><strong>Week 3</strong> 10/1/11</td>
<td><strong>Week 3</strong> 21/11/11</td>
</tr>
<tr>
<td>Rough draft due, Story Circle/</td>
<td>Rough draft due, Story Circle,</td>
</tr>
<tr>
<td>Work on Script, Storyboard</td>
<td>Storyboard and Music Sourcing</td>
</tr>
<tr>
<td>Creation</td>
<td>(tutor feedback on story draft -</td>
</tr>
<tr>
<td></td>
<td>optional)</td>
</tr>
<tr>
<td><strong>Week 4</strong> 17/1/11</td>
<td><strong>Week 4</strong> 28/11/11</td>
</tr>
<tr>
<td>Windows Moviemaker</td>
<td>Final story due for recording.</td>
</tr>
<tr>
<td></td>
<td>Audacity tutorial: Voice</td>
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<tr>
<td></td>
<td>recording and Soundtrack Editing.</td>
</tr>
<tr>
<td></td>
<td>*Students recording VO through</td>
</tr>
<tr>
<td></td>
<td>the week*</td>
</tr>
<tr>
<td><strong>Week 5</strong> 24/1/11</td>
<td><strong>Week 5</strong> 5/12/11</td>
</tr>
<tr>
<td>Intro to voice recording, Music</td>
<td>DST Work Session: source and</td>
</tr>
<tr>
<td>sourcing &amp; uploading, Final</td>
<td>edit images, music. Finalise for</td>
</tr>
<tr>
<td>script due</td>
<td>compilation in WMM. *Students</td>
</tr>
<tr>
<td></td>
<td>recording VO through the week*</td>
</tr>
<tr>
<td><strong>Week 6</strong> 31/1/11</td>
<td><strong>Week 6</strong> 12/12/11</td>
</tr>
<tr>
<td>Image sourcing, editing, and</td>
<td>Windows Movie Maker Lesson</td>
</tr>
<tr>
<td>Copyright Issues</td>
<td></td>
</tr>
<tr>
<td><strong>Week 7</strong> 7/2/11</td>
<td><strong>3 week interval</strong> 19/12/11 to</td>
</tr>
<tr>
<td>Work Session, continue voice</td>
<td>2/1/12</td>
</tr>
<tr>
<td>recording. <em>Voiceovers due</em> at</td>
<td>Christmas Holidays: Put DST</td>
</tr>
<tr>
<td>the end of the week.</td>
<td>together in WMM</td>
</tr>
<tr>
<td><strong>11 week interval</strong> 14/2/11 to</td>
<td><strong>Week 7</strong> 2/1/12</td>
</tr>
<tr>
<td>25/4/11</td>
<td>Open 4/1/12: Work/Help sessions</td>
</tr>
<tr>
<td></td>
<td>in PC lab all week.</td>
</tr>
<tr>
<td></td>
<td><strong>Final DST due 6 January, 2012</strong></td>
</tr>
</tbody>
</table>
Due to the new block teaching practice schedule, there was time to take students through the first two DST lessons before they went out on their first teaching block. As in the second design iteration, students were asked to keep a reflective journal during their teaching practice, and to be aware of any incidents recorded in their journal that they might want to use as the basis for their DST/critical incident upon their return to college.

### 8.2.2.1 Reflection

Minor design changes were made to the process of introducing students to the concept of DST. In the second iteration of the design, we did not have any example DSTs to show the students that dealt with reflecting on a critical incident. The pilot project DSTs were so broad in nature that we decided not to use them as examples. They were not a good demonstration of deep reflection on a single topic from teaching practice that was the focus of the critical incident. Instead, links to DSTs from various sites on the Internet were used as example DSTs during the second design iteration.

However, for the third iteration of the design, we had several example DSTs from the second iteration to share with the students. These were put up on Blackboard (Bb), with permission, for the students to look through at their own leisure. Students were encouraged to watch several of the example DSTs to get a feel for the DST format, as well as to see what kinds of topics students had chosen to use as their critical incidents in the previous year. One of the DSTs from the 2010-2011 cohort was even shown during the first day of the course induction, to the new 2011-2012 students, to give them an idea about the types of projects they would be completing in Ed Tech that year.
In an effort to encourage students to consult the academic literature as part of the reflective process, the 2010-2011 DST assignment brief (Appendix 14) called for the inclusion of “…at least three quotations from academic literature about teaching and learning that hold significant meaning for you in relation to this incident” (p.1) While assessing the DSTs from the second iteration of the design, the researcher found that many students had not used academic quotes pertinent to their DST topic, and had instead used generic education quotes from Dewey, Einstein or Aristotle, to name a few, which they sourced from online quote websites such as www.brainyquotes.com.

While the wording of the assessment rubric and the assignment brief were not changed for the third design iteration, the relevant passage in the DST assignment brief was changed to “Incorporate at least three quotations from academic literature about teaching and learning…” (Appendix 25). Acceptable types of academic literature were discussed with students when introducing the project and it was pointed out to them that sourcing the quotes from a 'quotes website’ was not acceptable for this aspect of the assignment.

8.2.2.2 Narrative

At the end of the second design iteration, we were satisfied that the introduction to story format and the graphic organisers provided for students gave them the basic foundation that they needed to create a story out of their critical incident. However, when student feedback essays and questionnaire responses were analysed, we realised that many students were unclear on the reasons for using the storyboard in the DST process. The purpose for the storyboard as a planning tool, and what was expected of the students in the creation of the storyboard, needed greater clarity.

The slides used to introduce the concept of storyboarding to the students in the third iteration of the design can be seen in Figure 8.1. Additional slides were created to show examples of storyboards created by the previous year’s students.
Students were reminded to use the storyboard for planning as the project progressed, and encouraged to submit the ‘messy’ planning version of their storyboard in their working portfolio at the end of the process. This messiness, or low fidelity prototyping, is accepted as part of the initial, formative stages of IT design practice (Rogers, Sharp, & Preece, 2011).

8.2.2.3 Engagement

As noted in Chapter 7, one area of disengagement with the DST process noted during the second design cycle had to do with the amount of marks allocated to the assignment. This was addressed with the director of the course and the marks for the assignment were changed from 25 to 40, which
reflected more accurately the time and effort students were devoting to the creation of their DSTs.

Another area which caused disengagement among the students with the DST process was the timing of the assignment in the academic calendar. To alleviate this problem during the third iteration of the design, it was decided to start the DST unit just before students went out on their first teaching block, at the end of September. As shown in Table 8.1, once students returned from teaching practice in November, their Ed Tech classes were devoted to creating their DSTs. The DST due date was also moved forward, to early January. It was envisaged that this would give students the time needed to finalise their DSTs over the winter break, but not give them so much of a time gap that they would forget the necessary audio and video editing skills they had learned in Ed Tech class. In addition, the new due date did not clash with any other assignment deadlines, something which had proven very disconcerting for many students during the second design iteration.

8.2.2.4 Sociality

The formal structured process designed and implemented for the story circle session during the second iteration was very successful, and it was decided to continue with this format of peer feedback for the third iteration of the DST design.

A few minor changes were made to the design for the third iteration with regards to further peer feedback and support. Students did not share rough cuts of their DSTs before final submission. Due to the new block teaching schedule during the third iteration, they would now have a chance to share their finished DSTs with each other during Ed Tech, when they returned from their second teaching block in February.

A formal process for the sharing of students’ finished DSTs was devised. The students were familiar with this type of peer assessment session, as it was based on peer assessment sessions used for other Ed Tech assignments throughout the year. This process included a peer assessment form.
anonymous assessors, and encouraged positive, constructive feedback (See Brown & Dove, 1991; Sluijsmans, 2002).

During the third iteration of the design, the researcher had become acquainted with a teacher educator in South Africa who was also using DST with her student teachers, through the researcher’s conference publications. After much correspondence, we hoped to create a private website for our students so that they could share their DSTs with each other, and get a glimpse into each other’s experiences as student teachers. The South African teacher educator asked our students to view her students’ DSTs on her public blog (http://edutechcput.wordpress.com/digital-storytelling-resources/), and was eager to receive their feedback. The researcher felt that showing the students a DST created by a student teacher in a different country would help them to see that they were not the only ones being asked to create digital stories, and would hopefully help them to see the wider application of the use of digital storytelling in teacher education.

During the peer feedback session in Ed Tech class (Figure 8.2), students were introduced to the feedback process by watching a DST online that was created by one of the student teachers from South Africa (http://vimeo.com/36266930).

Figure 8.2: Slides from the completed DST peer feedback session, 2011-2012
They were asked firstly to give ‘practice’ feedback on this DST before beginning the process of giving feedback on each other’s DSTs. A peer feedback form (Appendix 21) was used by students to provide anonymous feedback to each other, and a section was provided for them to write down their feedback on the South African DST first.

The South African student teacher’s DST was played on the large screen for the class to watch together. Students then wrote down their feedback on the form provided. After a short class discussion on what they thought of the DST, students individually viewed each other’s DSTs on the PCs, using their own headphones. During this process, they had a chance to see three or four of their peers’ DSTs.

After the peer feedback session, the researcher asked the group what they thought of the process. Students enjoyed the process, and were happy that they got to see each other’s completed digital stories, after all the hard work that they put into them (Long, 2012).

8.2.2.5 Technology

Several technical issues still needed to be addressed during the third design iteration in order to make sure that the DST process ran smoothly for the students. Among these were clearer instructions on project file management; accessing more hard drive space for students’ large DST files; and sourcing an appropriate recording venue for students to use while recording their DST voiceovers.

8.2.2.5.1 File management instructions

A handout was created to show students how to correctly set up their folders for the DST project (Appendix 22). Instructions were included on this to show students what to do when they moved the image or sound files after inserting them into Windows Movie Maker (WMM), and ended up with red Xs (Figure 8.3) where their files should be (a problem that plagued students in the second iteration, and proved highly frustrating for many.)
8.2.2.5.2 Hard drive space

Several students ran into difficulty while creating their DST in the second design iteration due to lack of memory on their storage devices. Students were sent an email before returning from their first teaching practice block, asking them to request more user-drive space on their on-campus user-drive from Computer Services. Instructions for doing this were included with the email. Throughout the process, students were also reminded to make sure there was plenty of space on their memory sticks if they were saving to those instead of their on-campus user-drives.

8.2.2.5.3 Voiceover-quality

Three digital recorders were purchased by the Ed Tech department for the third iteration of the design. Students were able to check these out and record their voiceovers at home. This meant that students now had several options for recording their voiceovers with very good equipment, as shown in Table 8.2. They could choose to check out a digital recorder, a PC Microphone, or to record on their smart phones at home. Alternatively, they could sign up to record on campus in the School of Education’s ‘dark room’.
Table 8.2: Voiceover recording options for student during the third design iteration, 2011-2012

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hand-held Digital recorder:</strong></td>
<td>Three Easy-speak pro digital recorders available for students to check out and record at home.</td>
</tr>
<tr>
<td><strong>PC Microphone:</strong></td>
<td>Ten available for students to check out and record at home.</td>
</tr>
<tr>
<td><strong>Smart Phones:</strong></td>
<td>Students were encouraged to use their smart phones for recording their voiceover at home.</td>
</tr>
<tr>
<td><strong>Recording on campus:</strong></td>
<td>A Blue Snowball USB microphone and a Lenovo (Windows) laptop were set up in the old ‘dark room’ in the School of Education building. Audacity was installed on the laptop for students to use.</td>
</tr>
</tbody>
</table>

8.2.2.5.4 Voiceover recording

After several complaints from students regarding the disruptive noise they experienced while recording in the Mac Lab on campus during the second iteration of the design, a different place to record on campus was located. The researcher was granted permission to use the School of Education’s former, now disused ‘dark room’, which had previously been used for developing photographs in the very early days of Educational Technology. It seemed like an appropriate space; small, enclosed, with a heavy black curtain that could be pulled across the closed door to muffle noise from the outside. The Blue Snowball microphone and School of Education Lenovo (Windows OS) laptop were set up in the ‘dark room’. The same version of Audacity that was installed on the lab computers was installed on the laptop. The written instructions for recording, saving and exporting the recorded voiceover using Audacity were updated and clarified from the previous year’s instructions, and were left in the recording studio.
Finally, the latest version of Audacity was installed on the lab computers and students were provided with a link to download the same version of Audacity to their own computers. This would allow them to edit their voiceover at home without the confusion experienced by the previous year’s students by the use of different versions of Audacity on campus and at home.

8.2.2.5.5 Windows Movie Maker

Many students reported high levels of frustration when trying to align their images to their voiceover in WMM. For the third iteration, the following sequence of importing and aligning images in WMM was stressed throughout the video editing process:

1. Import images into WMM.
2. Drag the images onto the timeline in the correct order for the script.
3. Add in title slides (for text such as quotes and titles).
4. Put in transitions and effects.
5. Align the images and title slides with the voiceover.

It was hoped that this would help students to avoid the frustration experienced by many the previous year, who ended up adjusting the timings for images in their movie several times over, and became quite disillusioned with the video editing process.

In order to avoid the frustrations caused by the use of different versions of WMM on the lab computers and on students’ own computers, students were encouraged to download and use WMM 2.6, even if they had a newer operating system such as Windows Vista. WMM 2.6 for older and newer operating systems could be downloaded for free from Microsoft Online.

8.2.2.5.6 WMM and Audacity lessons redesigned

After teaching the WMM and Audacity lessons during the second iteration, the researcher felt that there was some ‘disconnect’ evident in the students’ understanding of the software applications and how they should be used for the creation of their DST. She thought it would be more beneficial to the students if the two lessons were designed in a way that simulated the
creation of a mini-DST. Dorinina (1995) suggests giving the new technology user preliminary training in computer interaction in which the subject constructs a situation that is appropriate to the training task. The lessons were redesigned so that by the end of these classes, students had gone through the process of editing part of a real voiceover in Audacity; adding music and sounds to the voiceover to create a soundtrack; and then putting this together with images in WMM to create a sample mini-DST.

The researcher recorded a short section of a former student’s DST script (with permission) in her own voice, and deliberately made several mistakes in the recording. The voiceover editing lesson using Audacity was then based on the editing of this recording. In the next step of the process, creating the soundtrack using Audacity, sample music and sound files were added to the edited voiceover file to create a practice soundtrack. Finally, during the WMM lesson, the finished practice soundtrack was imported into WMM, and sample images, title slides, transitions and effects were added to create a mini-DST of about two minutes duration. By following this process, students were taken through all the steps they would need to follow in order to create their own DST.

8.2.2.6 Additional assistance

For the third iteration of the design, even more emphasis was placed on reaching out to students, especially those whose ICT skills were at the beginner level. This was done through email reminders and invitations to attend help sessions; checking on student progress in class; and keeping a close eye on those students we knew might struggle with the assignment.

8.3 Data analysis

8.3.1 Working portfolio

As in the pilot project and the second iteration of the design, items used for data analysis included the students’ completed digital stories, their ‘working portfolios’, the online discussion board and a post digital storytelling questionnaire. As in design two, students were asked to complete an 800 to 1000 word reflective feedback essay on what they thought of the DST
process and the product they created. These essays were analysed using the qualitative data analysis software NVivo. Students were given a permission form to submit with their digital stories (Appendix 23).

Of the 197 students who submitted a DST during the third design iteration, 162 gave permission for their materials to be used in the data analysis. Twenty students returned a permission slip stating that they did not want their DST materials included in the research. Twelve students did not return a permission slip, so their material was not included for data analysis. This left a total of 159 reflective feedback essays for analysis. Descriptive statistics for the students who gave permission for their materials to be included in analysis can be found in Appendix 24.

8.3.2 Post DST questionnaire

Minor changes were made to the post digital storytelling questionnaire for the third design iteration. A few new questions were added to the questionnaire regarding the sharing of the finished DSTs in class. The questionnaire was administered to students via the online survey website, Kwik Surveys (https://www.kwiksurveys.com/). All students on the course were emailed a link to the survey. Participation was voluntary, as was stated in the email with the link sent to students. Despite implementing ‘good follow-up procedures’ as suggested by Creswell (2005, p. 368), such as resending the questionnaire at two week intervals, the response rate was low. Of the 197 students on the course at that time, 44 started the questionnaire, but only 25 completed it (13% of the cohort). The questionnaire was made available to students from 1 March, 2012 to 31 May 2012. Results were downloaded from the survey website as excel files after the survey was closed. The questionnaire data were then analysed using SPSS. Frequency tables were run to derive descriptive statistics for the questionnaire participants. These can also be seen in Appendix 24.

8.4 Design three findings

Findings from the completed digital stories, working portfolios, reflective feedback essays and the post-DST questionnaire are presented here. Due to the relatively low response rate (13% of the cohort), it is debatable as to
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whether the questionnaire data can be generalised to the whole cohort. Creswell (2005) notes that “…a high response rate creates a stronger claim in generalizing results from the sample to the population” (p. 367). While analysing the questionnaire data, the researcher considered that the numbers garnered from the data might not be an adequate representation of the PDE cohort ‘population’. The possibility of response bias (Creswell, 2005) exists. Therefore, while the questionnaire data have been presented here, greater emphasis has been placed on the qualitative data retrieved from the students’ reflective essays and from the working portfolio materials.

8.4.1 Reflection

Throughout the PDE programme we have been asked to reflect on our every thought and experience. The Digital Story has brought about deeper reflection as I thought carefully about my critical incident…Some of my weekly reflections were typed up and neatly stored away, however reflections need to be engaged with over and over again. The Digital Story allowed this thorough engagement resulting in complex thinking and reflection on my critical incident (2011-2012 Student 55).

Similar to the results in the second year of the design, once again students found that the DST enabled them to reflect more deeply than they had done in other reflective assignments on the course. Some of the reasons students gave for this deeper level of reflection were: the additional time taken to reflect while creating the DST; the self-questioning required during the process; having a chance to assess their own actions more thoroughly; looking at the incident from different time frames and from different perspectives; assessing personal beliefs and philosophies; connecting theory to practice; and having the chance to step back and see the broader context. Students felt all of this was amplified and enhanced greatly by the use of multimedia to create their DSTs.

8.4.1.1 Depth of reflection

Several different parts of the DST rubric (Appendix 26) were analysed to devise a depth of reflection score for the students for the third year of the design, as was done in year two. These included all the criteria for the critical incident, planning materials including the reflective feedback essay, and the use of multimedia in a reflective manner. These scores from the
assessment rubric were totalled up and a ‘reflective score’ was given. Based on the marking scheme used by the university, a rating of high, medium or low levels of reflection were assigned, (as shown in Table 7.3). Only those students who gave permission for their materials to be used for this research (N=159) were included in the analysis.

Figure 8.4 shows the results of the level of reflection scores attained by the students, based on their rubric scores.

![2011-2012 Levels of Reflection Scores](chart)

Figure 8.4: 2011-2012 Student levels of reflection achieved

In comparison with the levels of reflection scores of the 2010-2011 research participants (Figure 7.12), there is a marked improvement in the reflective level scores, as can be seen in Table 8.3.

<table>
<thead>
<tr>
<th>Level of Reflection</th>
<th>2010-2011 Scores</th>
<th>2011-2012 Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>53%</td>
<td>85%</td>
</tr>
<tr>
<td>Medium</td>
<td>43%</td>
<td>14%</td>
</tr>
<tr>
<td>Low</td>
<td>4%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Table 8.3: Difference in level of reflection scores from year two to year three implementations

Questionnaire results regarding students’ perception of the use of DST to enhance reflection show that students agreed that creating a DST is a reflective process. Figure 8.5 shows that 80% of students who responded to the questionnaire felt that it was a reflective process.
Figure 8.5: 2011-2012 responses to the statement, 'Creating a DST is a reflective process'.
Seventy-six per cent of students who completed the questionnaire felt that creating a DST allowed them to be more reflective than solely writing an essay would have (Figure 8.6).

Figure 8.6: 2011-2012 responses to the statement, 'Creating a digital story on a critical incident allowed me to be more reflective than solely writing an essay would have'
Seventy-two percent of the students agreed that creating their DST helped them to make better sense of their critical incident (Figure 8.7).
In discussing how the DST helped to change her thinking on her own practice as a teacher, one student noted,

It has reinforced my belief that reflection must go beyond description of teaching incidents to ask why and to have the courage to implement the 'So what now?' implications of this deeper questioning (Q 75, Student 25).

Many students remarked in their reflective feedback essays that they enjoyed reflecting differently through the DST process. As in the results from the second year, several students described written reflection on the course as a chore, and felt that the DST process helped them to see the process of reflection in a different light:

There is every danger that as a teacher you could spend your career oblivious to many of the things happening around you. The word ‘reflection’ has been bandied around constantly during the PDE. There is no denying its importance in every professional’s life. However, journal entries and essays, when overdone, take the fun and joy out of reflection. The creation of my digital story provided me with a new method to approach reflection (2011-2012 Student 151).

It was quite an exciting process, too, trying to show how I felt and what happened through images rather than the normal boring reflection type essay we would have to do…I feel it really makes you think about what you are doing, why are you doing it and can give a whole new understanding to situations. It’s like you are there again reliving the moment (2011-2012 Student 136).

Others felt that it deepened their reflection on, and assessment of their own
practice:

Making my digital story forced me to tear the incident apart, to scrutinise and examine it using lenses and tools that I would not normally use. Moreover, it helped me to structure my reaction to my critical incident. Though I had spent some time thinking about the “Now what?” the need to develop this in a cinematic format required me to recognize and articulate how my critical incident would change my practice as a teacher (2011-2012 Student 151).

What is really weird about doing the project is that it has made me see incidents that happen in the class in a completely new light…I am not saying that there has been some huge new revelation in regard to the way I should deal with the students. I just mean that it has given me an additional tool that I can use to assess my teaching strategies (2011-2012 Student 62).

Many noted how the DST process allowed them to look at their critical incident from different perspectives:

I believe the creative process involved in making this digital story has truly required me to become a “reflective practitioner” as a student teacher. I found myself feeling bad for the student as I wrote the script, the images caused me to think more about his perspective and how I could try improve my relationship with him (2011-2012 Student 75).

The digital story enabled me to investigate an eye opening experience, look at it through the eyes of others and finally, create solutions to ensure this wouldn’t happen in future. In honesty, this project put focus on reflection (2011-2012 Student 91).

Several noted that the DST process gave them the time to reflect more deeply on the incident:

From a reflection point of view this project has been a great success although it is important to note the amount of hours dedicated to this one incident really did allow me to develop an in-depth understanding of what had happened, the reasons and theory behind the decisions made and the correct course of action which should be taken should a similar scenario arise in the future (2011-2012 Student 50).

Overall, the making of my digital story was a positive experience. I gained new computer skills and had the opportunity to reflect in a fresh and creative medium. This process afforded me the time to really think about my actions in the classroom, to think about how I will face the future and therefore I believe that it has helped me develop in my teaching (2011-2012 Student 67).

A strong theme throughout the students’ reflective feedback essays was that the creation of their DST helped them to understand the process of reflection better, and made it more relevant to them:
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This, in turn, has pushed me to engage with the reflective practices which we were supposed to put in place in the first teaching practice block, and which I will for the future, having found the context and purpose of ‘reflection’ – in short, its relevance (2011-2012 Student 1).

Before starting this course I had a few preconceived notions of what being a good teacher means. I knew about the material I had to know and some of the areas I felt I would be weak in but I had never really considered how a good teacher must continuously reflect and improve their teaching. This one incident during my teaching practice really taught me that. The making of this DST has greatly helped me review the reflection process I did at the time and during its construction it has helped me again reflect on areas I need to improve as a teacher (2011-2012 Student 61).

Many students commented that knowing they had to look for a ‘critical incident’ while on their first block of teaching practice to use as the subject of their DST, caused them to look more closely at the incidents they had encountered. This form of second order reflection is encouraged by Moon (2004) to enhance depth of reflection:

I looked back over my first block in school as a teacher and took note of particular things that took me by surprise, knocked my confidence, made me happy or made me angry. It was beneficial to have the opportunity to revisit some of these events. As my teaching practice block had been relatively problem-free, I had to search deep to find what were the small things that seemed insignificant, but had actually had quite an effect on me (2011-2012 Student 57).

Initially, I found it quite difficult to identify 1 critical incident from my teaching practice. However, after spending a substantial period reflecting on it, the broad outline of what became my digital story began to emerge. I probably did not even log the incident as being “critical” to my development as a teacher at the time. It was only through the process of honest self-evaluation and critical reflection that the significance of the incident in my development as a teacher became apparent (2011-2012 Student 78).

8.4.1.2 Reflection and Multimedia

On the questionnaire, students were asked if using sound, video, music and images in their digital story made it easier for them to express themselves. Eighty-six percent of questionnaire respondents agreed that it did, as shown in Figure 8.8.
The use of multimedia by students to express more clearly their reflections on their critical incident was also evident in the reflective feedback essays:

Having to take the time to write an engaging script and source suitable images really made me think about the emotions I felt, as I wanted to portray them as best I could. I wanted the viewers to feel how I felt. I also tried to do the same when it came to sourcing the music… Throughout the process I was really aware of every little emotion, and how to portray it affectively through my writing, imagery and music. This would not have been the case had I just written an essay (2011-2012 Student 23).

Nearly three-quarters of the students who completed the questionnaire felt that the process of choosing images for their DST added to their reflection on their critical incident (Figure 8.9).
This feeling was also evident in the students’ reflective feedback essays. Many students commented on the manner in which their search for images added to their reflection on the critical incident:

The use of image I think was the most effective way of reflection… Each image tells a story or expresses an emotion much better than my words that accompany it. At times I felt like I could not find the words so I kept it simple and used an image instead… I feel like the images made me think more too. When I saw what I was trying to say in picture form, like the child crouched in the corner being yelled at, it made me think even harder about my story. We tend to reflect on something once or twice and try and learn from it but with this process I was continuously thinking about the incident and what it meant… (2011-2012 Student 35)

Spending time sourcing suitable images facilitated deeper reflection of the incident, as I really wanted to find images that would complement the story. The time spent sourcing those images equalled to time spent reflecting on the incident. It surprised me how time consuming this part of the process was as I was keen to find the right image for each scene so that the message was portrayed sincerely and honestly…(2011-2012 Student 148)

…it is also important to note that the process of finding images to explain a feeling or emotion and finding a song or songs to convey a mood is extremely helpful as one tries to reflect on a situation. And I can categorically say that the sourcing of the images and music was very helpful with my reflection as it made me think about how I felt at each stage of the incident (2011-2012 Student 50).

Some students explained how the use of images added to their analysis of the incident:
The use of pictures and having to find the perfect image made me have to think about what I was saying very carefully. This made me analyse things a lot more thus I came to some good quality conclusions (2011-2012 Student 18).

When I was choosing the images it dawned on me- they were quite dramatic. Now I know dramatization makes a story more interesting anyway, but for myself I didn’t realise the extent of my panic that Friday afternoon. I now realise it was a complete over reaction – but my fear was very real at the time (2011-2012 Student 81).

8.4.1.3 Connecting theory to practice

There was a great deal of evidence of students connecting theory to practice in the reflective feedback essays in the third iteration of the design. Some students noted that having to search for relevant quotes to include in their DST ‘forced’ them to consult the relevant literature, and gave them time to think about how the theory related to their own practice. It helped them to make a connection between the theory they were learning in lectures and the practical issues they were dealing with in their own classrooms:

Academically I have researched and reflected on the incident in the classroom, which has allowed me to identify and link it to corresponding material which I have studied in lectures, workshops and read in supplementary literature recommended during the course. This assignment forced me to take what I had learned theoretically and apply it to a practical situation thus reaffirming the theories and concepts learned during my academic progression (2011-2012 Student 13).

The inclusion of quotes also made me think about the situation from a theoretical viewpoint. Yes, it is probably true to say that this would also have been the case if I had written an essay, but I feel, like that of my reflective journal, had I simply sourced quotes to include in an essay I would have forgotten about them as soon as they hit the page. Having to format them and spend time including animations and transitions, I really began to think about the quotes and how they fit into my story and therefore my situation (2011-2012 Student 23).

Finally, many students noted that watching their finished digital story continued to enhance their reflection on the incident. Some noted that it gave them an ‘outside perspective’ on their incident, allowing them to take a step back and look at the incident in a different way:

Looking back over the digital story I can view it as an independent story, not something that is internal in my mind but something that is an external and unattached incident which allows me to even further reflect on and examine the situation discussed and the manner in which I dealt with it (2011-2012 Student 57).
8.4.2 Narrative

Students in the third iteration of the design were very successful in taking the critical incident idea from their reflective journal and refining it to create a story about what they learned from the incident.

8.4.2.1 Rubric narrative scores

The story format scores from the assessment rubric were totalled up and a ‘narrative score’ was given. Based on the university marking scheme, as shown in Table 7.3, a narrative score of high, medium or low was assigned for each student. The results of this analysis can be seen in Figure 8.10.

![2011-2012 Narrative Scores](image)

Figure 8.10: 2011-2012 Narrative scores from the DST rubric

Eighty-two percent of the students met the narrative criteria at the highest level, while a further 17% scored in the medium level. Only 1% of students scored in the lowest band. This suggests again, as in the second iteration, that the level of instruction provided on story format at the beginning of the process; the use of the critical incident as the basis of the story; and the extended use of the graphic organizers, all contributed to the exceptionally high numbers of students successfully utilising the story format for their digital stories. Table 8.4 shows the increase in Narrative scores between the second and third iterations of the design.
Table 8.4: Comparison of narrative scores from second and third design iteration

<table>
<thead>
<tr>
<th>Narrative</th>
<th>2010-2011 Scores</th>
<th>2011-2012 Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>63%</td>
<td>82%</td>
</tr>
<tr>
<td>Medium</td>
<td>33%</td>
<td>17%</td>
</tr>
<tr>
<td>Low</td>
<td>4%</td>
<td>1%</td>
</tr>
</tbody>
</table>

A few questions on the post-DST questionnaire dealt with issues pertaining to the use of narrative in the DSTs. Students were encouraged to get feedback from their Ed Tech tutors on their penultimate draft of their DST before recording their voiceover. During the third iteration of the design, nineteen students reported receiving feedback from their tutors on their story draft, as shown in Figure 8.11.

![Figure 8.11: 2011-2012 questionnaire results regarding tutor feedback on story draft](image)

Eighty percent of students who completed the questionnaire found this feedback very helpful, as shown in Figure 8.12. The students who answered with 'Neutral' did not state why they felt this way in the additional comments.
Figure 8.12: 2011-2012 questionnaire results regarding helpfulness of tutor feedback on story draft

Several students mentioned the feedback they had received from their tutor regarding their story draft in their reflective feedback essays. All who mentioned it found it helpful. Many stated that it gave them confidence in their own story, as they were unsure if they were on the right track. Getting positive feedback from their tutor allayed their worries and allowed them to proceed with their DST with a bit more confidence.

8.4.2.2 Graphic organizers - story map

Several students mentioned the story map in their reflective feedback essays. They found the story map very helpful at the beginning of the story writing process, and most commented on its usefulness for brainstorming the different parts of their story. Those who had not written a story for several years found the story map helpful in turning their critical incident into a story:

Writing a story is not something I have done for many years and focusing on a beginning middle and an end was in itself a challenge, helped by the story map (2011-2012 Student 116).

Some students articulated the ways in which the story map added to their understanding of their critical incident, as well as the reflective process:
As I began to brainstorm and map out my digital story, I found that it gave me another level of understanding to my critical incident… there was a beginning in which life is interrupted by an event, a middle in which the problem is solved by personal transformation and finally the end, in which closure is achieved for the individual involved. Looking at my critical incident in this way gave me a different perspective to the situation (2011-2012 Student 135).

…the story map schema of the critical incident, causing one to struggle and eventually come to newer insight, has given me a valuable schema for the important work of reflection on practice (2011-2012 Student 10).

8.4.2.3 Graphic organizers - storyboard

Use of the storyboard as a planning aid was stressed with students for the third iteration of the design after we realised that many students had misunderstood its intended use during the second design iteration. Examples of ‘messy’ storyboards created by previous students were demonstrated when introducing students to the storyboard concept, which seemed to help students use the storyboards for the planning stages of their DST.

Several students commented on the help provided by the storyboard in the DST process for image selection, planning and organisation of their DST. Many said that this was their favourite part of the process, as they could finally see the whole project coming together, and could visualise what their final DST would look like:

My favourite part of making “Too good to be true” was creating my storyboard. Prior to this each of the stages (the drafting of my script, the search for images, music and sound) had happened in isolation. It was only once I started copying and pasting into my storyboard that I started to see my digital story come to life. It was at this stage that I became committed to the project and even started to enjoy working on it (2011-2012 Student 151).

I found that using the Story Board was extremely beneficial. It was the element that tied the story to the final project compilation. It took me some time to understand how to use it, but when I did, I never left it out of my hand during the process, scribbling on it and reading it and looking for ideas on images and scene transitions (2011-2012 Student 129).

Many found the storyboard helpful in thinking about and finding the images they wanted to use in their DST:

This storyboard made me really think about what I wanted to put into my digital story, it made me think about the type of pictures I would require and where they would be appropriate. The storyboard was extremely
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beneficial to the whole process as it helped me to break down the incident into segments (2011-2012 Student 150).

I loved the story board as it really helped me with fleshing out my story and got me thinking about the images and music that I needed to enhance my story. I took my time and really thought deeply about the outline of my story, it was at this point that I really got excited and couldn’t wait to see my final edited version (2011-2012 Student 154).

One student described the storyboard as a ‘visual aid for reflection’, and went on to explain what he meant in the following manner; “When you search for pictures that mirror your words, you reinforce any conclusions that you drew from your critical incident. This is not possible in an ordinary essay and so adds a unique feature to the assignment” (2011-2012 Student 28).

A few students, who commented that they did not use the storyboard at first, described how they ended up backtracking and using the storyboard eventually:

I now acknowledge that the story board is pivotal for the success of a well-structured digital story…initially I assumed that I could complete the digital story in the movie maker without utilising a story board. However I learned that the story board was key to organising and aligning the images effectively with my recorded voice over…I felt that this story board proved fundamental in my overall planning process of the voice over and the images (2011-2012 Student 42).

While some thought the storyboard would be a waste of time, many found it actually saved them time in the end:

The storyboard was also really practical and helpful. Initially I thought it was just an unnecessary, time-consuming part of the project. But I then found it excellent for helping me organise which images should go where; it provided me with a plan, and ironically saved me a lot of time in the end! (2011-2012 Student 81)

8.4.2.4 Story/script writing

Students who commented on the script writing process in their reflective feedback essays were evenly divided on whether or not the process was easy for them. Some students found the script writing easy with the help of the graphic organisers and a good deal of brainstorming. Those that struggled had a hard time with the word count, keeping within the three to five minute time limit for the DST.
Whether they found the process easy or not, many mentioned the manner in which writing their script helped them to reflect further on their critical incident:

I believe that the initial thinking and planning stages in the creation of the digital story have greatly benefited me. I had to think about my critical incident, again and again, tease it out and try to make sense of the factors that had led to its occurrence. In doing so, I have gained a better understanding of the students in question, the dynamic within the classroom and also how to best approach this group and to meet their needs. I had to constantly return to the incident in order to bring some resolution to my story and in doing so I answered several of my own questions, which otherwise I would probably have pushed to the back of my mind (2011-2012 Student 67).

The script was changed from the initial draft several times until I was happy with how it read. I relished the opportunity particularly because it gave me the opportunity to detail the reflection which I had completed, without knowing it, during and after the incident (2011-2012 Student 22).

8.4.2.5 Narrative and reflection

Many students noted that the drafting and re-drafting of their script led them to deeper reflection on their critical incident. Going through the editing process allowed them to see the incident from different perspectives, different time-frames, and to look more closely at the impact their own emotions had on the incident:

I recalled the incident again in my mind and read over my reflective journal entry from that week. I remembered how that student must have felt…As a result I amended my final script because I wanted to try and display these emotions during my story…As I spent time editing, recording and re-recording my final draft I found the story coming to life in my own mind. I was placing myself into the mind of the student to see if I could understand the feelings he must have felt and to see if the story was a true reflection of his experiences (2011-2012 Student 103).

The editing process is probably more beneficial to reflection than anything else as it forces you to look at the incident from various angles and the more you dwell on something the more likely you are to develop and improve on it (2011-2012 Student 28).

Many also stated that clarifying the message they wanted to convey added to the depth of their reflection:

Each draft and script I persistently reflected on the message that I wanted to portray and illustrate. I wrote and edited each draft of the script numerous times and I felt that each time I developed the story further as it forced me to reflect deeper on the critical incident (2011-2012 Student 42).
8.4.2.6 Multimedia to tell the story

Nearly all the students were very positive about the use of multimedia in their digital stories:

I am technology phobic and very lucky to be able to use clip art not to think of creating an entire video which would convey meaning. I couldn’t understand why we couldn’t just write about our critical incident in an essay, plain and simple. However, during the process of making my digital story my feelings completely changed and now I sit here with my digital story complete I can’t think of any better way in which this critical incident could have been told. This story could never have been conveyed in the same way with just the words of an essay (2011-2012 Student 113).

Students felt that the use of multimedia enhanced their stories, adding depth and emotion, and in one student’s words, making her story “multi-dimensional” (2011-2012 Student 33). Many found the multimedia used instrumental in helping to convey the key message of their story:

I was very proud of my digital story. It may not be the best one ever created but it tells the story I wanted to tell how I wanted to tell it. I love my images. I think they stir up a mixture of emotions, sometimes lightening the mood, sometimes driving a point home at the risk of being hard to accept (2011-2012 Student 35).

I also noticed that when I included images and sounds over my narration of the incident, it made the message or lesson all the more poignant and emotional (2011-2012 Student 36).

The images truly reflect my thoughts, sometimes literally and sometimes on a more symbolic level. I find that they tell the story more vividly and bring it to life, which really evokes the emotions I could not express through text alone (2011-2012 Student 57).

Many found that they were able to cut their stories back once they started adding in images, and were able to use imagery to add meaning, or to tell part of their story:

With the incident selected I began to write. This took me a long time and several drafts. I was used to writing essay type reports but not scripts. I had to strip back all the details of the story leaving only the basic facts. I had too many words but I had the opportunity to substitute them with images and sounds. This was a new story telling experience for me (2011-2012 Student 86).

I underestimated the impact the use of still imagery could have on a reflective piece. The phrase ‘a picture paints a thousand words’ is definitely proved true in the case of the digital story. I notice, from both my own story and through looking at work carried out by other student
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teachers, how just one image can reveal so much and/or enhance a seemingly simple phrase (2011-2012 Student 73).

Music was not used by all students in their DSTs. Out of the 162 students who gave permission for their materials to be used for research during the third design iteration thirty students (19%) chose not to include music or sounds in their DST. Those that did use music and sound effects found that they added a great deal to their DSTs by enhancing the emotional content and the mood of the story. Some students commented specifically about the manner in which they used music, and why they chose the music that they did:

The music I chose was music that I liked, but also music that fit into the story. I wanted to start off with something lively like dance or trance music…It’s a hook that reflects me and my overconfidence both in real life and in my story. This is the same overconfidence that led to me not enjoying my teaching and is the beginning of the story. In my opinion, it was key in getting this overconfidence across (2011-2012 Student 16).

Getting the right music was essential in the effectiveness of the story and I eventually decided on a calm acoustic guitar sound in the background of the story. It gave a sense of peace and calm throughout the story but at certain stages the strumming of the guitar strings would become more intense and this connected with my heightened emotions at certain stages such as anger, frustration and shock (2011-2012 Student 3).

I was unsure about adding music, however I did decide to in the end…I am now glad that I included it, as it creates an atmosphere of uncertainty and doubt, something which surrounded me at the time. It helps convey the emotion I was feeling and the thoughts which flooded my mind (2011-2012 Student 57).

8.4.2.7 Use of metaphorical images

Metaphorical imagery was strong in students’ DSTs during the third iteration of the design. Some students explained their use of metaphorical images in their reflective feedback essays, discussing how they felt this implicit imagery added to the depth of meaning in their stories:

…when I mention the impact of what teachers had told me had on me, and looked for images related to “impact” on gettyimages.ie, I found the picture of the boxer getting knocked down extremely powerful. This is exactly how I felt when these incidents took place. I was coming to a foreign environment with my beliefs and ideals, and they were shattered to the ground in one instant. The image expresses this much more strongly than my voice (2011-2012 Student 94).
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...I put a lot of effort into choosing effective images. I wanted images that conveyed a deeper meaning to what was being said. An example of this was the image of the beaten boxer getting advice. The line in the script was ‘I thought back to advice given to me in a lecture’. I initially had an image of a lecture hall filled with students. When I thought about it however, I realised that it was not the lecture that was the important part but the advice given to me in it, so I changed the image where the advice was central (2011-2012 Student 97).

8.4.2.8 Teacher identity creation

There was a great deal of evidence of students’ developing teacher identities in the reflective feedback essays from the third design iteration. Many students discussed how working through their story for the DST helped them to develop as teachers:

Overall, I feel I developed as a teacher during the whole process...the way the process was structured; each stage offered an opportunity to really critically examine myself, my approach to teaching and allowed me to identify areas for change in my actions. Each stage of the process from writing the script, participating in the peer feedback session, finalising the story, recording the voice over and compiling the images, allowed for deep reflection on the incident and enabled me to assess my own attitude and beliefs which was extremely enlightening. As a result of this process I am more self-aware, more confident in my own approach and have a renewed, positive attitude going into my second block of teaching (2011-2012 Student 148).

Several students noted the skills gained from the DST process that they felt would aid them in their careers as teachers:

I see the skills I gained through this process as valuable assets to my future teaching career. I feel my own self-evaluation, analysis and reflection processes were improved upon, as they grew in a new direction when greater insights were gained in relation to the incident (2011-2012 Student 25).

Importantly, many felt that the self-assessment inherent in the process improved their ability as teachers. The DST process caused them to take a closer look at their own actions, which was uncomfortable for some:

I feel that this assignment really made me face up to what I was going through at that time and helped me to realise yet again the type of teacher I want to be in the future. When you are training to be a teacher it is so easy to get bogged down by the challenges but I feel now after reflecting on the situation that I will know exactly how to deal with similar situations in the future (2011-2012 Student 138).

I have already touched on the personal reflection that I experienced thanks to this assignment...Never did I feel like I wasn’t capable to teach nor did I
entertain the idea of leaving the course. I did however feel it absolutely prudent to reassess my approach to teaching and adapt in the necessary ways (2011-2012 Student 141).

Many gained a deeper understanding of their own teaching beliefs and philosophies, especially when they were put to the test during their critical incident:

…the story genuinely made me stop and think about how I want to develop as a teacher; about how I want to always treat every student with the utmost respect and about how I want to continuously work towards motivating each student. The actual incident was simple but taught me so much, not just about the effect of having preconceived ideas and not just about the one student that responded so remarkably to the praise, but it also reminded me that as a teacher I should be working towards ensuring the success of each student (2011-2012 Student 148).

My critical incident forced me to revaluate my views and values. I learned that my values and beliefs about teaching are different to others. Not everyone has the same values and beliefs, and as a result, students have different experiences with different teachers. After my critical incident I thought about how treating students in different ways affects their ability to perform in the classroom. It gave me a lot to reflect on and I found myself thinking that this incident was more than a critical incident for my digital story; it was an incident that helped me to understand teachers and students in different ways (2011-2012 Student 134).

A few students described how struggling with the DST assignment gave them a deeper insight into the struggles of their own students, and a better understanding of the differing abilities in the classroom:

…the most important thing that creating the digital story showed me is that not everybody has the same abilities. For example, I find this part of the assignment easy but the technology part difficult. Others in the PDE were the opposite of me. Some found it all difficult, and the rest found the whole assignment easy to do. It made me realise that when I am teaching my classes, just because the topic is easy to me and I understand, it does not mean that my students do. Furthermore, if it is evident that some students in my classes are grasping a topic well, this does not mean that everybody in the class is at the same level. Creating this digital story showed me how it feels to be ‘learning’ again (2011-2012 Student 15).

Many who were unsure of their abilities as a teacher during their first teaching block felt that the DST process gave them confidence, through reflecting on their own actions, in their ability to teach successfully:

It was very helpful to get the chance to reflect on an issue I had in school. It gave me the opportunity to think about it properly and look at how I would approach the topic in the future. Looking back on how I dealt with
the problem has also given me confidence to tackle more behavioural issues in the second block of Teaching Practice (2011-2012 Student 137).

The digital story has also made me reflect more deeply on that incident. On teaching practice I hadn’t really got a chance to reflect on it. Once it was over it was just something that I had taken for granted and hadn’t thought again about how worried I had been. Having been given the chance to reflect on it again properly I realise what a big step it was for me. It improved my belief in myself and made me much more confident on entering a classroom and with dealing with new classes (2011-2012 Student 29).

Others felt that the DST process helped them to see better their own developing teacher identity:

The critical incident that I have investigated for purposes of this assignment is one which dramatically influenced and altered my thinking, methods and reasoning towards a career in teaching. This incident in particular has also changed my own perception of the teacher that I aspire to become (2011-2012 Student 116).

I feel this assignment allowed me to be actively involved in my learning which I believe is crucial in education. I am now more aware of myself and my behaviour. I feel I have a greater understanding of who I am as a teacher, what I stand for and believe in as a teacher (2011-2012 Student 136).

8.4.3 Engagement

…it was a project I got engaged in and had great motivation and enjoyment in completing. My digital story has a lot less words than it would, say, if I typed up an essay, but is was way more impactful in its message and on the person who produced it (2011-2012 Student 46).

8.4.3.1 Evidence of engagement in questionnaire results

Evidence from the post DST questionnaire in the third iteration of the design showed high levels of engagement and motivation by the students in the DST process. As in the second year of the design, raw scores for engagement and intrinsic motivation were re-coded in SPSS to obtain scores of High, Medium or Low in these areas. The resulting scores can be seen in Figures 8.13 and 8.14.
Students were asked what they liked most about the digital storytelling process in an effort to ascertain what parts of the process engaged them more fully. Students’ open-ended responses were imported into MS Excel where they were analysed and coded. Some students gave more than one answer. Figure 8.15 shows student responses to this question.
Figure 8.15: 2011-2012 what students liked most about the DST process

Students enjoyed choosing images the most, followed by gaining ICT skills and the deeper reflection afforded by the DST process. These results are similar to student responses from the second design iteration. Alternative assessment was also mentioned by students as one of the things they liked most about the DST process. On a separate statement on the questionnaire, nineteen out of twenty-five students agreed that they enjoyed completing a different type of assignment (Figure 8.16), which suggests that this aspect of the DST process in itself is engaging for the students.
This sentiment was confirmed in the students’ reflective feedback essays, with several noting that they enjoyed the chance to complete a different type of reflective assignment. A few students even took this thought a step further, and related it to the types of assessment they could use in their own classrooms, showing a connection of their experiences with the DST to educational theory:

I feel strongly that these kinds of assignments should be incorporated more into teaching and learning. I would wholeheartedly welcome more use of media as an assessment tool. As a trainee teacher, the end process of this film illustrated to me how easy and enjoyable it is to learn through ICT. Indeed, we are encouraged to use visual, auditory and kinaesthetic methods in our teaching to encourage inclusivity in our classrooms, and to promote our students’ creativity. This assignment showed me how easy it would be to undertake an assignment of this kind with my students (2011-2012 Student 2).

Students responded very positively on the questionnaire regarding how they felt about the DST process overall. Student responses to this open ended question were re-coded in SPSS as being positive, negative or neutral. The results of this analysis can be seen in Figure 8.17.
Figure 8.17: Students’ overall feelings about the DST project, design three

One student who answered positively about the DST process overall stated,

A great change from other assignments, fresh and interesting and allowed me to use my creativity, which isn’t something I had an opportunity to do very often during the course of the PDE (Q 29, Student 16).

Many found the process difficult, but worthwhile. The majority of the positive statements followed along the lines of the comment made by another student, who stated, “It was daunting at the beginning but overall I really enjoyed it and would consider using it again in the future” (Q 29, Student 12).

In the reflective feedback essays, many students discussed how much they enjoyed the process of creating their DST and felt that they benefitted greatly from it:

On completion of the assignment I can say without hesitation it has been the most enjoyable and beneficial project I have ever completed. I believe that it not only improved my ICT skills but also gave me the chance to be reflective at a deeper level….Completing this assignment really gave me a sense of accomplishment and made me excited to learn. It is the first time that I have really stood up after doing an assignment and said I am proud of what I achieved and I’m happy to be able to say it (2011-2012 Student 138).

I found the entire process both fun and a brilliant way to explain all the emotions and feelings that I had after my first teaching practice session (2011-2012 Student 140).
Overwhelmingly, students were extremely proud of the DST that they created. After all the time and effort they had put into their DST, many were happy to share with their peers, friends and family:

I am delighted with my digital story and very proud of it. I have never been prouder of an assignment before this one. The sense of real achievement in completing this project is overwhelming and it is the first assignment I have shown to my family. Every time I watch it I learn something more which makes me think about the incident in a new light. The incident with this student really did change my thinking about teaching and how I teach and it feels really good to have a project which both vocalises and visually portrays my experiences and feelings, which I can share with others (2011-2012 Student 113).

8.4.3.1.1 Creativity

Digital Storytelling produces a more creative way of expression, and it was this creative element that I enjoyed the most (2011-2012 Student 39).

Students were engaged by the creative aspects of the DST process. Many students who described themselves as creative people noted the stifling of creativity inherent in written reflections, and relished the chance to show off their creative sides with this project:

I am a very creative person and was really looking forward to starting this project. It was a way of expressing my experiences in an original format, unlike any other project I have completed for academic purposes… As a creative person, I relished the opportunity to produce the film… (2011-2012 Student 125)

Not only have I improved my IT skills but I have also had the chance to show the creative flare that lies within me… I would not have been able to display these talents in a written exam or worse again a written weekly reflection due to the restrictions that surrounds these types of assessment! (2011-2012 Student 153)

Students who did not feel they were very creative people were engaged by the creativity of the process as well, and many were surprised by their hidden creative potential:

I am not artistic and was never good at design so I thought that creative work would not suit me. However, I found I really enjoyed the process. Matching effects and transitions to the pictures and the script was exciting. I was surprised at how much I thought outside the box while making the movie (2011-2012 Student 2).

Once I got used to it, I enjoyed being able to express myself with images and sound, as well as text and, although the project was unusual, it was a
welcome change. I never realised I could be as creative as I came up with metaphorical images and themes (2011-2012 Student 149).

Several pointed out the link between completing an assignment creatively and the creativity needed by teachers in their own classrooms:

As teachers we need to be creative and I feel that this assignment encourages the type of creativity needed to design effective and exciting lesson plans as well as giving alternative ideas for formative and summative assessment (2011-2012 Student 138).

The creation of the digital story, in my view, appeals to the creative side of individuals. As teachers we will need the key to unlock our creative sides and I think that this digital story will benefit us in this regard (2011-2012 Student 49).

8.4.3.1.2 Time spent

In the third iteration of the design, students reported spending an average of 30 hours on the creation of their DSTs. The breakdown of these hours can be seen in Figure 8.18.

![Figure 8.18: 2011-2012 time spent on DST creation](image)

The chart shows that many aspects of the DST process only took students 1-2 hours (red sections on the chart). The aspects of the process that were
more time consuming were script writing, sourcing images and using the video editing software to compile the final DST.

Evidence from the students’ reflective feedback essays showed a great deal of engagement, through time spent on the DST process. Many students remarked that even though the process was time consuming, and at times difficult, they enjoyed it:

When I first heard about the digital story assignment two thoughts came into my head. Firstly I thought that I would never be able to do this and secondly I thought that it would just take up a load of my time. I was only right about my second thought, however it was not in the painful way I had assumed it would be. I actually found the making of the digital story to be quite a therapeutic experience, and although it was quite time consuming I enjoyed the time that I spent doing it (2011-2012 Student 105).

As I got into the project and understood what I had to do and learned how to do it I really enjoyed the process and I never had experienced any feelings of dread when approaching the project, sometimes experienced with other assignments. It was a time consuming process however, I didn’t find this to be a negative. I formed such a strong connection with the project that I wanted to put in the time in order to make it the best I could (2011-2012 Student 113).

Students used terms such as “challenging and rewarding” (2011-2012 Student 106), “interesting and engaging” (2011-2012 Student 107) and “stimulating and gratifying” (2011-2012 Student 125) to describe the process. For those students who took a while to warm to the project, many ended up getting a great deal from it:

…I was starting to really enjoy working on my digital story. In the space of a few days I had changed my opinion on this assignment. It was no longer a tick the box exercise. I was constantly thinking and analysing how I could really transmit the core meaning of the incident (2011-2012 Student 103).

I began to put more of it together and dare I admit it I actually began to enjoy the process. As the whole digital story began to come together I found myself showing it to various people and they were even surprised to see me engaging so enthusiastically with it as they had seen how concerned and annoyed I was with it initially (2011-2012 Student 130).

Many students discussed the fact that they lost track of time working on the DST, and cared a great deal about the final product, further indication of engagement with the process (Csikszentmihalyi, 1991):

Throughout the process of making the digital story I was constantly being surprised. I thought that sourcing my images would be an insanely
difficult task and that I would not be able to find enough to cover the story. However this was surprise number one. I ended up with much more than enough images to use in my story and the real task was trying to pick which images were the best to use. I found myself being a perfectionist that I would never have classed myself as before (2011-2012 Student 105).

Indeed images were a key part of the process for me. I put a lot of time and effort into the selection of the images that I wanted to include. I was surprised at how almost ‘protective’ I was becoming of my digital story. It wasn’t a case of just getting it finished; I wanted the images to communicate my thinking and reflection. I had high standards, and found myself genuinely excited when I at last found an image that I was pleased with, thinking to myself ‘Yes, that’s exactly what I want it to look like’ (2011-2012 Student 132).

Many students expressed surprise at the depth of attachment they felt toward their DSTs, evidencing further significant engagement in the process:

It is very hard to remain objective when you spend a long time working on any project. This is even truer of a project such as this which deals primarily with your emotions and focuses on an extremely personal account of an incident that happened during such an important time in your life. It becomes your little baby and it is difficult divorce yourself from this attachment and look at it critically. I am very proud of my digital story (2011-2012 Student 151).

After editing my voiceover, I saved it and a couple of days later bits of it were missing…I was aghast, I had lost a couple of hours work…I could not leave this lie into the morning. I had to deal with it now. There and then I reedited an old version. What had taken me four hours to do a couple of days ago just took me just under two hours but this gave me a fright. It was two o’clock in the morning! It was then I realised I was getting passionate about my work and emotionally involved in the project (2011-2012 Student 46).

8.4.3.2 Disengagement

In an effort to pinpoint areas of the DST process that might disengage students, they were asked on the survey what they liked least about the digital storytelling process. Students’ open-ended responses were imported into MS Excel where they were analysed and coded. Figure 8.19 shows the results of this analysis.
Two students liked everything about the process. Their responses are indicated by the red bar on the chart. Many students felt that the reflective feedback essay about the DST process was unnecessary, one student’s comment simply being, “Doing a reflection on a reflection!!” (Q3, Student 9). While this can seem repetitive to some students, the researcher found a great deal of evidence of deeper reflection in many students’ reflective essays than was evident in their digital stories, and therefore would not consider removing this part of the DST process. As discussed in Chapter 6, Gravestock and Jenkins (2009) suggest the use of additional evidence outlining the steps taken to create the digital story to show evidence of deeper learning. They feel that “… it may be possible for a student to engage in quite high levels of learning and reflection…but for this not to be manifest within the final digital story” (p. 269). The researcher agrees with, and posits that this research supports, their findings.
Others noted that the process was very time consuming. Third highest on the list was the feeling that there were not enough marks given to the project, considering the amount of time that went into it. Significantly absent from this year’s list was the timing of the project, noted by several students the previous year, which suggests that implementing the DST project at the beginning of the year, immediately after the first teaching block, was a successful change to the design.

Student comments in the reflective feedback essays were very similar to the questionnaire results when it came to possible disengagement with the DST process. Technical difficulties were high on the list of causes of student frustration, which will be discussed further in section 8.4.5.2. However, while many students noted that they were frustrated ‘at times’ by the process, most were not discouraged by this and persevered with the project. In the end, nearly all were very proud of their finished DSTs, and had very positive things to say about the benefits of completing the project.

Several students stated that at the beginning of the DST process, they could not see the relevance of the DST project to their learning about becoming a secondary school teacher, and several mentioned that they complained bitterly about having to complete one. However, by the end of the process most of these students had come around to a completely different attitude towards their DST assignment:

I must admit that this was a process that I was quite sceptical about to begin with. I understood the idea of it being a reflective exercise and the benefits of reflective work, but I struggled to understand why we had to create a digital story. Would learning how to use these computer programmes really ever stand to me? After all, I am no Spielberg! Would I not have to spend a lot of time and energy completing my movie, time and energy I do not have? Would it not be easier and a quicker process for everyone if we just had to write an essay? ... I think I can confidently say that I was completely wrong! Yes, it took time to complete, but never have I reflected so deeply on an issue before (2011-2012 Student 23).

In analysing students’ overall feelings about the DST process, only four students’ essays were coded as “Final feelings negative toward DST”.

Reasons given by these students for their negative feelings were that it was too time consuming (2011-2012 Student 21), the ICT level was too difficult
(2011-2012 Student 100), one would have preferred to complete an essay (2011-2012 Student 24), and another felt there were not enough marks awarded for the time spent on the project (2011-2012 Student 32). All four did say that they enjoyed parts of the process, but their overall feelings toward the assignment were negative in the end.

### 8.4.4 Sociality

I also feel the peer influence on the preparation of the digital story was very important, from feedback on the critical incident to the storyboard, and indeed the final product. It is one of the best features of the course that pre-service teachers share experiences and provide feedback and support to one another. I particularly enjoyed sharing ideas and listening and learning from my peers while completing my digital story (2011-2012 Student 64).

#### 8.4.4.1 Peer feedback

Students were asked on the questionnaire if they participated in the story circle activity. Their responses can be seen in Figure 8.20.

![Figure 8.20: Percent of students who participated in the story circle activity, design three](image)

Of the 25 students who completed the questionnaire, 88% said that they did participate in the story circle activity. Of the two students who did not participate, one did not feel comfortable sharing with strangers, and the other did not have their story ready in time. These answers were comparable with those given by students in the second year of the design.
Figure 8.21 shows student responses to the question regarding the helpfulness of their peers’ feedback during the story circle process.

![Pie chart showing student responses](chart.png)

**Figure 8.21: 2011-0212 Questionnaire responses regarding peer feedback during the story circle activity**

Sixty percent of the students felt the story circle session was helpful, while 32% did not agree with this statement. When asked why they felt it was or was not helpful, those that answered in the negative said that they felt their peers were not prepared for the session, or were not comfortable critiquing each other’s work. One student stated, “Most of the students I participated with had done little or no preparation for the session” (Q 31, Student 8). Those that found it helpful felt that they received very good feedback and guidance with their story development. One student stated, “I was a bit unsure about the story I picked until the feedback class” (Q 31, Student 22), while another said, “Everyone was so supportive and offered constructive criticism” (Q 31, Student 6).

Student comments in the reflective feedback essays regarding the story circle activity were overwhelmingly positive. Nearly all felt that it was a beneficial process where they received helpful feedback from their peers:

> I felt that sharing my draft story with others in the class was really helpful. It created a space where I could express my most personal feelings and doubts. I got really good feedback from my peers in the class who listened, asked questions and gave advice. My peers had a chance to listen
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and empathise with my story. It created a healthy dialogue and gave me a new insight into my story (2011-2012 Student 71).

Nearly all the students who commented on the story circle process stated that they were able to incorporate aspects of the peer feedback into their story, and many were appreciative of the alternative perspectives provided by their peers:

In one of our Education Technology classes, we gave and received feedback on each other’s draft stories. I found this very useful as I could give constructive advice to others and also benefit from their interpretation of my story. Gaps in the outcome of the story which one student found in the ending helped me to rethink the story arc and the overall message I wanted to convey (2011-2012 Student 75).

…I was able to get a few ideas from different perspectives to improve the draft and also give ideas to other people. I found this helpful as I was able to look at my story from different views as opposed to the one line of thought I had had when I first started writing it (2011-2012 Student 84).

Many students commented on learning from each other’s critical incidents, and felt there were benefits in both giving and receiving feedback.

A few students mentioned their reluctance to share their story with their peers before the story circle activity. They felt exposed at having to discuss an incident from their teaching practice that might not put them in the best light. However, all of these students reported getting something positive out of the experience, and they did not feel it turned out to be as bad as they feared it would be:

I felt very vulnerable at the start of the process as it is a very personal situation to speak about. Sometimes as a student teacher I can feel embarrassed if something does not go as planned in the classroom, but this process has taught me that it is ok to make mistakes and that they will only improve if I talk about them and reflect on why it happened (2011-2012 Student 27).

I was very nervous about other people reading my story and giving feedback. I was not used to ‘peer assessment’ and having to receive feedback… Reading other peoples stories gives me more confidence in my ability. It helped me see ideas for improving my own story. At the end of the class I felt the experience had more positive than negative aspects (2011-2012 Student 7).


8.4.4.2 Peer support

Working together during the story circle to flesh out their story drafts opened the way to many students for further collaboration with their peers. Some, who would not ordinarily look to other students for help, sought out support from their peers after the story circle process:

With my story drafted, I now needed to condense the content. The ‘peer assessment’ in class gave me confidence to use my fellow PDE class to continually provide feedback on my numerous drafts of the story (2011-2012 Student 7).

I often asked other students who were working on their digital story for help in the process. Similarly they asked me for advice. A sense of community developed as we discussed our own critical incident freely to one another. Before this I would not talk about issues or I would be too embarrassed to do so (2011-2012 Student 133).

Many students noted the sense of community that developed between students as they worked on their DSTs in the computer labs together. Students most often sought support from each other when they were having technical difficulties, but many also reported getting help from their peers on their developing story drafts:

Even though it was an individual project I found it to be a collaborative process. Ideas were shared and confided with fellow PDE students, as we all tried to rationalise our story choice to a wider audience, trying your hardest to convey what it meant to you. I found this to be a great support during the editing and development of the story (2011-2012 Student 144).

Some students reported pairing up with a fellow classmate to help each other through the DST process:

A friend and I decided to give a whole day to the digital story…This was not a fun day. It was a very tedious process, which involved close attention to detail and also patience as sometimes something was deleted accidentally and the whole thing had to be started over. However, as the day went on, it got easier and easier. I found that I was able to help my friend with hers as I learned from the mistakes which I had made (2011-2012 Student 145).

…my friend and I, who is also in the PDE, peer assessed each other’s product using the digital story assessment rubric. We graded the products using the rubric for assessment…I found this to be extremely beneficial as we both graded each other’s digital stories, this allowed us to pinpoint areas that we could improve on and allowed us to highlight points that we may not have included to accomplish the optimum grade (2011-2012 Student 42).
A few students noted that they would not have been able to complete their DST successfully without the support of their peers, and were therefore very grateful that collaboration was encouraged throughout the DST process.

8.4.4.3 Sharing of finished DSTs in class

In discussing the depth of reflection experienced by teachers participating in a DST workshop, Lambert (2009) states, “When stories are completed in an environment of shared reflection, they can inspire and lead to more in-depth reflections by the storyteller’s peers” (p. 101). Due to the restructuring of the timing of the DST unit in the academic calendar, students finally had a chance to share their completed DSTs with each other in Ed Tech class during the third iteration of the design.

Figures 8.22 to 8.24 show the questionnaire results dealing with students sharing their finished DSTs with each other.

Figure 8.22: Percent of 2011-2012 questionnaire respondents who shared their finished DST in class with their peers

Almost half of the students who participated in the questionnaire did not share their completed DST in class with their peers. Figure 8.23 shows student responses as to why they did or did not share their completed DSTs in class. Reasons for sharing are shown in blue, and reasons for not sharing are shown in red.
Those who did share their DSTs with their peers were eager to receive feedback, or to learn from others’ DSTs. The majority of those who did not share were too embarrassed, or felt their DST was too personal to show others. Student 8 stated, “I was a bit afraid that people might laugh!!”, and another student said, “I felt too embarrassed, even though I thought it was good” (Q23, Student 16).

For those who did share their digital stories in class, all but one commented positively about the experience. Most enjoyed receiving positive feedback from their peers and many felt their confidence was boosted by this feedback. Many felt that they learned from watching others’ experiences. However, one student, whose response was coded by the researcher as ‘mistrusted feedback’ stated, “I felt classmates were making up comments for the sake of it” (Q 24, Student 21).

Figure 8.23: 2011-2012 reasons for not sharing completed DST in class

![Chart showing reasons for not sharing DST in class]

- embarassed/too personal
- wanted to learn from others
- wanted peer feedback
- had other work to do
- forgot to bring it in

Count

(N=16)
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Figure 8.24: 2011-2012 responses regarding what students got from sharing their finished DST in class

At the time of writing the peer feedback essays for submission with the DST assignment, students had not had a chance to share their completed DSTs with each other yet. However, some did comment about the possibility of sharing their completed DSTs with their peers at this time. Many were looking forward to the opportunity to share and see what their peers had created, and to learn from each other’s stories:

I am looking forward to sharing my digital story with my fellow student teachers, and seeing how they portrayed their own critical incidents. Although I wasn’t taken by the idea at the start, I believe that this will prove to be a hugely beneficial experience. We can learn so much from engaging and sharing with our peers. By learning from these stories, we can prepare for different circumstances and become better professionals (2011-2012 Student 124).

After viewing the final product, I can see how these digital stories can be useful during teaching practice. We are encouraged to become reflective practitioners and this is an exciting way to portray a trainee teacher’s thoughts and problems. These digital stories can provide practical solutions to common problems or simply show that we are all in the same boat. Because of this, I have no doubt that our digital story sharing session will be of benefit to all the students in our Education Technology class. I learnt something from this event and I will surely learn from others experiences (2011-2012 Student 6).

Many students who had watched and learned from the sample DSTs made available to them at the beginning of the process, were aware of the potential for future PDE students watching their DSTs. They were happy to
share their stories with future student teachers in the hope that they would learn from their stories, too:

Above all, I hope that...other student teachers can learn from the experience that I have portrayed in this Digital Story... I feel that a lot of other student teachers can relate to this experience and I hope that my reflection and learning can, in turn, trigger some learning for them and give them 'food for thought'. I enjoyed watching the sample Digital Stories from previous years and many images and ideas about teaching and dealing with difficult situations from these stories have stuck in my mind. Therefore, I look forward to watching the Digital Stories from my class and sharing our learning together (2011-2012 Student 149).

A few students were hesitant to share, embarrassed by their critical incident and worried about what their peers might think about them after seeing their story. However these students, too, felt there was something to be gained from the sharing process:

I have to admit, this assignment initially made me very nervous. The thought of sharing a personal story with my classmates did not sit well, and that fact that I would have to record my own voice telling the story just added to that fact. It is one thing I felt to share such stories with the education school staff, whose job it is to objectively assess these offerings, quite another to put it out there for classmates to look at…. This format, I feel, narrows the gap between author and viewer, making it all the more difficult to share the story. I overcame these anxieties in the end by reasoning that since everyone was in the same boat, they would probably be less judgemental, having gone through the same process (2011-2012 Student 24).

It is important to note that none of the students were forced to share their story if they did not feel comfortable doing so. There were no more absences than usual in the Ed Tech DST sharing classes, so it seemed that most students were comfortable attending class that week and sharing their completed DSTs (Long, 2012). One student approached the researcher before class and asked to be excused from the activity, which she was. She was encouraged to stay and view other students’ DSTs, but did not have to share her own. Other than the one student though, no one else asked to be excused from the activity.

8.4.4.4 Sharing of finished DSTs on class website

The private class website was set up for students to share their finished digital stories with each other for the third iteration of the design. There
was no mention of the DST sharing website in the students’ reflective feedback essays. (The DSTs were not put up on the website until after the projects were submitted.)

Ninety-six out of the 197 students (49%) who completed a DST gave permission for it to be put up on the private class website (http://nuigpde-digitalstories.phanfare.com) in order to share it with their classmates. Of the students who completed the questionnaire, only 40% said they shared their completed DST on the class website (Figure 8.25).

Figure 8.25: 2011-2012 percentages of students who said they shared their DST on the class website

Students were asked on the questionnaire why they did or did not share their completed DST on the class website. Those that did share wanted to learn from others’ DSTs. While those who did not share felt their DST was too personal or too embarrassing to share. Two students forgot the opportunity to share was available.

On the questionnaire, students were asked what they got from the experience of sharing their DST on the class website. Twenty-one students did not answer this question. Those that did answer the question stated that they wanted to learn from others, and that it was good to see that others had experienced similar incidents to themselves.
8.4.4.5 Scaffolding and support

In an effort to find out what students found most helpful when completing their DST, students were asked an open ended question on the questionnaire regarding this topic. Some students mentioned more than one thing as being helpful. Students’ open-ended responses were imported into MS Excel where they were analysed and coded. The results of this analysis can be seen in Figure 8.26.

![Figure 8.26: 2011-2012 What students found most helpful in the DST process](image)

Students found the handouts and Ed Tech classes most helpful, followed by tutor assistance and the resources provided on Blackboard. Some of their comments were: “Bonnie has presented each step in a logical manner, she made what should have been a difficult process relatively easy!!” (Q4, Student 6) and, “The Ed Tech classes were very helpful, the list of websites such as gettyimages.ie, etc., made the process easier” (Q4, Student 9). Students also mentioned the help they received from their peers as important, with one student noting, “The students in class that were very computer literate were able to help the students not as capable” (Q4, Student 20).
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8.4.4.5.1 Handouts helpful

Student comments in the reflective feedback essays regarding the handouts provided on the DST process were 100% positive. All who commented on the step-by-step handouts found them very helpful, and many noted that they would have been lost without them, especially when using WMM or Audacity on their own. Students noted that having the notes at hand gave them confidence to work on their own without tutor assistance. This is consistent with Tharp and Gallimore’s (1988) Stage II of the Zone of Proximal Development, where performance is assisted by the self with the aid of scaffolding.

Even some of the students who considered themselves complete ICT beginners found they were able to use the software successfully with the use of the handouts as a guide:

We were given handouts on each section; creating practice folders, sourcing images, sequencing elements in the storyboard, editing music files, script writing and recording your voiceover. Each of these sections was broken down into a step-by-step process making it accessible to all, even me! (2011-2012 Student 19)

The step by step guides we were given regarding MS Audacity and MS Movie Maker were fantastic and could be followed easily by a complete beginner (2011-2012 Student 87).

8.4.4.5.2 Ed Tech classes

The Ed Tech class structure and step-by-step process was mentioned by several students in the questionnaire as helping them to successfully complete their DST. Students also mentioned this in their reflective feedback essays. They found the class structure helpful in building their understanding of both the DST process and the technology skills involved. Many noted that the step-by-step design of the classes helped to alleviate their initial fear of the project:

When I saw the schedule of classes for the digital story which would allow for a slow building up of the skills needed for the production, I began to become more reassured. With these little steps week by week, it was not as daunting a proposition as before (2011-2012 Student 10).

With regard to the processes involved in undertaking and creating the digital story, I was at first bombarded with software names such as
‘Audacity’ that I had never heard of before. This created an instant fear. This fear was short-lived; the Educational Technology class guided us through every step of the way. There was ample support from the staff and invariably the task did not seem as monumental as it had first sounded (2011-2012 Student 102).

While most students found the Ed Tech classes very helpful and easy to follow, there were a couple who mentioned getting lost in class due to their machines freezing, and then not being able to catch up with the class. Only one student mentioned that she felt the classes were too rushed, and thought more classes were needed on the different software packages used. For the most part, students felt that the handouts were sufficient in helping them understand the process when they got lost in class, and most mentioned that help was readily available outside of class when they asked for it:

During the educational technology classes, I learnt a great deal about the processes involved in making the digital story. In each class, the individual aspects were broken down and explained in great detail. Although I was a complete novice, after each of the lessons relating to the digital story, my confidence grew and I thought that maybe I could achieve the goal of creating the video. I think that the help from the tutors were invaluable in helping me to get rid of my fears (2011-2012 Student 49).

8.4.4.5.3 Tutor support

Many students mentioned tutor support on the questionnaire as helping them to successfully complete their DST, as shown in Figure 8.26 above. Tutor support came up quite often in the reflective feedback essays as well. Students felt that there was ample support available, both during Ed Tech classes and outside of classes when needed:

There was plenty help available from the tutor in educational technology and was always available for questions at any time which eased the pressure when completing this project (2011-2012 Student 104).

There were times when I found it challenging, but I used the support that was readily available from Bonnie Long and with some much appreciated guidance and assistance, I completed my digital story and I am very pleased with the outcome (2011-2012 Student 148).

Some students mentioned receiving help with the editing of their story, but most students mentioned needing support with Audacity and WMM, as most had not used this type of software before. None of the students
mentioned not being able to get help when they needed it, but there were those who did not seek help.

Several students mentioned that the support they received from the tutors gave them the confidence to complete their DST successfully:

I felt a huge sense of pride achieving this project, as I always have stayed far away from technology type projects. I never had the confidence to start IT project from scratch and actually accomplish it on my own and see it through to the end. I had shadows of doubt about actually been able to carry out this project but with the encouragement and reassurance from my lecturer and my peer’s I gained confidence to do this project. I think everyone needs support and positive reinforcement. I won’t in future be shying away from technology (2011-2012 Student 96).

This has been a great learning experience for me. I really enjoyed making this digital story. I have always felt that me and technology have never really worked well together. However, after great guidance this digital story has worked out well and I am more confident using technology now (2011-2012 Student 5).

### 8.4.5 Technology

#### 8.4.5.1 ICT skills gained

Dealing with the technology side of creating their DST was easy for many students, but a cause of frustration for others. When asked on the questionnaire what they liked least about the process (Figure 8.19 above), one student mentioned Windows Movie Maker (WMM) and two students mentioned Audacity. However, when asked what they liked most about the process (Figure 8.15 above), the ICT skills gained by completing a DST was the second most common answer. In the reflective feedback essays, students’ positive comments regarding the ICT skills they gained during the creation of their DSTs far outweighed the negative comments regarding the technical difficulties experienced by some. While described as a challenge by many of the students, most reported that they were successful in the completion of their DST with assistance from peers and tutors.

#### 8.4.5.2 Technical difficulties

On the whole, students were much more positive about the technology used during the third iteration of the design than in the second design iteration. Students reported fewer problems with file management and saving issues
than in the previous year. Changes made to the design along these lines did make a positive difference to students’ experiences with the DST technology. However, there were still a few students who encountered difficulties with the technology.

Students who completed the questionnaire all considered themselves as either intermediate or advanced computer users, as shown in Figure 8.27.

![2011-2012 Skill as a Computer User](image)

Figure 8.27: 2011-2012 Questionnaire results regarding self-reported skill as computer user

However, some of these intermediate and advanced computer users reported struggling with the technology. Figure 8.28 shows the students’ perceptions of the ease of use for the video and audio editing software used.
Of the questionnaire participants, twenty-four reported using WMM, while one used different video editing software, which they did not name. Twenty-four of the questionnaire participants used Audacity to edit their voiceovers. One student reported not using audio editing software at all. When asked on the questionnaire how easy they thought the video or audio editing software was to use, most thought they were ‘easy’ to ‘very easy’ to use. However, several did not feel the software was easy to use.

Crosstabulations were run in SPSS comparing students’ perception of ease of use of the video and audio editing software used with their self-reported skill as a computer user. The results of this can be seen in Figures 8.29 and 8.30.
Most of the advanced users found the video editing software ‘very easy’ to ‘easy’ to use, while one found it very difficult to use. A high number of intermediate level computer users did not find the software easy to use. Similar results are found for the audio editing software used, with intermediate and advanced computer users finding the software difficult to use.

Figure 8.29: 2011-2012 Crosstabulation of ease of use video editing software * skill as a computer user

Figure 8.30: 2011-2012 Crosstabulation of ease of use audio editing software * skill as a computer user
This could be the result of students over-estimating their own level of computer skill, and then struggling with a new kind of software application. Most had never used audio or video editing software before. While considering their skills intermediate or advanced in using day-to-day word processing and Internet applications, audio and video editing software was new to them, and possibly not as easy to use as they were accustomed to. The researcher’s hypothesis regarding this was further supported by comments made by some students in their reflective feedback essays, such as the following:

> Overall, I found making the digital story difficult. Naively, I believed I had enough computer skills to get me through and underestimated how much time I would need to complete the project. I found that I spent a great deal of time trying to find my way around the different applications and this slowed my progress greatly (2011-2012 Student 41).

### 8.4.5.3 Software

Students’ comments on the use of WMM and Audacity in their reflective feedback essays were mostly positive. Many remarked on their initial fear of using this unfamiliar technology, but most commented that it turned out to be easier than expected. Several self-proclaimed technophobes even commented on the ease of use of the unfamiliar software:

> By the time I was ready to tackle the voiceover, I actually had a very uncomfortable night’s sleep at the thought of it – ridiculous I know. I think I had myself convinced that I wouldn’t be able to operate the technology. When I saw how easy it was, the voice recording aspect went very smoothly… I found audacity and windows movie maker very easy to use once I relaxed into the process. I was starting to realise I tend to panic a little at the thought of using new technology until I actually get down to it (2011-2012 Student 98).

As mentioned in section 8.4.4.5.1, many students found the step-by-step handouts for using the software very helpful, and for most, these allowed them to use the software successfully:

> This was my first time being introduced to Audacity and Windows movie maker programmes and at first I was terrified at the thought of even double-clicking the icon buttons, but to my amazement and the excellent lecture notes given to us by the lecturer, they were actually easy to use (2011-2012 Student 96).
8.4.5.3.1 Audacity

Students had several alternative methods available to choose from when it came to recording the voiceover for their DST. Sign-up sheets were posted for students to check out the digital recorder, microphones or to record in the ‘dark room’ on campus. Table 8.5 shows how many students signed up to record using each method.

### Table 8.5: 2011-2012 Student sign-up numbers for recording options

<table>
<thead>
<tr>
<th>Recording Method</th>
<th>No. of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital recorder</td>
<td>34</td>
</tr>
<tr>
<td>Recording on campus</td>
<td>100</td>
</tr>
<tr>
<td>PC Microphone</td>
<td>20</td>
</tr>
</tbody>
</table>

A few students commented on recording at home in their reflective feedback essays. Some found this easier than recording on campus as they lived quite a distance from the university. Others commented that it was more comfortable to record at home than on campus. However, the downsides to recording at home reported were interruptions from family members, stormy weather being picked up by the microphone, and not having support available when they encountered difficulties. Those students who recorded on campus also found background noise to be a problem. There were two rooms designated for voiceover recording, both located in busy campus buildings. The ‘dark room’ did not turn out to be as optimal a place to record as we had hoped it would be, as students reported a great deal of noise, such as people talking and the sound of loud footsteps from outside the room, being picked up by the microphone. Other noise interference reported by students were the wind and rain, ubiquitous in the Irish winter, as well as noise from construction work being completed nearby.

Surprisingly, students who reported the least amount of trouble recording were the ones who recorded in their car, using either the digital recorder checked out from the School of Education, or their own smartphone.

Students did not report the same level of problems in their reflective feedback essays when it came to editing their voiceovers in Audacity, as did students the previous year. Two students mentioned having trouble saving
their files, and three had trouble with the computer crashing while editing. Most reported that they found Audacity easy to use while editing their voiceover, many stating that it was much easier than expected. Students commented that they found Audacity ‘user friendly’ and ‘straightforward’. Where students did report trouble was when they tried to add music to the voiceover to create a soundtrack. While most were successful doing this, and many enjoyed it a great deal, it did cause a good deal of frustration for some:

The next part of the process I found to be very tedious and didn’t realise how hard it would be until I started looking for background music. I firstly spent ages searching for the music and then trying to get it to marry with the voiceover was painstakingly tedious. I found it very difficult to get all the sounds properly aligned with the voiceover and simple things like the right volume were hard enough to achieve. This got on my nerves a bit and I often got frustrated with audacity and its workings (2011-2012 Student 49).

Frustrations aside, nearly all students found that with the classes and step-by-step handouts, they were able to incorporate successfully music and sounds into their voiceover to create a soundtrack:

Again it was tedious trying to get the music to gel with the sound recording. When the sounds were finished, I could not help but marvel at my handy work, it sounded really good, I almost could not believe that I had done it myself. My ICT Skills were greatly improved by doing this, and I feel that these skills will help me when I am teaching (2011-2012 Student 145).

8.4.5.3.2 Windows Movie Maker (WMM)

Students’ comments in the reflective feedback essays regarding WMM were very positive. Many students used terms like ‘fun’, ‘enjoyable’, ‘user-friendly’ and ‘straightforward’ to describe WMM. While most found it very time consuming aligning the images with the voiceover, the majority found the programme very easy to use:

When it came down to it, tying everything together was surprisingly easy. Granted it took most of the day to finish things to my satisfaction and I found myself having to find a few extra pictures but overall, it was the simplest part of the process. Looking at the finished product I’m completely amazed by how cool it looks. No-one looking at it would think its creator spent approximately fifty seven percent of the time freaking out! (2011-2012 Student 53)
Overall, I enjoyed this part of the process. It did take a long time to complete but I put that down to the fact that I am a bit of a perfectionist. Trying out different transitions and effects was fun and when the process was complete I felt an overwhelming sense of achievement. I wanted to show everyone the completed project (2011-2012 Student 6).

Several commented that as long as they followed the handouts, they did not encounter any difficulty. All in all, troubles encountered by students during the third iteration of the design consisted of crashing/freezing and saving issues. When they did not save often, the programme usually froze when they did try to save. Many remedied this problem themselves by remembering to save after every action, as they had been encouraged to do. Computers crashing due to lack of hard drive space arose when students were using the lab computers, as several ended up not requesting additional user-drive space in time, but most reported that these issues did not arise when they worked on their own PCs and laptops at home. Only one student reported losing files due to moving them after importing them into WMM. It would seem that our emphatic warnings on this topic were duly heeded by the students.

Another problem that adversely affected students in the previous year was adding transitions between images after aligning all the images with the voiceover, and then having to realign the images as the transitions changed the timing. Only three students mentioned having trouble with this during the third iteration of the design. Stressing a particular step-by-step process for arranging images, titles and transitions saved many students from this frustration.

Students noted a sense of achievement when finally compiling all the elements of their DST into WMM, and many stated that they found it very rewarding to see their movie finally come together:

I found that putting the final story together on movie maker was a very enjoyable experience, as I embarked on a huge learning curve (making mistakes which ended up losing me hours of my time). At the same time however, I felt a great sense of enjoyment, fun and achievement in putting all the elements of the story together (2011-2012 Student 30).

Putting the whole project together in Movie Maker, was actually quite fun! It was also very rewarding to see all the respective pieces of the project finally come together (2011-2012 Student 81).
8.4.5.4 Technology self-efficacy

In the course of this one assignment I have taken more journeys than ever previously in my educational life. I have journeyed through ideas surrounding my own teaching philosophy, ideas about myself as a professional teacher leading to building in confidence and a personal progression. I have also journeyed to the edge of sanity and back with my laptop as my sole companion. What makes me proud though is that I have gotten to the end and I am still standing- I did not let either situation better me, I now have a Digital Story I feel proud of and an enhanced teaching philosophy. Not bad at all for a person who is not naturally reflective and who has an uneasy relationship with technology!!! (2011-2012 Student 37)

As discussed in Chapter 7, a technology self-efficacy score was derived for questionnaire respondents based on their responses to several questions on the questionnaire. The results, shown in Figure 8.31, show that the majority of questionnaire respondents finished the DST process with medium to high levels of technology self-efficacy.

![2011-2012 Level of Technology Self Efficacy](image)

Figure 8.31: 2011-2012 Technology self-efficacy scores

Students with high to medium levels of self-efficacy tend to engage more frequently in task-related activities and persist longer in coping efforts, while those with low self-efficacy tend to engage in fewer challenging efforts, give up more easily under adversity and evidence less mastery (Torkzadeh & van Dyke, 2001).
A crosstabulation was run in SPSS to compare respondents self-reported computer skill level with their technology self-efficacy scores. The results of this can be seen in Figure 8.32.

Figure 8.32: Crosstabulation: level of technology self-efficacy * skill as computer user

None of the questionnaire respondents classified themselves as beginner computer users. Only one questionnaire respondent, an intermediate user, scored as ‘low technology self-efficacy’. Similar to the year two results for one questionnaire respondent, when this student’s questionnaire responses were analysed, she answered negatively to nearly every single question. She made several negative comments regarding the lack of marks going for an assignment that took up so much of her time, and was thoroughly disengaged in the process throughout, as evidenced by her comments. When asked to rate her agreement with the statement *I enjoyed completing an assignment that was different from the other assignments I have been asked to do this year*, she strongly disagreed (Q 19, Student 1). As suggested in discussing a similarly disengaged student from the second year of the project, what could possibly be at work here is the student’s own ‘innovation risk aversion’.
In contrast to this seemingly aversive attitude, exhibited by very few students, the majority of students commented in their reflective feedback essays that completing their DST had changed their opinion of the use of innovative methods, such as the use of ICT in teaching, in a positive manner:

But aside from learning new skills, and a new way of expression, I realised the importance of being open minded to new ideas. Initially I was quite hostile towards the whole idea, in the end however, I actually enjoyed the process and I feel more proud of my finished Digital Story than a lot of other work I have produced. I have also discovered a new modern resource for teaching as I.T becomes an integral part of today's classroom. As Ireland's education system undergoes some renovation, I believe open mindedness will be focal in its success (2011-2012 Student 39).

This project has greatly increased my confidence with computers but it’s also taught me not to jump to conclusions. Sometimes simply trying without letting preconceptions weigh you down can be harder than you’d think, but despite the heavy dread I associated with this assignment, seeing the result makes it all worthwhile. The knowledge that I created something I'd once assumed was impossible makes the digital story a valuable and important part of my course (2011-2012 Student 53, italics in original).

Student comments in the reflective feedback essays were overwhelmingly positive regarding the new ICT skills they developed and honed while creating their DSTs:

The compilation of my digital story introduced me to various software programmes that I had never used before and by completing my own story successfully, I now have the confidence and the ability to utilise these software packages as part of my own teaching strategies going forward. I have to say I found the movie-making process most enjoyable and I really got into it (2011-2012 Student 78).

There is very strong evidence that the experience of using technology successfully during the completion of their DST increased students’ belief in their ability to use technology successfully in their classrooms:

It was the technology related tasks that proved the most difficult. With the help of Ed Tech classes and my classmates this was something I surprised myself with. My ICT skills have improved immensely and I am now confident that I can adapt these to other areas of my course. Some of the programmes and software I was introduced to will prove very beneficial as I use ICT within my own classrooms in future lessons (2011-2012 Student 26).

Other students who considered themselves beginner computer users were very positive about the skills gained during the project, and showed
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evidence of high levels of confidence in their ability to use technology at the end of the process:

I feel very proud of my completed digital story project. When I first started this project, I felt that I would find it very difficult to complete and that I would struggle a lot with it because of my basic IT skills. However, I found that I surprised myself when I realised that I had the ability to use the various software in order to compile the digital story. Also, I was pleasantly surprised with the end-product. I had imagined that it would be very ‘unpolished’ and embarrassing to watch, and although I know that it may not be one hundred per cent perfect, I am very pleased with it and am proud of what I had achieved considering my prior skills only stretched as far as being able to use Microsoft Word and PowerPoint!! (2011-2012 Student 155)

The technology side of things is where I usually struggle; however, I practiced with audacity and windows movie maker and got a lot better. I think that knowing how to use this software is a great help to me. I can already see myself using audacity to help teach physics in some of my classes and windows movie maker would be excellent for summarising the end of a topic (2011-2012 Student 16).

Several of the students who struggled with the technology assignments in Ed Tech at the beginning of the year gained confidence in their abilities through the creation of their DST. One such student was able to connect his own struggles with learning to use ICT to those students who struggled in his own classes:

The critical incident taught me that class strugglers need praise and encouragement more than class achievers. If they get it, they will try harder and improve. In parallel to me crafting the critical incident story, I was one of the Ed Tec class strugglers. I was fragile about the whole process at the beginning. But through the encouragement of my lecturer, I began to try and eventually got some unique piece of work done. We all need praise. Strugglers, even Ed Tec strugglers, need it more than most!! (2011-2012 Student 10)

Only one student reported that her confidence in her ability to use technology had been negatively affected by the DST assignment. While she was positive about the reflective skills gained during the process of creating her DST, her inability to include a soundtrack successfully in her DST undermined her confidence. She did feel that she had learned new skills, but found these difficult to learn. Significantly, she states that “Perhaps the reason I found this assignment so difficult was because I had never used some of the technology before, but also because I never had any interest in using it, and still don’t” (2011-2012 Student 100). It would seem that her
low level of engagement in the technology aspects of the project was 
influenced by her lack of interest in ICT in general, and an inability to see 
the benefit of using these skills in her teaching. She states at one point that, 

Although new skills were learned, it is not feasible to apply these to my 
teaching. I cannot see myself having the time to make a video like that for 
a class, this year especially, as it literally took me weeks. And I still have 
not mastered it. I feel the reflection part of this assignment was beneficial 
to me as a teacher, but the technology part unfortunately was not (2011-
2012 Student 100).

An analysis was made of those students who reported low technology skills 
or confidence in their ICT skills at the beginning of the process in their 
reflective feedback essays, to see if they felt more confident in their ICT 
skills at the completion of the project. Of the sixty-five students who were 
coded as having low technology skills/confidence before completing their 
DST assignment, sixty-one reported improved ICT skills and confidence in 
using ICT due to the DST project. The other four did report an improvement 
in their ICT skills, and were proud of their finished DSTs, which would give 
an indication towards improved technology self-efficacy. However, they did 
not definitively state that their ICT confidence had been improved. For this 
reason, it cannot be said with total certainty that their technology self-
efficacy improved.

8.5 Chapter summary

In this chapter we have presented the analysis of the third, capstone iteration 
of the DST intervention, predicated on the R-NEST framework. The chapter 
illustrates the impact of the final DST design, informed by the preceding 
two DST innovations. The next chapter presents the discussion of findings 
in relation to the three design cycles, which have sought to investigate the 
potential of DST to enhance reflective practice in initial teacher education.
Chapter 9: Findings and Conclusion

9.1 Summary of thesis structure

This thesis has explored how digital storytelling can be designed to enhance reflection in initial teacher education. It has attempted to produce a design framework or model that design researchers, educators and educational technologists can use to support the introduction and integration of digital storytelling, to enhance novice, pre-service teachers’ capacity for reflection on practice.

Prior to this research, there existed no such design model or guidelines for developing technology to support reflection in teacher education. Therefore, in undertaking this research, the five central aims of the thesis were identified as:

1. To explore the provenance and development of reflection, and highlight its importance as a core, developmental activity within teacher education;

2. To demonstrate how new technology could be integrated effectively to support reflection on practice learning among pre-service teachers;

3. To identify and articulate the key criteria of an effective ICT intervention to support reflection in initial teacher education;

4. To apply these criteria systematically to the design and development of a technology-enhanced reflective process for novice teachers;

5. To examine and analyse pre-service teachers’ experience of, and learning from the innovation.

Chapter one outlined the rationale for the research, and the researcher’s biographical motivation for undertaking it, while proposing the research questions and issues that the thesis would address through the subsequent chapters. The thesis’ five key research questions were framed thus:
Chapter 9: Findings and Conclusion

1. How can digital storytelling be designed to enhance reflective practice in initial teacher education?

2. Does digital storytelling create new, engaging and creative possibilities for pre-service teachers to reflect on practice?

3. If so, what are these new, engaging and creative possibilities?

4. What are the characteristics of a successful digital storytelling design for the enhancement of reflection on practice?

5. What design informants and resources need to be consulted in order to create an effective technology-enhanced reflective process for teachers, where digital storytelling is utilised?

In Chapter 2 the thesis examined, in detail, the provenance and development of the concept: 'reflection', charting the emergence of reflection as a key developmental activity in teacher education. This second chapter helped to define the parameters and scope of the research, particularly through identifying elements of reflection that the designed DST intervention would need to support.

Chapter 3, the review of literature, investigated the extant, relevant research in the area. This was done through a comprehensive and thorough examination of what other educators and researchers have found in designing computing to enhance pre-service teachers’ reflection. The review of literature also helped to provide ideas for what a successful computer-augmented intervention would entail, and also for the methodological approach one might adopt, in order to design successfully digital storytelling to enhance the reflective capacity of novice teachers.

Chapter 4, informed by the methodological requirements identified through Chapters 2 and 3, described the methodological approach adopted in this research. This chapter provided the rationale for the selection of Design-Based Research (DBR) as the methodology adopted to address the thesis’ research questions. Theory is a crucial foundation of the DBR paradigm, as is a reflexive relationship between practice and theory.
Consequently, before outlining the practical, interventionist aspects of the thesis, Chapter 5 described the theoretical framework and design themes that guided the thesis' empirical, iterative implementation work. Chapter 5 also introduced the prototype design model: R-NEST, which framed and informed the cyclical and iterative design, evaluation and development of the DST innovation.

Chapters 6, 7 and 8 described the practical implementation of the research, and the design process that was undertaken to develop systematically and iteratively, DST to enhance pre-service teachers' reflection on their practice learning.

In addition to outlining in detail the development of a digital storytelling intervention, the research has resulted in a design model, R-NEST, and a related series of guidelines for designing technology to enhance pre-service teachers’ capacity for reflection on their practice learning.

9.2 R-NEST Design model and guidelines

The R-NEST design model and guidelines emerging from the longitudinal study comprise five principal criteria or ‘design sensitivities’ (Ciolfi & Bannon, 2003). R-NEST is also composed of five key design informants and resources, which should be consulted in order to develop and implement successfully digital storytelling to enhance reflection in initial teacher education.

9.2.1 Design guidelines

9.2.1.1 Criteria of a successful digital storytelling design for enhancing reflection in initial teacher education

1. Reflection:
   - Allow students to focus on a single incident from practice: The digital story design exemplified in this study did not result in a deepening of reflection until the critical incident analysis became the basis for the DST in the second design iteration. Both Dewey (1933) and Schön (1987) hold that the reflective process starts with a state of doubt, perplexity, surprise or a
problem to be solved. Critical incident analysis asks students to reflect on an issue that is troubling to them, or that makes them stop and think about something they have encountered in their practice (Tripp, 1993). Giving the students an incident to focus on in their reflection allows them to delve more deeply into the topic at hand. In addition, the critical incident analysis asks students to articulate how their insight into the incident has caused them to change their thinking or their practice. This can give them a chance to link their reflection to an action or application, as has been suggested by Boud, Keogh and Walker (1985a) and Moon (2004).

- Second order reflection should be used as the basis for the digital story: Students’ second order reflections are likely to yield deeper levels of reflection (Moon, 2004). Asking students to choose a critical incident from their teaching practice reflective journal caused them to look back over their first hand reflections from their teaching practice experience. Students reported paying closer attention to daily incidents as they occurred, as well as spending more time reflecting on their previous reflections. In addition, asking students to pick an incident from their teaching practice reflective journal to reflect on further allowed students to delve more deeply into the incident, and gave them a chance to look at it from different perspectives and different time frames, which in itself is evidence of deeper levels of reflection (Moon, 2004).

- Allow students time to reflect at the beginning of the DST process: Boud, Keogh and Walker (1985a) hold that students need time to reflect. Time should be built into the beginning of the DST project so that students have time to reflect, through the brainstorming, drafting and re-drafting of their story.

- The process is centrally important, and can be more important than the product: Students reported experiencing deep reflection throughout the process of creating their digital stories, even
though this was not always evident in their final digital stories. Sandars et al. (2008) hold that reflection can take place at all stages of the DST process, a finding that has been corroborated by this study. Even if students’ final digital stories do not show evidence of deep reflection, this does not mean that students did not experience deeper levels of reflection during the process of creating their digital story. “Each step of the production of the digital story provides an ideal opportunity to stimulate reflection and this is in addition to reflection on the final overall product” (Sandars et al., 2008, p. 775).

2. Narrative:

- Use of the personal narrative format encourages the first person stance needed in reflective writing: Storytelling can be used as a means to enhance reflection on practice (McDrury & Alterio, 2002; Moon, 2004; Moon & Fowler, 2008; Schön, 1988). Putting their thoughts into a story format helped many students to better articulate what they had learned.

- Students need basic story structure information before beginning the DST process: A basic introduction to the criteria for personal narrative, and story structure in general, should be included in the DST discussions/lessons at the beginning of the process. The inclusion of Ohler’s (2008) story map can assist in student understanding of the basic story format.

- Use of narrative graphic organisers such as story maps and story boards can help students in the reflection process: Students reported that the use of these graphic organisers encouraged them to think about the other characters involved in their stories and to include alternative viewpoints in their reflections. The story map also helped them to consider conflicts encountered, as well as lessons learned from their critical incident. The use of narrative graphic organisers helped to support processes of deepened reflection, such as those described by Moon (2004).
A time parameter or limit can enhance the final digital story: the iterative method of script creation helped students to clarify the message they were trying to convey. The three to five minute time limit, and the small word count necessitated by it, helped to deepen students’ reflection on the incident through repeated editing of their story drafts.

3. Engagement:

- Novelty of a different type of assignment and the inclusion of digital media can engage students in the reflective process: The use of multimedia digital technologies was motivating and engaging for the preponderance of students involved in this study. Many suggested that the addition of multimedia to the reflective process deepened and enhanced their reflection. This is in keeping with the views of many theorists on reflection, who suggest that written reflection alone might not be the best way to represent reflection, and that creative means may prove more effective in supporting deeper reflection (Hatton & Smith, 1995; Korthagen, 1993; McDrury & Alterio, 2002; Moon, 1999).

- The value of the reflective and ICT skills to be gained for teaching should be made explicit: Students who recognised the value of reflective and ICT skills they could gain from the project for their own teaching were more engaged with the DST process.

- The DST project should be implemented promptly after the student teachers’ first teaching practice experience: This gives the student teachers a chance to process what they have learned during this initial practice period. It also helps them to understand the reflective process at the beginning of their initial teacher education (ITE) programme, which can lead to deeper reflective writing and deeper engagement in the reflective process for the rest of the course, and into their next practical teaching placements.
Chapter 9: Findings and Conclusion

- The DST production period should be compact, within the parameters of the ITE programme: Once the students have been taken through the software tutorials, the DST should be finished within a timely manner so that students are using the technology to create their digital story while it is still fresh in their minds.

- Break the DST process into smaller, manageable steps: The DST process should be broken into smaller steps, and ‘due dates’ should be set-up for key deliverables in the project. This can help keep students on track and engaged with the project. If this is not done, students may fall behind in the project and become overwhelmed. The step-by-step process, broken down class-by-class for this design, made the process one that most students felt they could accomplish, and assuaged most of the fears many felt when they first heard about the DST assignment.

4. Sociality:

- Opportunities for collaborative reflection should be included in the DST process: reflecting with others can deepen reflection on practice (Dewey, 1916; Hatton & Smith, 1995; McDrury & Alterio, 2002; Moon, 2004; Rodgers, 2002; Schön, 1987). Students benefited greatly from the collaborative aspects of the DST process, such as the story circle peer feedback activity, peer and tutor feedback, and the opportunity to work collaboratively with each other on their digital stories.

- Follow a formal, structured story sharing session for the story circle: a formal, structured story sharing session, such as that suggested by McDrury and Alterio (2002), where tellers share a pre-determined story and listeners engage tellers in reflective dialogue, can help to enhance students’ learning and deepen reflection.

- Provide tutor feedback early in the construction of the digital story script: Moon notes that in the early stages of reflective writing, learners often ask if they “…are doing it right...” (Moon, 1999, p. 173). Tutor feedback on the penultimate story
draft can be crucial in helping students know if they are ‘on the right track’ with their reflective writing.

- Provide an opportunity for students to share their completed digital stories with each other: sharing of the completed digital stories provides an opportunity for further reflection on one’s own story, as well as opportunities to learn from others’ stories of practice.

- Scaffold technology lessons to minimise students’ anxiety or fear of using new technology/software: Scaffolding can include tutor and peer support, as well as step-by-step handouts to guide students through the different technical processes involved in the creation of the DSTs. The amount of new technology that students have to master in order to complete a DST can be overwhelming for some. Because of this, it is critically important that students have access to support for the process, as and when they need it. Many students in this study stated that even though they had difficulty at times with the software, the ready availability of support meant that they did not get overwhelmed by any technical difficulties encountered.

5. Technology:

- Use low-threshold (Gilbert, 2002) technologies for the creation of students’ digital stories: the use of technologies that are accessible, low in cost or free, easy to learn, non-threatening, and can be relied upon to work as expected can be more easily adopted by students because they take little time to learn and are user-friendly. This proved to be the case with the use of Audacity and Windows Movie Maker during this study.

- Provide access to good quality hardware for the voiceover recording process, and give students a choice of recording technologies: students should feel free to use the recording process they are most comfortable with. The voiceover recording proved to be the most nerve-wracking part of the DST process for many students involved in this study. Providing the
students with good quality options for recording allowed them to choose the method that was the least stressful for them.

- Provide technology support to avoid disengagement due to technological difficulties: even self-proclaimed ‘technophobes’ can successfully complete a DST if they have access to the necessary technical support. This support can be in the form of online discussion boards where students can ask technical questions of the tutor or each other, individual tutor assistance, as well as a final week of supervised production where the tutors can be on hand to help those students who need it during the final steps of the digital storytelling production process.

9.2.1.2 Components of a successful design process

In order to create a successful digital storytelling design for the enhancement of reflection in initial teacher education, this research proposes that the design process incorporates the following five elements:

1. **Students’ perspectives:** students are a key informant of the design process. The digital storytelling experience should be developed in-situ, in the ‘messy’ context of the ITE programme, with students’ feedback informing the successive design iterations. The design should address key aspects of the student teachers’ experiences and prior learning, including their technology self-efficacy and intrinsic motivation.

2. **Wider professional ITE context:** the design should aim to address requirements of relevant, key regulatory/statutory bodies and the wider, national and international teacher professional education context. For example, for the DST intervention at NUI Galway, criteria and recommendations of the Teaching Council of Ireland and the OECD were considered in the design of the technology-enhanced reflective process for pre-service teachers.

3. **Local ITE programmatic perspective:** the process must be sensitive to the local context, exigencies and aims of the initial teacher education programme itself, as well as the structure of the
programme, for example: the timing of teaching practice; staging of block periods on campus; and the focus and timing of other assignments/coursework submissions.

4. **Collaboration and involvement of teacher education professionals:** the design should incorporate a collaborative approach with staff, including them in important aspects of the DST design. Getting staff support for the digital storytelling project is an important collaborative process, within the overall context of designing digital storytelling to enhance the reflective capacity of pre-service teachers. To ensure the integration of DST in a meaningful, relevant and informed way within the programme, other staff members should have a critical input into the implementation process.

5. **External evaluative perspective:** Finally, there is a need for ‘critical friends’ in the process; those who can provide a third-party, critical evaluation to help ensure oversight in relation to efficacy and quality assurance of the intervention. The external examination process for the PGDE/PDE at NUIG helped to provide this external evaluative perspective in relation to the DST innovation within the programme. Additional external feedback can be gained through presentation to research committees, as well as national and international conferences.

### 9.2.2 The R-NEST model

These design criteria and sensitivities, as well as the supporting design informants and resources, are illustrated in the R-NEST model, presented in Figure 9.1.
9.3 Summary of contribution, conclusions and future research

9.3.1 Summary of contribution

The questions which this research initially set out to explore have been answered through the thesis. The contribution of the thesis to the understanding of digital storytelling as a technology-enhanced reflective process for pre-service teachers is threefold.
Firstly, the research has established and illustrated systematically the potential of DST as a technology-enhanced reflective process for supporting and augmenting reflection in ITE.

Secondly, through the detailed articulation of a longitudinal and repeatable DBR process, the thesis demonstrates practically how a digital storytelling intervention was designed and developed to enhance reflection in an ITE program.

Thirdly, the thesis has contributed to advancing design research in education/learning sciences, by producing an educational technology design model: R-NEST, which can be adapted and adopted by other design researchers, educators and educational technologists, in designing digital storytelling to enhance pre-service teachers’ professional practice learning. Although beyond the immediate scope of this thesis, this R-NEST design model could be adapted to support the development of technology to enhance professional learning in other disciplines.

9.3.2 Conclusion

The three implementations of the DST design demonstrated the potential, formative and positive impact of digital storytelling within initial teacher education, particularly in enhancing the pre-service teachers’ capacity to reflect critically on their professional development and practice learning. The majority of students that participated in this study evidenced greater engagement in reflection through the completion of their DSTs. The students also potentially demonstrated greater creativity in the reflective parts of the PDE, benefitting from the multimedia aspects of the process.

The impact of digital multimedia to enhance student teachers’ reflection on practice is a significant contribution of this research. Most students benefitted significantly from the use of multimedia, in making better sense of the experience of their first foray into teaching, and in gaining a better understanding of the process one needs to go through when reflecting deeply on practice.
Students felt that a significant amount of their reflection during the DST process was enhanced by the process of choosing imagery for use in their digital stories. Many noted that during the production process, they were constantly thinking about the kinds of images they might use in their DST, which caused continuing reflection on the incident. The choice of images also clarified and distilled emotions for many of the students. Images portraying metaphors and the use of implicit imagery gave students greater insight into their own motivations and rationales in their practice choices.

Students found that the DST process enabled them to reflect more deeply than they had done in other reflective assignments on the course. Some of the reasons students gave for this deeper level of reflection were: the additional time taken to reflect while creating the DST; the self-questioning required during the process; having a chance to assess their own actions more thoroughly; looking at the incident along different time frames and from different perspectives; assessing personal beliefs and philosophies; connecting theory to practice; and having the chance to step back and see the broader context. Students felt all of this was amplified and enhanced significantly by the use of multimedia in the creation of their DSTs.

Overwhelmingly the DST process improved students’ confidence in using ICT skills in the classroom. Most students were very happy with the new skills they had acquired and many students commented on the benefits of these skills for their future teaching. Several students described themselves as ‘technophobes’ before they started the DST project, but said that they were no longer afraid of technology after the project. Many commented that their DST experience had ‘opened their eyes’ to the use of ICT for teaching and learning.

As previously discussed, the comments of one student seem to encapsulate the generally very positive effects and impacts of the DST experience:

On completion of the assignment I can say without hesitation it has been the most enjoyable and beneficial project I have ever completed. I believe that it not only improved my ICT skills but also gave me the chance to be reflective at a deeper level….Completing this assignment really gave me a sense of accomplishment and made me excited to learn. It is the first time that I have really stood up after doing an assignment and said I am proud
Chapter 9: Findings and Conclusion

of what I achieved and I’m happy to be able to say it (2011-2012 Student 138).

9.3.3 Future research

This thesis explored how digital storytelling can be designed to enhance reflective practice in initial teacher education. This constitutes an important research question – both in Ireland and internationally – because reflection is a core, foundational developmental activity in contemporary teacher education (Collin et al., 2013; Organisation for Economic Co-operation and Development, 2005; The Teaching Council, 2011b; 2012). Furthermore, reflection is likely to become an even more important developmental component as research and practice learning, for which critical analysis and reflection are crucially important, assume a more significant and substantial focus across the ‘three i’s’ of the teacher education continuum – initial, induction and in-service. This research has demonstrated how technology can be used to enhance reflection and practice learning in initial teacher education. Future research could explore how DST might be used to support teacher education in the two other key strands of the ‘continuum of teacher education’: induction and in-service, supporting teachers as reflective practitioners throughout their professional careers as educators.

The research reported in this thesis explored a particular ‘genre’ of digital story, as defined by the Centre for Digital Storytelling in Berkeley, California. Considering the importance and adaptability of the multimedia design of this research, future research could explore other forms of narrative technology – where storytelling and digital media are combined in novel ways – and examine the potential impact of these innovations on learning and reflection.

The ‘low-threshold’ software utilised during this research was chosen due to its ready availability, ease of use and low cost/no cost for students. Due to the dynamic and evolving nature of technology, many new Web 2.0 technologies have become freely available that might be used in the creation of DSTs. One video editing software in particular, WeVideo (http://www.wevideo.com/) has potential for the support of DST. Future
research could explore the use of this Web 2.0 software, and others, for use with DST.

Finally, a number of the PGDEs/PDEs have explored using digital storytelling to support their classroom teaching. For example, having completed her reflective digital story for the PDE programme, one of the students in the 2011-2012 cohort used digital storytelling to teach poetry during teaching practice. This pre-service teacher supported her pupils in collaboratively developing a multimedia poem, inspired by and using the same structure and technology as her reflective DST. This thesis has established the potential of DST as a technology-mediated reflective process. Future research could look at its methodological potential as a pedagogical-teaching tool. This could further widen the impact of digital storytelling as a context for technology-enhanced learning in education/teacher education.

9.3.4 Researcher’s learning journey

I have learned a great deal and grown immeasurably during the process of this research. I started my career in education as a middle school teacher, and still see myself as one to this day. For this reason, when I first started my PhD, I sometimes felt overwhelmed by the world of academia; the language, the politics, the way things must be done and the pressure of coming up with a brand new idea. Early on, someone told me not to worry too much about trying to contribute something ‘new to the field’ and just to document my own path as I went along on this research journey. They said, “Sure, PhD students are just baby researchers, you’re just learning the trade. No one expects you to change the world.”

This relieved some of the worry of having to come up with something ‘new’, and helped me to concentrate on my own practice, and why I wanted to embark on this journey in the first place. When I didn’t know what I was doing, and there were many times that I didn’t, I would remind myself that I was just a ‘baby’ researcher, and go about finding out how to do whatever it was that had me stumped. I discovered a wealth of knowledge in my own
colleagues, and found that talking to them usually sent me off in the right
direction to solve whatever research dilemma I was facing.

Prensky (2001) would probably classify me as a ‘digital immigrant’.
Desktop computers were not commonplace during my formative years in
school. In fact, I was quite afraid of computers [read - DOS] until someone
showed me a Macintosh computer in college in the early 1980s. From then
on, I was hooked! As a young teacher, I discovered that I had a flair for
working with technology in the classroom, which eventually set me on the
path to becoming an education technologist. During the process of this
research, I made full use of the technology available to assist researchers;
tackling, and taming, programs such as EndNote, SPSS and NVivo along
the way. While utilising these programs made the research process easier in
some ways, relying on the technology led to a few sleepless nights when my
overworked laptop didn’t prove up to the task of running them. Through
these technological hiccups, I learned not to rely too much on the
technology, that sometimes pen and paper are just as good, and to always,
always, ALWAYS, back-up my work!

I was not born a naturally organised person. But when I became a classroom
teacher many years ago, I had to learn to be organised or face imminent
failure. Since then, I have prided myself, and received many compliments,
on my organisational skills. However, the organization skills needed for a
PhD study can be formidable. Keeping track of literature, data results, data
analysis and all the other myriad bits of information involved in a large
research project, tested even my ‘expert’ organizational skills. I had to
school myself into being even more organised than ever before or important
data could be lost. Spreadsheets, databases, a detailed journal and my diary
helped me to stay on top of the potential chaos.

As I began the search for literature at the beginning of this research process,
I found that I loved ‘the hunt’. I sometimes spent days tracking down that
one article that would provide the answer that I was looking for. Of course
when I found it, the writings referred to in the article would send me off in
another direction. I found this invigorating, and I realised I loved this aspect
of the research process. I have even offered to hunt down obscure journal articles for friends as an enjoyable past time! I believe this bodes well for my prospects as a researcher, and look forward to many more ‘hunts’ in the future.

What started as a desire to make reflection more relevant and engaging to the students I work with has taught me so much about reflection in teacher education. I realised at the start of my research how little I actually knew about reflection and the reflective process, even though I had been teaching the topic to my students for a few years at that point. In the hectic environment of a teacher education program, I didn’t have much spare time to read in depth around the topic. This research endeavour provided me with an opportunity to delve deeply into the literature on reflection, and to examine the sources of reflection in teacher education. In particular, I immersed myself in the writings of John Dewey, and sometimes did not want to leave his world of flowery prose and deep insight. I loved having the opportunity to decipher Dewey’s writings for myself, instead of reading about his ideas filtered through someone else’s words. In a similar light, I thoroughly enjoyed reading the original works of Bruner, Vygotsky and Papert referred to in this thesis. In fact, I was moved to tears by Papert’s 1993 vision of computers for children, when I realised that the dream he described back then has actually come to pass in the form of the tablet computers of today. I have been intellectually and philosophically challenged, and significantly enriched, by reading the original works of so many of education’s great minds.

This research process has also allowed me to solidify my own philosophies of teaching and learning, and has given me the opportunity to reaffirm my own beliefs in the power of social constructivism and constructionism in the classroom. As a newly qualified teacher in the early 1990s, I was lucky enough to work in a school district that supported these philosophies in the classroom through a curriculum that fostered active, hands-on, collaborative learning. My inner-city students bloomed in this atmosphere. Now, as a teacher of teachers, I can see the strength of these philosophies of learning supported yet again through this research.
Now that this work has come to a close, I look forward to my next forays into research; maybe not with the confident strides of an expert researcher, but no longer with the hesitant steps of a ‘baby’ researcher. This PhD study has allowed me to find my feet in the world of academia, and I endeavour to make many further research contributions to the area of technology in initial teacher education.


doi:10.1080/0965079930010102


doi:10.1080/13540602.2012.632268


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Appendices

Appendix 1: PGDE/PDE Course Structure over the course of the Study (2009-2012)

The tables below show the structure of the PGDE/PDE over the course of the three implementation years of this study. The DST intervention was part of the Professional Studies module during the pilot project in 2009-2010. In the subsequent years, it became a part of the Professional Practice module (2010-2011) and then the Professional Development module (2011-2012). It was delivered by the researcher and a colleague through the education technology course.

The following descriptions are taken from the course handbooks from the respective years:

2009-2010:

The Postgraduate Diploma in Education (PGDE) at NUI Galway provides the professional knowledge, understanding and pedagogical skills required to become a teacher at post-primary level. It is one year fulltime programme for graduates and is recognised by the Teaching Council of Ireland for the purposes of registration as a post-primary teacher in Ireland and the EU as well as other English speaking countries. The programme is wide-ranging and equips student teachers with the theoretical and conceptual tools necessary for developing creative and flexible approaches to teaching and enables them to address the potentially complex and manifold educational needs of a diverse constituency of pupils in the age range 12-18 years.

Programme organisation

The PGDE in NUI Galway is organised on a modular basis as follows:

<table>
<thead>
<tr>
<th>Module</th>
<th>ECTS</th>
<th>Marks</th>
<th>Areas of study/themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Educational Sciences</td>
<td>30</td>
<td>300</td>
<td>Psychology of Teaching and Learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Education, Diversity and Social Justice</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>History and Structure of Irish Education</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Philosophy of Education</td>
</tr>
<tr>
<td>2 Professional Studies in Education</td>
<td>20</td>
<td>200</td>
<td>Teaching and Learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Professional Practice</td>
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<td>Curriculum and Assessment</td>
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<td>Catering for Diversity</td>
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<td></td>
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<td></td>
<td>ICT in Education</td>
</tr>
<tr>
<td>3 Teaching methodology A</td>
<td>50</td>
<td>50</td>
<td>Subject Methodology</td>
</tr>
<tr>
<td>4 Teaching methodology B</td>
<td>50</td>
<td>50</td>
<td>Subject Methodology or Specialist Methodology</td>
</tr>
<tr>
<td>5 Teaching Practice</td>
<td>-</td>
<td>Grade</td>
<td>Practical component: Teaching Practice in School</td>
</tr>
</tbody>
</table>

(School of Education, 2009, p. 6)
Appendices

2010-2011:

Programme organisation

The PGDE in NUI, Galway is organised on a modular basis, as illustrated below. The modules and related learning outcomes correspond to the required components of an initial teacher education programme, as specified by the Teaching Council. Through the taught components of the programme students are introduced to conceptual frameworks and relevant issues within the disciplines and professional studies of education and to a variety of teaching strategies, materials and approaches to classroom management which are important for achieving teaching and learning objectives. In addition student teachers are supported in practical teaching placements which provide them with a rich experiential base for the development of their potential as teachers. Tutorial sessions throughout the year enable the development of critical reflective thinking which supports individual professional development and helps to integrate theory and practice.

PGDE Programme Structure - Overview

<table>
<thead>
<tr>
<th>Modules</th>
<th>ECTS</th>
<th>Areas of Study</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Educational Sciences</td>
<td>15</td>
<td>Psychology of Teaching and Learning Education, Diversity and Social Justice</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>History, Structure &amp; Context of Irish Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Philosophy of Education</td>
<td></td>
</tr>
<tr>
<td>2 Professional Studies</td>
<td>10</td>
<td>Teaching &amp; Learning</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curriculum &amp; Assessment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Catering for Diversity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ICT in Education</td>
<td></td>
</tr>
<tr>
<td>3 Teaching Methodology</td>
<td>5</td>
<td>Subject Methodology</td>
<td>50</td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Teaching Methodology</td>
<td>5</td>
<td>Subject Methodology or Specialist Methodology</td>
<td>50</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Professional Practice</td>
<td>10</td>
<td>Teacher as Professional</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reflective Practice</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Digital Storytelling</td>
<td></td>
</tr>
<tr>
<td>6 Teaching Practice</td>
<td>15</td>
<td>Prior Preparation &amp; Debriefing</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Practical Teaching</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Additional School Experience</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Educational Technology &amp; Resource Development</td>
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<tr>
<td>Total ECTS</td>
<td>60</td>
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</table>

(School of Education, 2010, p. 8)
2011-2012:

Programme organisation

The PDE in NUI Galway is organised on a modular basis, as illustrated below. The modules and related learning outcomes correspond to the required components of an initial teacher education programme, as specified by the Teaching Council. Through the taught components of the programme students are introduced to conceptual frameworks and relevant issues within the disciplines and professional studies of education and to a variety of teaching strategies, materials and approaches to classroom management which are important for achieving teaching and learning objectives. In addition student teachers are supported in practical teaching placements which provide them with a rich experiential base for the development of their potential as teachers. Tutorial sessions throughout the year enable the development of critical reflective thinking which supports individual professional development and helps to integrate theory and practice.

### PDE Programme Structure - Overview

<table>
<thead>
<tr>
<th>Modules</th>
<th>ECTS</th>
<th>Areas of Study</th>
<th>Marks</th>
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</thead>
<tbody>
<tr>
<td>1 Educational Sciences</td>
<td>15</td>
<td>Psychology of Teaching and Learning Education, Diversity and Social Justice</td>
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<tr>
<td></td>
<td></td>
<td>History, Structure &amp; Context of Irish Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Philosophy of Education</td>
<td></td>
</tr>
<tr>
<td>2 Professional Studies</td>
<td>10</td>
<td>Teaching &amp; Learning Curriculum &amp; Assessment</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Catering for Diversity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ICT in Education</td>
<td></td>
</tr>
<tr>
<td>3 Teaching Methodology A</td>
<td>5</td>
<td>Subject Methodology</td>
<td>50</td>
</tr>
<tr>
<td>4 Teaching Methodology B</td>
<td>5</td>
<td>Subject Methodology or Specialist Methodology</td>
<td>50</td>
</tr>
<tr>
<td>5 Professional Development</td>
<td>10</td>
<td>Teacher as Professional</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reflective Practice</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Digital Storytelling</td>
<td></td>
</tr>
<tr>
<td>6 Teaching Practice</td>
<td>15</td>
<td>Prior Preparation &amp; Debriefing</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Practical Teaching</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Additional School Experience</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Educational Technology &amp; Resource Development</td>
<td></td>
</tr>
<tr>
<td>Total ECTS</td>
<td>60</td>
<td></td>
<td>600</td>
</tr>
</tbody>
</table>

(School of Education, 2011, p. 8)
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Appendix 2: Proposed PME course structure for the 2014-2016 programme

The new PME structure will include a greater emphasis on reflective practice, given greater research and practice learning emphases within the programme:

Year 1:

<table>
<thead>
<tr>
<th>Code</th>
<th>Year 1: Modules</th>
<th>Area of Study</th>
<th>ECTS</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Educational Sciences</td>
<td>Psychology of Teaching and Learning Education, Diversity and Social Justice History, Structure &amp; Context of Irish Education Philosophy of Education</td>
<td>15</td>
<td>Integrated Project</td>
</tr>
<tr>
<td>2</td>
<td>Professional Studies</td>
<td>Teaching &amp; Learning Curriculum &amp; Assessment Catering for Diversity Literacy and Numeracy ICT in Education</td>
<td>10</td>
<td>Collaborative Curriculum Design Project</td>
</tr>
<tr>
<td>3</td>
<td>Teaching Methodology 1A</td>
<td>Subject Methodology</td>
<td>5</td>
<td>Pedagogical Practice Assignment</td>
</tr>
<tr>
<td>4</td>
<td>Teaching Methodology 1B</td>
<td>Subject Methodology or Specialist Methodology</td>
<td>5</td>
<td>Pedagogical Practice Assignment</td>
</tr>
</tbody>
</table>

Year 2:

<table>
<thead>
<tr>
<th>Code</th>
<th>Year 2: Modules</th>
<th>Area of Study</th>
<th>ECTS</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Practitioner Research</td>
<td>School as Organisation Contemporary Issues in Education Some selected themes: • ICT in Education • Classroom Management • Development Education • Diversity and Inclusion • Literacy and Numeracy • Differentiation • English as a Second Language Research Process and Methods</td>
<td>25</td>
<td>Online Externities (20%) Research Proposal (30%) Research Project (50%)</td>
</tr>
<tr>
<td>3</td>
<td>Teaching Methodology 2A</td>
<td>Subject Methodology</td>
<td>5</td>
<td>Pedagogical Practice Assignment</td>
</tr>
<tr>
<td>4</td>
<td>Teaching Methodology 2B</td>
<td>Subject Methodology or Specialist Methodology</td>
<td>5</td>
<td>Pedagogical Practice Assignment</td>
</tr>
<tr>
<td>5</td>
<td>Professional Practice/School Placement</td>
<td>Prior Preparation &amp; Debriefing (Moving to School 2) Practical Teaching Teacher as Professional Additional School Experience Collaborative Practice in School Reflective Practice Resource Development</td>
<td>25</td>
<td>Teaching Practice File/Professional Practice Portfolio</td>
</tr>
</tbody>
</table>

(School of Education NUI Galway, 2012, pp. 15-16)
# Appendix 3: Pilot project digital story evaluation rubric

## Digital Story Evaluation Rubric

### Author’s Name: [Name]  
**Ed Tech Class:** [Class]

The following rubric will be used to evaluate your Digital Story. This rubric is based on the guidelines discussed in class for creating a digital story.

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
<th>0-2</th>
<th>3-4</th>
<th>5-6</th>
<th>7-10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planning and Preparation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working Portfolio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storyboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of Technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Editing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Images</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music/Sound</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Working Portfolio
- **Beginning (0-2):** Working portfolio does not include planning notes; brainstorming sheet, story drafts, storyboard, and copies of articles/chapters/resources used in the creation of the video.
- **Developing (3-4):** Working portfolio includes some required planning notes; brainstorming sheet, story drafts, storyboard, and copies of articles/chapters/resources used in the creation of the video.
- **Accomplished (5-6):** Working portfolio includes complete and detailed planning notes; brainstorming sheet, story drafts, storyboard, and copies of articles/chapters/resources used in the creation of the video.
- **Exemplary (7-10):** Working portfolio includes complete and detailed planning notes; brainstorming sheet, story drafts, storyboard, and copies of articles/chapters/resources used in the creation of the video.

#### Storyboard
- **Beginning (0-2):** Little to no evidence of planning, including minimally complete sketches, sequencing, pacing, script, images, and sound.
- **Developing (3-4):** Evidence of planning through some of the storyboard, including sketches, sequencing, pacing, script, images, and sound.
- **Accomplished (5-6):** Evidence of planning through most of the storyboard, including sketches, sequencing, pacing, script, images, and sound.
- **Exemplary (7-10):** Complete and detailed evidence of planning throughout entire storyboard, including sketches, sequencing, pacing, script, images, and sound.

#### Use of Technology
- **Beginning (0-2):** Transitions, effects, audio, and editing are not appropriate to the subject matter and distract from the video.
- **Developing (3-4):** Little or no attempt made to use images to create an atmosphere or tone, but more work is needed.
- **Accomplished (5-6):** Most transitions, effects, audio, and editing are appropriate to the subject matter and add to the flow of the video.
- **Exemplary (7-10):** Images create a distinct atmosphere or tone that greatly enhances the story. The images may communicate symbolism and/or metaphor.

#### Music/Sound
- **Beginning (0-2):** Music/sound is distracting and/or inappropriate to the story.
- **Developing (3-4):** Music/sound is off and not distracting, but it does not add much to the story.
- **Accomplished (5-6):** Music/sound is an emotional response that somewhat matches the storyline.
- **Exemplary (7-10):** Music/sound is a rich emotional response that matches the storyline very well.

#### Text
- **Beginning (0-2):** Word choice is not relevant; text appears mostly as “narration”, not emotional mood, tone or impact.
- **Developing (3-4):** Word choice is somewhat relevant, but adds little extended value to the topic’s meaning. Some emotional mood, tone or impact.
- **Accomplished (5-6):** Word choice is somewhat relevant, but adds little extended value to the topic’s meaning. Some emotional mood, tone or impact.
- **Exemplary (7-10):** Word choice is relevant, enhances the topic’s meaning and creates insightful emotional mood, tone or impact.

---

**NICE PDES, Ed Tech, 2009-2010**

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Appendix 4: Levels of reflection rubric, 2009-2010

<table>
<thead>
<tr>
<th>Levels of Reflection Rubric</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Story</strong></td>
</tr>
<tr>
<td>Descriptive 1: This account is descriptive and it contains little reflection. It may tell a story but from one point of view at a time and generally one point at a time is made. Ideas tend to be linked for the sequence of the account / story rather than by meaning.</td>
</tr>
<tr>
<td>Descriptive with Some Reflection 2: This is a descriptive account that signals points for reflection while not actually allowing much reflection. The account is more than just a story. It is focused on the event as if there is a big question or there are questions to be asked and answered.</td>
</tr>
<tr>
<td>Reflection (1) 3: This account includes reflective elements, but it is focused with particular aspects accounted for reflective comment. There may be a sense that the material is being studied around. It is no longer a straightforward account of an event but it is definitely reflective.</td>
</tr>
<tr>
<td>Reflection (2) 4: This account now only serves the process of reflection, covering the issues for reflection and noting their content. There is still several over and internal dialogue.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Frames of Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is no recognition that the personal frame of reference can change according to the emotional state in which it is written, the acquisition of new information, the review of ideas and the effect of time passing.</td>
</tr>
<tr>
<td>There is little recognition that the personal frame of reference can change according to the emotional state in which it is written, the acquisition of new information, the review of ideas and the effect of time passing.</td>
</tr>
<tr>
<td>The account may recognize that frames of reference affect the manner in which we reflect at a given time but it does not deal with this in a way that links it effectively to issues about the quality of personal judgement.</td>
</tr>
<tr>
<td>There is recognition that the personal frame of reference can change according to the emotional state in which it is written, the acquisition of new information, the review of ideas and the effect of time passing. The effect of these variables on personal judgement is taken into account in making judgements.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Metacognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metacognition is not evident.</td>
</tr>
<tr>
<td>Metacognition is not evident.</td>
</tr>
<tr>
<td>Metacognition is not evident.</td>
</tr>
<tr>
<td>A metacognitive stance is taken, i.e., critical awareness of one's own process of mental functioning, ability to reflect on one's process of reflecting.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall level of reflection:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-8 Descriptive</td>
</tr>
<tr>
<td>9-16 Descriptive with some reflection</td>
</tr>
<tr>
<td>17-24 Reflective (1)</td>
</tr>
<tr>
<td>25-32 Reflective (2)</td>
</tr>
<tr>
<td>Final Score:</td>
</tr>
</tbody>
</table>

| Descriptive 1: The account may relate to ideas or external information, but these are not considered or questioned and the possible impact on behaviour or the meaning of events is not mentioned. |
| Descriptive with Some Reflection 2: There is little addition of ideas from outside the event, references to alternative viewpoints, or attitudes to others, comment and so on. |
| Reflective (1) 3: There is evidence of external ideas or information and where this occurs, the material is subjected to reflection. The account shows some analysis and there is recognition of the worth of exploring motive or reasons for behaviour. There may be recognition of things that look different from other perspectives, that views can change with time or the emotional state. |
| Reflective (2) 4: The account probably recognises that events exist in a historical or social context that may be influential on a person's reaction to them. Multiple perspectives are noted. The view and motives of others are taken into account and considered against those of the writer. |

<table>
<thead>
<tr>
<th>D. Multiple Perspectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>No self-questioning evident.</td>
</tr>
<tr>
<td>There is recognition of the worth of further exploring but it does not go very far. Asking the questions makes it more than a descriptive account, but lack of attempt to respond to the questions means there is little actual analysis of the events. The questioning does begin to suggest a standing back from the event in actually isolated areas of the account.</td>
</tr>
<tr>
<td>Where relevant, there is willingness to be critical of the action of self or others. There is likely to be some self-questioning and willingness also to recognise the overall effect of the event on self. In other words, there is some standing back from the event.</td>
</tr>
<tr>
<td>Self-questioning is evident in terms of questions and reflections on various ideas and reasons for behaviour and that of others. There is close evidence of standing back from an event and these is a willingness and internal dialogue.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E. Self-Questioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>There may be references to emotional reactions that they are not explored and not related to behaviour.</td>
</tr>
<tr>
<td>The account may mention emotional reactions, but be influenced by emotion. Any influence may be noted, and possibly questioned.</td>
</tr>
<tr>
<td>There is recognition of any emotional context, a questioning of its role and influence and an attempt to consider its significance in shaping the view presented.</td>
</tr>
<tr>
<td>There is recognition of the role of emotions in shaping the ideas and reflections of the manner in which different emotional influences can frame the account in different ways.</td>
</tr>
</tbody>
</table>

Based on elements developed by Jerry Kilbom, (2004) Remade
<table>
<thead>
<tr>
<th>Appendices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table</strong></td>
</tr>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td><strong>A. Effect of Prior Experience</strong></td>
</tr>
<tr>
<td><strong>B. Learning and Recognition</strong></td>
</tr>
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</table>

**Notes:**

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Appendix 5: 2009-2010 Criteria for Part D of portfolio

School of Education
Postgraduate Diploma in Education 2009-’10
Criteria for Part D of Portfolio

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>Maximum Mark in percentage terms</th>
<th>Student Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) RE-EVALUATION OF LEARNING GOALS AND PHILOSOPHIES</td>
<td>(30)</td>
<td></td>
</tr>
<tr>
<td>Restatement of learning goals and teaching and learning philosophy (brief statement)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to re-evaluate learning goals and to evaluate achievement of them, as well as to relate how you have achieved them</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity to trace any transformation in your teaching and learning beliefs, attitudes and assumptions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to comment on reasons for any transformation of your learning and teaching beliefs, values, attitudes and assumptions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) REFLECTING ON THE TEACHING AND LEARNING JOURNEY/EXPERIENCE</td>
<td>(30)</td>
<td></td>
</tr>
<tr>
<td>Ability to narrate and critically reflect on progress and development, highlighting significant achievements/improvements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample evidence illustrating progress and development in your understanding about teaching and learning, e.g. drawn from your journal, lesson plans and evaluations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iii) APPLICATION AND INTEGRATION</td>
<td>(30)</td>
<td></td>
</tr>
<tr>
<td>Evidence of appreciation of significance of local/school setting context</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity to make appropriate connections in your learning in context of Portfolio as a whole, e.g. in context of a critical incident, teaching for diversity, your journal, and if appropriate to relate to elements of PGDE programme as a whole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iv) PRESENTATION (applies to the entire Part D)</td>
<td>(10)</td>
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</tr>
<tr>
<td>Appropriate presentation, style of language, coherence and accuracy of writing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate use of referencing conventions (citations and quotations, as appropriate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate length (1,500 words)</td>
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<td></td>
</tr>
<tr>
<td>TOTAL</td>
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Appendices

Appendix 6: Pilot Project Ed Tech Schedule, 2009-2010

<table>
<thead>
<tr>
<th>Wednesday Ed Tech Tutorials:</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Time</td>
<td>Location</td>
</tr>
<tr>
<td>A</td>
<td>9:00 – 10:00</td>
<td>D101</td>
</tr>
<tr>
<td>B</td>
<td>9:00 – 10:00</td>
<td>D301</td>
</tr>
<tr>
<td>C</td>
<td>10:00 – 11:00</td>
<td>D101</td>
</tr>
<tr>
<td>D</td>
<td>10:00 – 11:00</td>
<td>D301</td>
</tr>
<tr>
<td>E</td>
<td>11:00 – 12:00</td>
<td>D101</td>
</tr>
<tr>
<td>F</td>
<td>11:00 – 12:00</td>
<td>D301</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thursday Ed Tech Tutorials:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Time</td>
<td>Location</td>
</tr>
<tr>
<td>A</td>
<td>9:00 – 10:00</td>
<td>D101</td>
</tr>
<tr>
<td>B</td>
<td>9:00 – 10:00</td>
<td>D301</td>
</tr>
<tr>
<td>C</td>
<td>10:00 – 11:00</td>
<td>D101</td>
</tr>
<tr>
<td>D</td>
<td>11:00 – 12:00</td>
<td>D101</td>
</tr>
<tr>
<td>E</td>
<td>11:00 – 12:00</td>
<td>D301</td>
</tr>
<tr>
<td>F</td>
<td>2:00 – 3:00</td>
<td>D101</td>
</tr>
</tbody>
</table>
Appendices

Appendix 7: Pilot project DST Assignment brief, 2010-2011

**Digital Storytelling Brief**

**Educational Autobiographies**

This is a voluntary assignment.

**Aim:** To create a digital story in place of the essay required for part four of your Professional/Reflective Portfolio. The digital story should demonstrate your capacity to draw connections between different elements of the PGDE programme and to offer a synthesis of your learning as a whole.

In your digital story, *reflect on:*

- your educational journey
- re-evaluate learning goals and learning philosophies, evaluate achievement of these learning goals
- trace any transformations in your learning and teaching beliefs, values, attitudes, and assumptions, how these changes have come about
- relate what/why/how different elements of the PGDE programme contributed to your learning and teaching
- highlight significant landmark achievements/improvements you have made to your learning and teaching (can draw from your journal, lesson plans and evaluations…)

**Guidelines:**

- The educational autobiography should be told as a personal narrative
- The film can incorporate text, still images, moving images, voiceover, music, special effects, animation
- The film should be between three and five minutes in length
- Teach the viewer about the growth of your understanding of teaching and learning
- You should explicitly incorporate some of the theories about teaching and learning that have influenced you this year
- Bibliographic references must be listed in the film credits
- Submitted with the film will be a *working portfolio* including: complete and detailed planning notes; (brainstorming sheet, story drafts, storymap, storyboard, music/sound list, image/shot list, and references for articles/chapters/quotes used in the creation of the video)
- A typed, printed hard copy of the voice-over script used for your digital story must be included in your final portfolio for part D.

**Resources:**

- PC Labs, AiPle Lab D302 – Computers, software (Windows Movie Maker, iMovie, GarageBand, Myna; etc.)
- 5 hours of supervised class time in the lab
- Additional unsupervised hours in the AiPle Lab or PC Lab at your discretion
Assessment:
Digital Stories will be assessed using the reflective portfolio part D marking criteria (Available on Bb)

Due: Thursday, 13 May, 2010
- Upload your published digital story as a .mov file to Blackboard.
- Include a hard copy of your script with your Reflective portfolio as ‘part D’.
- Turn your Working Portfolio in to the correct assignment box in D–Block. Your working portfolio should include:
  - Complete and detailed planning notes:
    - brainstorming sheet
    - story drafts
    - storymap
    - storyboard
  - Music List
  - Image/Shot List
  - A hard copy of your final script
  - References for articles/chapters/quotes used in the creation of the video

✓ Make sure you DON’T cite ‘google images’ for images you use in your digital story. You have to cite the actual web page that the image came from.
✓ If you use any commercial music, you must cite this specifically
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Appendix 8: DTS Brainstorming sheet – presented to students as a two-sided handout.

Ed Tech Homework
for the week of
8 February, 2010:

1. Brainstorm an idea for a Digital Story.

This should be a reflection on what you’ve learned so far this year. (Along the lines of what you’ll have to write for part 4 of your reflective portfolio.)

Reflective Portfolio part 4
Students demonstrate their capacity to draw connections between different elements of the PGDE programme and to offer a synthesis of their learning as a whole.

They reflect on:
• their educational journey,
• tracing any transformations in their learning and teaching beliefs, values, attitudes, and assumptions, how these changes have come about,
• relate what why how different elements of the PGDE programme contributed to their learning and teaching,
• highlight significant landmark achievements/improvements they have made to their learning and teaching,
• and refer to samples of evidence of this improvement, contained in a Dossier.

2. Once you’ve finished brainstorming ideas, write a rough draft of no more than 500 words to bring to the next class.

Next Ed Tech class: week of 22 February (no Ed Tech during Mid-term break next week.)
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Appendix 9: Pilot project story map – presented to students in landscape layout.

Story Map: Visual Portrait of a Story

**Homework:** Use this diagram to create a Story Map of your story. Write all over it, get your ideas out. This is the beginning of your Digital Storytelling journey! Bring your completed VSP to class next week.

![Story Map Diagram]

(From Otter, 2008, p. 80)
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Appendix 10: Storyboard template based on Porter (2004a) presented to students as a 10 page handout, with this same graphic on each page.

Appendix 11: DST help sessions provided for students during the pilot project:

<table>
<thead>
<tr>
<th>Help Session Date</th>
<th>Time</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>15/4/10</td>
<td>9:00-1:00</td>
<td>2</td>
</tr>
<tr>
<td>22/4/10</td>
<td>9:00 – 4:00</td>
<td>3</td>
</tr>
<tr>
<td>29/4/10</td>
<td>8:30 – 1:00</td>
<td>4</td>
</tr>
<tr>
<td>3/5/10</td>
<td>Bank Holiday – No Classes</td>
<td></td>
</tr>
<tr>
<td>4/5/10</td>
<td>9:00 – 4:00</td>
<td>2</td>
</tr>
<tr>
<td>5/5/10</td>
<td>9:00 – 4:00</td>
<td>4</td>
</tr>
<tr>
<td>6/5/10</td>
<td>Class exam – no students</td>
<td></td>
</tr>
<tr>
<td>7/5/10</td>
<td>8:30 – 5:00</td>
<td>3</td>
</tr>
<tr>
<td>10/5/10</td>
<td>8:30 – 5:00</td>
<td>2</td>
</tr>
<tr>
<td>11/5/10</td>
<td>8:30 – 8:00</td>
<td>3</td>
</tr>
<tr>
<td>12/5/10</td>
<td>8:00 – 10:00, 3:00 – 7:00</td>
<td>3</td>
</tr>
<tr>
<td>13/5/10</td>
<td>9:30 – 5:00</td>
<td>6</td>
</tr>
</tbody>
</table>
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Appendix 12: Pilot project research permission form

Permission to use Digital Storytelling Materials

**Digital Storytelling Research Study**

Purpose of study: The purpose of this research is to explore the use of digital storytelling with pre-service teachers. The research is being conducted by Bonnie Long, PhD candidate, School of Education, NUI Galway. Any collected data will only be used strictly within the research project. Any published findings (e.g. in reports, academic papers or presentations) from the research will be anonymised; participants’ confidentiality will be preserved. No commercial gain will be made from these materials.

Please sign the form below to indicate your preference regarding the use of your work in this research project.

Thank you,

________________________
Bonnie Long

Student Name: ________________________________

I am the student named above. I am more than 18 years of age, and have read and understood the information given above. I understand that my name will not appear on any materials used.

(Please check one):

☒ I **DO** give permission to Bonnie Long to use materials that I have produced as part of the digital storytelling unit for research and presentation purposes. No identifying information will appear on any of these materials.

Signature of Student: ____________________________________________

Date: ____________________________________________

Date of Birth: _____ / _____ /_____

☒ I **DO NOT** give permission to include materials that I may produce as part of classroom activities.

Signature of Student: ____________________________________________

Date: ____________________________________________

Date of Birth: _____ / _____ /_____
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Appendix 13: PGDE Critical Incident DST brief, 2010-2011

**Critical Incident: Digital Storytelling Assignment Brief**

**Aim:** To create a digital story that evidences your ability to reflect on a **critical incident** from your practical experience on the PGDE.

**Definition of a critical incident:**
A critical incident can be defined as a happening, a specific incident or event either observed by you or involving you. The happening **sparks your thinking and makes you subsequently think and/or act differently** about the particular event and related issues.

**Guidelines:**

**Content:**
- The digital story should evidence your **critical reflection** on a chosen **critical incident** from your reflective journal (**ensure that you have removed all identifiers in terms of pupils’ names, teachers’ names, particular school, etc.**)
- The story should be told as a personal narrative which explains the critical incident and should answer the following questions for the viewer:
  - What is your rationale for choosing this incident?
  - What happened during the incident? Who was involved?
  - What were your initial beliefs about the incident?
  - What is the possible significance of the incident in context of the school and the wider society?
  - What issues were raised for you by the incident?
  - How did you deal with these issues?
  - How did the incident impact on your emotions, thoughts, beliefs and actions?
  - How has this incident changed your thoughts and/or actions?
  - What did you learn from this incident?
  - What resources did you utilise to help you reflect on and resolve this incident? E.g. relevant literature, colleagues, your own internal dialogue, drawing on thoughts about the event within different time frames, etc.
- You should explicitly incorporate some of the theories about teaching and learning that are relevant to this incident
  - Incorporate **at least three quotations** from **academic literature about teaching and learning** that hold significant meaning for you in relation to this incident

**Technical:**
- The digital story can incorporate still images, moving images, voiceover, text, sound effects and music
- The digital story should be between three and five minutes in length
- The digital story should utilise video editing software effectively
- Bibliographic references must be listed in the film credits
- Submitted with the film will be a **working portfolio** including: brainstorming, planning notes; rough drafts, storyboarding, a copy of
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your final voiceover script; bibliography of articles/chapters/resources used in the creation of the film; and a 800-1000 word, type-written reflection about the making of your digital story that explains both the process of making the film and how you feel about the product.

- A typed copy of your final voiceover script must be included in your Professional Portfolio as ‘Part B’. You will also include the essay about the making of your digital story in the appendix/dossier section of your Professional Portfolio.

Resources:

- PC Labs, AiPle Lab D302 – Computers, software (Windows Movie Maker, iMovie, Audacity, Myna; etc.)
- 6 hours of supervised class time/tutorials in the computer labs
- Additional unsupervised hours in the computer labs at your discretion

Assessment:
The digital story will be assessed using the Digital Storytelling Rubric presented and discussed in class, available on Bb in the Intro to Digital Storytelling folder.

Due:

- “Rough cut” for peer assessment due in your Ed Tech class the week of 2 May, 2011
- “Final cut” of movie due, Thursday, 12 May, 2011
  - uploaded to Bb, and included in your Professional Portfolio on DVD
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Appendix 14: Year two, 2010-2011, DST evaluation rubric

Digital Story Evaluation Rubric

<table>
<thead>
<tr>
<th>Categories</th>
<th>Excellent to Supreme</th>
<th>Good to Very Good</th>
<th>Satisfactory</th>
<th>Unacceptable</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content (Critical Incident)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Rationale for choice of critical incident and context</td>
<td>Clear rationale for choice of particular critical incident, identifies what initial beliefs were about incident, interprets possible significance of incident in context of school and wider society.</td>
<td>Reasonable rationale for choice of particular critical incident, identifies what initial beliefs were about incident, interprets possible significance of incident in context of school and wider society.</td>
<td>No rationale evident for choice of particular critical incident. Attempts to identify what initial beliefs were about incident. Interpretations of incident in context of school and wider society are not aligned.</td>
<td>No rationale evident for choice of particular critical incident. Interpretations of incident in context of school and wider society are not aligned.</td>
<td>1</td>
</tr>
<tr>
<td>Outline of incident</td>
<td>Clearly describes key features of incident, chronology of events in the incident are clearly understood.</td>
<td>Describes key features of incident, chronology of events in the incident are understood.</td>
<td>Describes key features of incident, chronology of events in the incident are not clearly understood.</td>
<td>Does not describe key features of incident, chronology of events in the incident is not understood.</td>
<td>1</td>
</tr>
<tr>
<td>Demonstrates learning that involves the whole person</td>
<td>Clearly reflects and shows evidence of learning that involves the whole person; clearly shows how the incident impacted on their emotions, thoughts, beliefs and actions.</td>
<td>Reflects and shows evidence of learning that shows how the incident impacted on their emotions, thoughts, beliefs and actions.</td>
<td>Reflects and shows evidence of learning that shows how the incident impacted on their emotions, thoughts, beliefs and actions.</td>
<td>Little evidence of reflection that shows how the incident impacted on their emotions, thoughts, beliefs and actions.</td>
<td>1</td>
</tr>
<tr>
<td>Evidence of integration of theory and practice</td>
<td>Incorporates at least three quotations from academic literature about teaching and learning that hold significant meaning for their relationship to critical incident.</td>
<td>Incorporates at least two quotations from academic literature about teaching and learning that hold significant meaning for their relationship to critical incident.</td>
<td>Incorporates at least two quotations from academic literature about teaching and learning that hold significant meaning for their relationship to critical incident.</td>
<td>Little evidence of reflection that shows how the incident impacted on their emotions, thoughts, beliefs and actions.</td>
<td>1</td>
</tr>
</tbody>
</table>

Planning

Working Portfolio includes complete and detailed planning notes; brainstorming sheets, storyboards, script, voice-overs, images, music, and sound. 
Working Portfolio includes most required planning notes; brainstorming sheet, storyboards, script, voice-overs, images, music, and sound. 
Working Portfolio includes some required planning notes; brainstorming sheet, storyboards, script, voice-overs, images, music, and sound. 
Working Portfolio does not include the required planning notes or reflective write-up.

Citation of Sources and Permission

All sources, including references, are cited completely in the text. All copyrighted material, if used, is identified and used with written permission. 
One source is cited incompletely in the text and/or 2 copyrighted pieces of material are not identified property or were not given written permission. 
Two sources are not cited completely in the text and/or 3 or more copyrighted pieces of material are not identified properly or were not given written permission. 
More than two sources are not cited completely in the text and/or more than 3 copyrighted pieces of material are not identified properly or were not given written permission.

Length of digital story in minutes, 1-3 minutes.
Length of digital story in minutes, 3-5 minutes.
Length of digital story in minutes, more than 5 minutes.
Length of digital story in minutes, 1-3 minutes.
Length of digital story in minutes, 3-5 minutes.
Length of digital story in minutes, more than 5 minutes.
### Appendices

<table>
<thead>
<tr>
<th>Categories</th>
<th>Excellent</th>
<th>Good to Very Good</th>
<th>Satisfactory</th>
<th>Unacceptable</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grammar and spelling</td>
<td>Use of strong, clear, and engaging language that enhances the overall message.</td>
<td>Use of clear, precise, and engaging language that enhances the overall message.</td>
<td>Use of clear, but less engaging language that enhances the overall message.</td>
<td>No evidence of correct grammar or spelling.</td>
<td>5</td>
</tr>
<tr>
<td>Story Structure</td>
<td>Use of dramatic question, opening statement, and problem to create a narrative that engages the audience.</td>
<td>Use of clear, engaging language that creates a narrative that engages the audience.</td>
<td>Use of clear, but less engaging language that creates a narrative that engages the audience.</td>
<td>No evidence of dramatic question, opening statement, or problem to create a narrative that engages the audience.</td>
<td>5</td>
</tr>
<tr>
<td>Personal narrative</td>
<td>The story is told in the first person, creating a sense of connection and immediacy.</td>
<td>The story is told in the first person, creating a clear and engaging narrative.</td>
<td>The story is told in the first person, but lacks clear and engaging narrative.</td>
<td>No evidence of personal narrative.</td>
<td>5</td>
</tr>
<tr>
<td>Economy of story</td>
<td>The story is told with sufficient detail to create a narrative that engages the audience.</td>
<td>The story is told with clear and engaging narrative.</td>
<td>The story is told with clear, but less engaging narrative.</td>
<td>No evidence of narrative.</td>
<td>5</td>
</tr>
<tr>
<td>Resolution of dramatic question</td>
<td>The story concludes with a clear and engaging narrative that resolves the main conflict.</td>
<td>The story concludes with a clear and engaging narrative.</td>
<td>The story concludes with a clear, but less engaging narrative.</td>
<td>No evidence of resolution of dramatic question.</td>
<td>5</td>
</tr>
</tbody>
</table>

#### Use of Technology

<table>
<thead>
<tr>
<th>Categories</th>
<th>Excellent</th>
<th>Good to Very Good</th>
<th>Satisfactory</th>
<th>Unacceptable</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Images complement and help convey the main ideas</td>
<td>Images convey information that is not contained in the text.</td>
<td>Images convey information that is not contained in the text.</td>
<td>Images convey information that is not contained in the text.</td>
<td>No evidence of images conveying information.</td>
<td>5</td>
</tr>
<tr>
<td>Soundtrack (optional) contributes to the message of the story</td>
<td>The soundtrack enhances the overall message of the story.</td>
<td>The soundtrack contributes to the message of the story.</td>
<td>The soundtrack contributes to the message of the story.</td>
<td>No evidence of soundtrack contributing to the message of the story.</td>
<td>5</td>
</tr>
<tr>
<td>Voiceover supports purpose and tone of story</td>
<td>The voiceover effectively supports the purpose and tone of the story.</td>
<td>The voiceover supports the purpose and tone of the story.</td>
<td>The voiceover supports the purpose and tone of the story.</td>
<td>No evidence of voiceover supporting purpose and tone of the story.</td>
<td>5</td>
</tr>
<tr>
<td>Student utilizes video editing software effectively</td>
<td>The student effectively uses video editing software.</td>
<td>The student effectively uses video editing software.</td>
<td>The student effectively uses video editing software.</td>
<td>No evidence of effective use of video editing software.</td>
<td>5</td>
</tr>
</tbody>
</table>

#### Total Score:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Possible points</th>
<th>With Soundtrack</th>
<th>Without Soundtrack</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>125</td>
<td>150</td>
<td>125</td>
<td></td>
</tr>
</tbody>
</table>

Final %:
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Appendix 15: Center for Digital Storytelling handout regarding Script Writing and the Seven Elements

Digital Storytelling:
Script Writing and the Seven Elements

The Script Writing Elements

Element 1: Point of View
Stories will be written from the first person perspective. They will be about you and by you. When you think of point of view you also want to think about what kind of message you are communicating. What is the moral of your story? Why do you want to make a digital story about this life experience, rather than a different life experience?

The answers to these questions help shape the story. Being clear about your message also allows you to keep your story short. When you are editing, and need to decide what to leave out of the story, and what to add to the story, it is a good idea to make your decision by thinking about the most important message of the story.

Element 2: Dramatic Question
The dramatic question establishes suspense and creates a story arc. It is usually a statement at the beginning of the story – often the first sentence. This sentence creates a question in the mind of the people who are listening to the story. An example of a statement that generates dramatic question is the following:

“When I was younger I confused friendship with popularity.”

The statement can be thought of as a hook; it draws in the listener and creates a question in the listener’s mind. The listener wants to know more about the situation – what does it mean that she confused friendship with popularity? What happened to clarify the difference between friendship and popularity? Does she feel like she currently has true friends?

How do you usually start telling a story to your friends? Common examples include:

I couldn’t believe it when Joey told me he was moving to….
I had the worst weekend...
My Mom is going to kill me when I get home.
She/he was so beautiful!

The dramatic question creates suspense – it grabs you and makes you want to stick around to hear the rest of the story.

Element 3: Emotional Content
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People are often most attracted to stories that are “real.” Stories that are real don’t try to sugar-coat or over-dramatize our life experiences. They are about situations that are affecting our friends, neighbours and even our own lives.

However, to make a story real, close attention needs to be paid to the truth of the story. The events and emotions that are described in the story have to come from the heart for the story to ring true. Nobody is touched emotionally by something that they think is false. A good way of writing a story that is very compelling, and that makes people want to pay close attention, is to write something truly genuine.

Please note: Your story needs to come from the heart, and it’s important to be truthful in telling it. However, it is not necessary that the story be about your deepest darkest secret. You should choose a topic about which you can feel comfortable talking about in public, especially with your peers. If you start writing a story, and find yourself bending the facts or not writing quite what you feel, you may need to consider writing an emotionally “safer” story.

Element 4: Economy
Digital stories are short; great stories are often just 300-500 words long. The writing form has a poetic sensibility in that the most effective digital stories are very thoughtful about the use of every word, phrase and pause. The editing process almost always consists of pruning away ideas that are redundant, or don’t contribute to the central focus of the story.

The editing can also be informed by the visual narrative. Sometimes descriptive language can be deleted altogether because an image will convey the information in a much more richly detailed fashion. For example, a picture of workers labouring in a field or of a student running across a field after a soccer ball will communicate much more clearly than a long-winded description.

Elements for Producing the Digital Story

Element 5: Voice
The voice is the element that gives life to the script. Each person’s voice is unique; it is a gift that is used to connect with our friends, families and communities. When we use our voice to record our story, we are reaching out to all those people who will watch our digital story. The words of the script will communicate some of the information we want our audience to know, but we also communicate our feelings through the sound of our voice. We let the audience see a small part of our personality, and because of that the audience connects with us and what we have to say more easily.

A lot of people don’t like the way their voice sounds when it’s recorded. However, one of the requirements of a digital story is to use the gift of your voice to connect with people that will view the story. When recording the
story, it’s helpful to remember that your story, your message and your perspective is really important for other people to understand your world.

You can also think of the images and music as part of your voice. The audience of the story will learn about your experiences by hearing what you have to say. The audience will also learn about your experiences by watching the images in the digital story and by listening to the music. It’s important to select images and music that add to the meaning of your story and send the message you want your story to send. Be careful about selecting images and music that contradict your message.

**Element 6: Soundtrack**

Music is often used to tell stories, and it can be an important element of a digital story. However, it is not absolutely essential. A good digital story does not have to have music. There are a few things to keep in mind when selecting music.

One: the music should fade into the background as the voiceover plays. Avoid choosing music with a lot of volume changes. Also, lyrics can interfere with listening to the voiceover. It is usually easiest to avoid music with lyrics.

Two: the music should complement the story. It constitutes another layer of the narrative that is helping to communicate the message of the story. It can help convey the sense of time and place in a story, as well as set the emotional tone. For example, many people (both youth and adults) have used music from their homeland when telling immigration stories. Also, make sure that the music is not interfering with the emotional tone of the story; a story about loss should not incorporate festive music. When the music does have lyrics, make sure that they do not undermine the overall message of the story.

Finally, special effects can also be part of the soundtrack. Many video editing programmes include special audio effects. Sounds such as horns beeping, children on a playground, crickets at night, alarm clocks, can be successfully incorporated into a digital story.

**Element 7: Pacing**

Pacing the voiceover and the visual narrative of a digital story is part of creating a clear and evocative voice. It’s important to speak as normally as possible when recording the script – with all the natural variations of a regular speaking voice. This can be particularly challenging for anybody who feels self-conscious of their voice or intimidated by the recording process. The objective is to create a voice recording that is varied in tempo and tone – it should speed up and slow down at appropriate moments and contain the inflections that reflect the emotional tone of the story.

A few simple techniques can encourage a natural sounding voiceover. When recording the story, it is helpful to sit up straight and keep your shoulders back to make sure that there is good airflow into your diaphragm. Also, try
to keep the distance from the speaker’s mouth to the microphone consistent. Finally, one good voiceover recording trick is to imagine that you are telling the story to a particular person you know and care about. Create an image of that person in your mind as you start the recording and pretend you are talking to them from across the kitchen table.
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Appendix 16: 2010-2011 Story circle feedback form

Story Circle Feedback Form

Teller: __________________________

The teller has included:

- Rationale for choosing this incident
- What happened during the incident
- Who was involved
- Initial beliefs about the incident
- Possible significance of the incident in context of the school and the wider society
- Issues raised for the teller by the incident
- How they dealt with these issues
- Impact of incident on the teller’s emotions, thoughts, beliefs and actions?
- How incident changed their thoughts and/or actions
- What they learned from this incident
- Resources utilised to help them reflect on and resolve the incident

Is it a story (beginning, middle, end)?

Does it start with a dramatic question?

Is the dramatic question resolved in the end?

Questions you have for the teller:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Suggestions you have for the teller:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
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Appendix 17: Year two, 2010-2011, DST peer assessment form

**Ed Tech DST Peer Assessment Form**

**Background Information:**
Anyting you wish the assessor to know about your digital story at this point.

**Assessment Procedure:**
Please use the attached Digital Story Evaluation Rubric to assess the DST in its present state. Write your Rubric scores in the boxes below. Use the notes section to suggest improvements or make other comments.

### First Assessment

<table>
<thead>
<tr>
<th>Content</th>
<th>Rationale</th>
<th>Online</th>
<th>Learning</th>
<th>Other Perspectives</th>
<th>Change in thoughts</th>
<th>Integration</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Working Portfolio</td>
<td>Storyboard</td>
<td>Write-up</td>
<td>Notes:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanics</td>
<td>Citation of sources</td>
<td>Length</td>
<td>Grammar/ Spelling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Story Structure</td>
<td>Dramatic Question</td>
<td>Personal Narrative</td>
<td>Economy of Story</td>
<td>Resolution of D.Q.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of Technology</td>
<td>Images</td>
<td>Soundtrack</td>
<td>V overscribe</td>
<td>Editing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Soundtrack (music) is optional. If music is used, score will be out of 130. If music is not used, score will be out of 125.  

Total Score:

### Second Assessment

<table>
<thead>
<tr>
<th>Content</th>
<th>Rationale</th>
<th>Online</th>
<th>Learning</th>
<th>Other Perspectives</th>
<th>Change in thoughts</th>
<th>Integration</th>
<th>Total</th>
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<td>Storyboard</td>
<td>Write-up</td>
<td>Notes:</td>
<td></td>
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<td>Length</td>
<td>Grammar/ Spelling</td>
<td></td>
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<tr>
<td>Story Structure</td>
<td>Dramatic Question</td>
<td>Personal Narrative</td>
<td>Economy of Story</td>
<td>Resolution of D.Q.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of Technology</td>
<td>Images</td>
<td>Soundtrack</td>
<td>V overscribe</td>
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Total Score:

### Third Assessment

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<td>Storyboard</td>
<td>Write-up</td>
<td>Notes:</td>
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<td>Mechanics</td>
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<td>Length</td>
<td>Grammar/ Spelling</td>
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<td>Story Structure</td>
<td>Dramatic Question</td>
<td>Personal Narrative</td>
<td>Economy of Story</td>
<td>Resolution of D.Q.</td>
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<tr>
<td>Use of Technology</td>
<td>Images</td>
<td>Soundtrack</td>
<td>V overscribe</td>
<td>Editing</td>
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<td></td>
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</tr>
</tbody>
</table>

Total Score:
Appendices

Appendix 18: Research and sharing permission forms, 2010-2011

Digital Storytelling Research Study

Dear PGDE students,

Thank you for allowing me to be a part of the creation of your digital story. As you probably know, as well as being an Ed Tech tutor, I’m also a PhD student here in the NUI, Galway School of Education. My research deals with the use of digital storytelling to enhance reflection on practice for pre-service teachers. My hope is to be able to design a digital storytelling unit that enables pre-service teachers to reflect deeply on their practice, while providing an experience that is engaging, fun, and teaches you the skills you need to incorporate technology into your teaching.

As part of my research, I would like to find out from you what you thought of the digital storytelling process, what you got from it, and how you think it could be improved. I would also like to assess your digital stories for levels of reflection, and analyse them for the different ways that the multimedia aspects of digital storytelling added to your reflection on practice.

While completing a digital story was a required part of your coursework for the PGDE, participating in this research is completely voluntary. Choosing to participate, or not, will have no bearing on your mark for this course. No penalty will be incurred if you choose not to participate.

Different formats of evaluation data will be collected, including:

- Questionnaire data
- Interviews
- Digital story video analysis
- Analysis of planning materials
- Online shared discussions

Data collected for this doctoral research will become a part of my dissertation; all published data (including in reports, academic papers or presentations) will be anonymised: participants’ confidentiality will be preserved. No identifying information will appear on any of these materials.

If you have any questions or concerns regarding this research, you can contact me on (085) 758-0115, or by email on b.long1@nuigalway.ie. Alternatively, you can contact my supervisor, Dr. Tony Hall, on (091) 492153, or by email on tony.hall@nuigalway.ie.

Please sign and date the attached form to indicate your preference regarding the use of your work and your participation in this research project. Please keep this letter and a signed and dated copy of the consent form for yourself, and submit a signed and dated copy of the consent form with your DST working portfolio, on or before 12 May, 2011.

Thank you,

_____________________
Bonnie Long
Permission to use Digital Storytelling Materials

This research is being conducted by Bonnie Long, PhD candidate, School of Education, NUI, Galway.

If you have any questions or concerns regarding this research, you can contact Bonnie on (085) 758-0115, or by email on b.long1@nuigalway.ie. Alternatively, you can contact my supervisor, Dr. Tony Hall, on (091) 492153, or by email on tony.hall@nuigalway.ie.

*******************************************************************************

Student Name: _____________________________________________________________

(Please tick one):

☐ I DO give permission to Bonnie Long to use materials that I have produced as part of the digital storytelling unit for research and presentation purposes. No identifying information will appear on any of these materials.

Signature of Student: _______________________________________________________

Date: ____________________________________________________________________

☐ I DO NOT give permission to use materials that I have produced as part of the digital storytelling unit for research and presentation purposes.

Signature of Student: _______________________________________________________

Date: ____________________________________________________________________
Sharing of Finished Digital Stories with PGDE Classmates on Private Website:

The Power of Sharing: Sharing your digital stories with your peers can enhance your own reflection on practice. You have heard the beginnings of each other’s stories through the peer feedback sessions we’ve held, and have helped each other through the story development process. Sharing your final stories with each other can allow you to see how many of you have struggled with similar situations in your teaching practice. I hope that in viewing these you can continue to critically reflect on your own professional practice and learn from one another’s critical incidents. In this way the deep learning each of you experienced can be multiplied many times over.

A website has been established for the sharing of your digital stories with each other. This website is password protected. The only people who will be able to view your digital story on this site are your PGDE classmates and lecturers. Once the digital stories have been uploaded to the website, you will be sent a password by email. You will have the ability to comment on each other’s digital stories. If you like a particular story or feel that it has touched you in a certain way, please let the author know by leaving a comment. Digital storytelling, by design, is intended to get you to actively think about issues and to allow you to rethink critical moments, therefore, as you view peers’ digital stories, remember that they are more than entertainment – they are the building blocks of theory created by pre-service teachers.

If you would like to share your digital story with your classmates, please tick the appropriate box and sign the form below.

(Please tick one):

☐ I DO wish to share my finished digital story with my classmates on the private PGDE DST Site (Alternative email address: ____________)  

☐ I DO NOT wish to share my finished digital story with my classmates on the private PGDE DST Site

Signature of Student: _____________________________

Date: ________________

Category:

The digital stories will be categorized by topic. Please tick the category below that you feel your digital story falls under. If you do not feel that your digital story fits in any of these categories, please tick ‘Other’ and write in the category you feel is appropriate for your digital story.

☐ Classroom Control  ☐ Teacher Stress  
☐ Difficult Student  ☐ Staff Issues  
☐ Bullying  ☐ Diversity Issues  
☐ Other__________  ☐ Lesson Planning
Appendices

Appendix 19: Permission from Getty Images to use low-resolution images for DSTs

You are now chatting with Tom.
Tom: Hi! How can I help you?
Bonnie: I was wondering if you have free use for education projects.
Tom: Hi Bonnie - you can download preview images and use them as long as they are not published online or in print, how would you be looking to use them exactly?
Bonnie: My students are creating digital stories for a classroom assignment.
Bonnie: They are student teachers, a lot of them are ending up with your photos about teachers and classrooms with the water mark on them.
Bonnie: I wanted to find out if there was a way for them to use the images without having to pay the fee.
Tom: They would need to register on the website in order to download preview images, these will not be watermarked as long as they are from the 'Creative' collections.
Bonnie: Great! I'll pass on the information to them. Thanks very much for your help!
Bonnie: *very :)*
Tom: No problem!
Bonnie: Just ensure the images are not put on a website!
Bonnie: Definitely! Will ensure that if they use your images, their stories can't be published on the web.
Appendices

Appendix 20: Descriptive Statistics from Second Iteration

Questionnaire Descriptive Statistics

Age:

![2010-2011 Questionnaire Respondents Age Breakdown]

Gender:

![2010-2011 Questionnaire Respondents Gender Breakdown]

Teaching Practice Subjects

Students were asked to list the teaching practice subjects they were qualified to teach. These were re-coded in SPSS to show the broad subject area of the individual respondent’s teaching area. The breakdown of respondents’ teaching practice areas is shown in Figure __ below.

![2010-2011 Questionnaire Respondents Teaching Practice Areas]
The majority of respondents, 28, came from an Arts background, 18 came from a Maths/Science background, and 3 came from a Business background. Six did not answer this question. The data collected were collated and analysed using the R-NEST framework.

**Reflective Essay Descriptive statistics**

One-hundred forty-three students gave permission for their DST materials to be used in the data analysis. Descriptive statistics for these students were also collected, as shown in the following figures.

The researcher did not have permission to access data on students’ age, so this information is not included.
2010-2011 Research Participants Self Reported ICT Skills Level

ICT Skills Level

<table>
<thead>
<tr>
<th>Skill Level</th>
<th>Count</th>
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<tbody>
<tr>
<td>Absolute Beginner</td>
<td>10</td>
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<tr>
<td>Beginning</td>
<td>40</td>
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<tr>
<td>Competent</td>
<td>100</td>
</tr>
<tr>
<td>Advanced</td>
<td>5</td>
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</table>
Appendices

Appendix 21: Year three, 2011-2012 DST Sharing/Peer feedback forms

**Ed Tech DST Sharing/Peer Feedback Form**

Digital Story Title:

____________________________

**Background Information:**
Anything you’d like the assessor to know about your digital story:

____________________________

____________________________

Feedback Procedure
Watch the digital story and answer the questions below. Try to watch/give feedback on 3+ digital stories.

**First Feedback:**
1. How did this Digital Story Affect you?

____________________________

____________________________

____________________________

2. What did you learn from the story?

____________________________

____________________________

____________________________

3. What did you like best about the story?

____________________________

____________________________

____________________________

4. How does this story relate to your own TP experience?

____________________________

____________________________
Appendices

Other Comments:

_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________

Second Feedback:
1. How did this Digital Story Affect you?

_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________

2. What did you learn from the story?

_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________

3. What did you like best about the story?

_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________

4. How does this story relate to your own TP experience?

_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________

Other Comments:

_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
Third Feedback:
1. How did this Digital Story Affect you?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. What did you learn from the story?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3. What did you like best about the story?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

4. How does this story relate to your own TP experience?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Other Comments:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Practice Feedback:  
Haylee Whitcomb’s Digital Story from the CPUT Digital Storytelling Project

1. How did this Digital Story Affect you?

_____________________________________________________________

_____________________________________________________________

_____________________________________________________________

2. What did you learn from the story?

_____________________________________________________________

_____________________________________________________________

_____________________________________________________________

3. What did you like best about the story?

_____________________________________________________________

_____________________________________________________________

_____________________________________________________________

4. How does this story relate to your own TP experience?

_____________________________________________________________

_____________________________________________________________

_____________________________________________________________

Other Comments:

_____________________________________________________________

_____________________________________________________________

_____________________________________________________________
Appendices

Appendix 22: Year three, 2011-2012, instructions for creating DST project folders

**Creating your Digital Story Practice Project Folders**

1. Create practice project folders:
   a. Double click on the *My Computer* icon to open it.
   b. Navigate to your Ed Tech Folder on your Userdrive.
   c. Click the *New Folder* button on the toolbar.
   d. Name the folder ‘Your Name’s Practice DST Project’
   e. To add folders inside this folder:
      i. Double click on the folder to open it.
      ii. Click the *New Folder* button in the toolbar to create another folder.
      iii. Name this folder *Images*.
   f. Add the following folders to your Project folder as well:
      i. WMM Project
      ii. Music & Sounds
      iii. Script
      iv. Voiceover
      v. Soundtrack

**Note:** Create your own DST Project folder on your user drive or your own computer. Any files you use for your Digital Story need to be saved to these folders.

**Super incredibly TOTALLY important note!!!!**

Do not move the files from these folders once you have imported them into Movie Maker. WMM won’t be able to find them, and all you will see on your timeline is *big red Xs!!!!*

If this does happen to you:

1. Makes sure everything is in the right project folder.
2. Double click on the object in the timeline.
3. WMM will ask you if you want to find the file on your computer.
4. Click the YES button.
5. Navigate to the file on the computer and double click it. Repeat for other objects on the timeline as necessary.
Appendices

Appendix 23: Permission to use DST for research form, year 3, 2011-2012

Digital Storytelling Research Study

Dear PDE students,

Thank you for allowing me to be a part of the creation of your digital story. As you probably know, as well as being an Ed Tech tutor, I’m also a PhD student here in the NUI, Galway School of Education. My research deals with the use of digital storytelling to enhance reflection on practice for pre-service teachers. My hope is to be able to design a digital storytelling unit that enables pre-service teachers to reflect deeply on their practice, while providing an experience that is engaging, fun, and teaches you the skills you need to incorporate technology into your teaching.

As part of my research, I would like to find out from you what you thought of the digital storytelling process, what you got from it, and how you think it could be improved. I would also like to assess your digital stories for levels of reflection, and analyse them for the different ways that the multimedia aspects of digital storytelling added to your reflection on practice.

While completing a digital story was a required part of your coursework for the PDE, participating in this research is completely voluntary. Choosing to participate, or not, will have no bearing on your mark for this course. No penalty will be incurred if you choose not to participate.

Different formats of evaluation data will be collected, including:

- Questionnaire data
- Interviews
- Digital story video analysis
- Analysis of planning materials
- Online shared discussions

Data collected for this doctoral research will become a part of my dissertation; all published data (including in reports, academic papers or presentations) will be anonymised: participants’ confidentiality will be preserved. No identifying information will appear on any of these materials.

If you have any questions or concerns regarding this research, you can contact me on (085) 758-0115, or by email on b.long1@nuigalway.ie. Alternatively, you can contact my supervisor, Dr. Tony Hall, on (091) 492153, or by email on tony.hall@nuigalway.ie.

Please sign and date the attached form to indicate your preference regarding the use of your work and your participation in this research project. Please keep this letter and a signed and dated copy of the consent form for yourself, and submit a signed and dated copy of the consent form with your DST working portfolio, on or before 6 January, 2012.

Thank you,

________________________
Bonnie Long
Sharing of Finished Digital Stories with PDE Classmates on Private Website:

The Power of Sharing: Sharing your digital stories with your peers can enhance your own reflection on practice. You have heard the beginnings of each other’s stories through the peer feedback sessions we’ve held, and have helped each other through the story development process. Sharing your final stories with each other can allow you to see how many of you have struggled with similar situations in your teaching practice. I hope that in viewing these you can continue to critically reflect on your own professional practice and learn from one another’s critical incidents. In this way the deep learning each of you experienced can be multiplied many times over.

A website has been established for the sharing of your digital stories with each other. This website is password protected. The only people who will be able to view your digital story on this site are your PDE classmates and lecturers. Once the digital stories have been uploaded to the website, you will be sent a password by email. You will have the ability to comment on each other’s digital stories. If you like a particular story or feel that it has touched you in a certain way, please let the author know by leaving a comment. Digital storytelling, by design, is intended to get you to actively think about issues and to allow you to rethink critical moments, therefore, as you view peers’ digital stories, remember that they are more than entertainment – they are the building blocks of theory created by pre-service teachers.

If you would like to share your digital story with your classmates, please tick the appropriate box and sign the form below.

(Please tick one):

- [ ] I DO wish to share my finished digital story with my classmates on the private PDE DST Site (Alternative email address: ________________)

- [ ] I DO NOT wish to share my finished digital story with my classmates on the private PDE DST Site

Signature of Student: __________________________________________________________________________

Date: ______________________________________________________________________________________

*************************************************************************

Category:

The digital stories will be categorized by topic. Please tick the category below that you feel your digital story falls under. If you do not feel that your digital story fits in any of these categories, please tick ‘Other’ and write in the category you feel is appropriate for your digital story.

- [ ] Classroom Control
- [ ] Difficult Student
- [ ] Bullying
- [ ] Other ______________
- [ ] Teacher Stress
- [ ] Staff Issues
- [ ] Diversity Issues
- [ ] Lesson Planning
Appendices

Appendix 24: Descriptive Statistics for 2011-2012, year 3, research participants

Questionnaire Respondents:

Age

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<td>26 to 30</td>
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<td>31 to 35</td>
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<td>46 to 50</td>
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<td>51 to 55</td>
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(N=25)

Gender

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<td>Female</td>
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Subject area background

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<td>Arts</td>
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<td>Business</td>
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(N=25)
Self-reported ICT Skills

**Working Portfolio Research Participants:**

*Age:*
The researcher did not have permission to access data on students’ age, so this information is not included.

*Gender:*

---

**2011-2012 Questionnaire Respondents Self Reported ICT Skills**

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<td>Beginner</td>
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<td>24%</td>
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<tr>
<td>Intermediate</td>
<td>10</td>
<td>40%</td>
</tr>
<tr>
<td>Advanced</td>
<td>6</td>
<td>24%</td>
</tr>
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</table>

(N=25)

**2011-2012 Research Participants Gender Breakdown**

- Male: 31%
- Female: 69%

(N=159)
Appendices

Subject area background:

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<td>Arts</td>
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<td>Maths/Science</td>
<td>57%</td>
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<td>Business</td>
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Self-reported ICT Skills Level:

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<td>Beginner</td>
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<td>Competent</td>
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<td>Advanced</td>
<td>17%</td>
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Appendices

Appendix 25 Year 3 PDE critical Incident-DST assignment brief, 2011-2012

Critical Incident: Digital Storytelling Assignment Brief

Aim: To create a digital story that evidences your ability to reflect on a critical incident from your practical experience on the PDE.

Definition of a critical incident:
A critical incident can be defined as a happening, a specific incident or event either observed by you or involving you. The happening sparks your thinking and makes you subsequently think and/or act differently about the particular event and related issues.

Guidelines:

Content:
- The digital story should evidence your critical reflection on a chosen critical incident from your reflective journal (ensure that you have removed all identifiers in terms of pupils’ names, teachers’ names, particular school, etc.)
- The story should be told as a personal narrative which explains the critical incident and should answer the following questions for the viewer:
  o What is your rationale for choosing this incident?
  o What happened during the incident? Who was involved?
  o What were your initial beliefs about the incident?
  o What issues were raised for you by the incident?
  o How did you deal with these issues?
  o How did the incident impact on your emotions, thoughts, beliefs and actions?
  o What is the possible significance of the incident in context of the school and the wider society?
  o What resources did you utilise to help you reflect on and resolve this incident? E.g. relevant literature, colleagues, your own internal dialogue, drawing on thoughts about the event within different time frames, etc.
  o What did you learn from this incident?
  o How has this incident changed your thoughts and/or actions?
- You should explicitly incorporate some of the theories about teaching and learning that are relevant to this incident
  o Incorporate at least three quotations from academic literature about teaching and learning that hold significant meaning for you in relation to this incident
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Technical:
- The digital story can incorporate still images, moving images, voiceover, text, sound effects and music
- The digital story should be between three and five minutes in length
- The digital story should utilise video editing software effectively
- Bibliographic references for images, music, sounds and quotes must be listed in the film credits

Working Portfolio:
- Submitted with the Digital Story will be a working portfolio including:
  - Brainstorming
  - planning notes
  - rough drafts
  - story maps
  - storyboard
  - a copy of your final voiceover script
  - bibliography of resources used in the creation of the digital story
  - 800-1000 word, type-written reflection about the making of your digital story that explains both the process of making the film and how you feel about the product.

Resources:
- PC Labs, AiPle Lab D302 – Computers, software (Windows Movie Maker, Audacity, Myna)
- 9 hours of supervised class time/tutorials in the computer labs
- Additional unsupervised hours in the computer labs at your discretion

Assessment:
The digital story will be assessed using the Digital Storytelling Rubric presented and discussed in class, available on Bb in the Digital Storytelling folder. (Professional Development Module)

Important Milestone Dates:
- Choice of critical incident, begin writing story during first teaching block (10 October to 18 November, 2011)
- **Story Rough Draft** due in Ed Tech for peer feedback week of 21 November, 2011
- **Final Story** due for recording, week of 28 November, 2011
- **Record voiceover** weeks of 5th December and 16th December
- All images, music, sounds due for compilation of DST, work session week of 12 December, 2011
- Help sessions in D101 and D301, 3 – 6 January, 2012
- **Final Digital Story Due Friday, 6 January, 2012**
Appendix 26: DST evaluation rubric, year 3, 2011-2012

Digital Story Evaluation Rubric

<table>
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<th>Excellent to Supreme 1-5</th>
<th>Good to Very Good 6-8</th>
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<th>Unacceptable 11-12</th>
<th>Score</th>
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<td>Rationale for choice of particular critical incident</td>
<td>Rationale for choice of particular critical incident</td>
<td>Rationale for choice of particular critical incident</td>
<td>Rationale for choice of particular critical incident</td>
<td>Score</td>
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<tr>
<td></td>
<td>Clear rationale for choice of particular critical incident, identifies what initial beliefs were about incident, interprets possible significance of incident in context of school and wider society.</td>
<td>Clear rationale for choice of particular critical incident, identifies what initial beliefs were about incident, interprets possible significance of incident in context of school and wider society.</td>
<td>Clear rationale for choice of particular critical incident, identifies what initial beliefs were about incident, interprets possible significance of incident in context of school and wider society.</td>
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<td>Clear rationale for choice of particular critical incident, identifies what initial beliefs were about incident, interprets possible significance of incident in context of school and wider society.</td>
<td>Clear rationale for choice of particular critical incident, identifies what initial beliefs were about incident, interprets possible significance of incident in context of school and wider society.</td>
<td>Score</td>
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<td>Clear rationale for choice of particular critical incident</td>
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<td>Clear rationale for choice of particular critical incident, identifies what initial beliefs were about incident, interprets possible significance of incident in context of school and wider society.</td>
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<td>Clear rationale for choice of particular critical incident, identifies what initial beliefs were about incident, interprets possible significance of incident in context of school and wider society.</td>
<td>Score</td>
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### Appendices

#### Categories

<table>
<thead>
<tr>
<th>Score</th>
<th></th>
<th></th>
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<th></th>
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<tbody>
<tr>
<td>5</td>
<td>Excellent to Supreme</td>
<td>Good to Very Good</td>
<td>Satisfactory</td>
<td>Unsatisfactory</td>
<td>Score</td>
</tr>
<tr>
<td>4</td>
<td>Grammar and spelling are almost perfect. Minor errors exist.</td>
<td>Grammar and spelling are acceptable. Some errors exist.</td>
<td>Grammar and spelling are acceptable. Some errors exist.</td>
<td>Grammar and spelling are unacceptable. Errors are distracting.</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>The narrative is well written and engaging.</td>
<td>The narrative is engaging and well written.</td>
<td>The narrative is acceptable.</td>
<td>The narrative is unacceptable. Errors are distracting.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The dramatic question is clearly stated and engaging.</td>
<td>The dramatic question is stated and engaging.</td>
<td>The dramatic question is stated.</td>
<td>The dramatic question is unacceptable.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>The resolution of the dramatic question is clearly stated and engaging.</td>
<td>The resolution of the dramatic question is stated.</td>
<td>The resolution of the dramatic question is unacceptable.</td>
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<tr>
<td>0</td>
<td>The economy of the story is well managed.</td>
<td>The economy of the story is acceptable.</td>
<td>The economy of the story is unacceptable. Errors are distracting.</td>
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<td>0</td>
<td>The personal narrative is well written and engaging.</td>
<td>The personal narrative is acceptable.</td>
<td>The personal narrative is unacceptable. Errors are distracting.</td>
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#### Rubric

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<th>Categories</th>
<th>Score</th>
<th>Excellent to Supreme</th>
<th>Good to Very Good</th>
<th>Satisfactory</th>
<th>Unsatisfactory</th>
<th>Use of Technology</th>
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<tr>
<td></td>
<td>5</td>
<td>Employed imagery used to convey information, not overwhelming.</td>
<td>Employed imagery used to convey information, not overwhelming.</td>
<td>Employed imagery used to convey information, not overwhelming.</td>
<td>Employed imagery used to convey information, not overwhelming.</td>
<td>Employed imagery used to convey information, not overwhelming.</td>
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<td>4</td>
<td>Some use of implicit imagery used to convey information, not overwhelming.</td>
<td>Some use of implicit imagery used to convey information, not overwhelming.</td>
<td>Some use of implicit imagery used to convey information, not overwhelming.</td>
<td>Some use of implicit imagery used to convey information, not overwhelming.</td>
<td>Limitation of use of implicit imagery used to convey information, not overwhelming.</td>
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<td>3</td>
<td>Minimal use of implicit imagery used to convey information, not overwhelming.</td>
<td>Minimal use of implicit imagery used to convey information, not overwhelming.</td>
<td>Minimal use of implicit imagery used to convey information, not overwhelming.</td>
<td>Minimal use of implicit imagery used to convey information, not overwhelming.</td>
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<td>Minimal use of implicit imagery used to convey information, not overwhelming.</td>
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<td>Less than minimal use of implicit imagery used to convey information, not overwhelming.</td>
<td>Less than minimal use of implicit imagery used to convey information, not overwhelming.</td>
<td>Limitation of use of implicit imagery used to convey information, not overwhelming.</td>
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<td>No use of implicit imagery used to convey information, not overwhelming.</td>
<td>Limitation of use of implicit imagery used to convey information, not overwhelming.</td>
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#### Points out of 40:

| Possible points: With Soundtrack 125 Without Soundtrack 105 |
|-------------------------------------------------------------|-------------------------------------------------|
| 125                                                          | 105                                            |

| Rubric based on School of Ed. essay criteria and assessment rubric provided by the Center for Digital Storytelling. www.storycenter.org. Used with permission. Allocated to N2C grade bands. |
Appendices

Appendix 27: Examples from Implementation Logs

Pilot Project implementation log sample, 2009-2010:

24/25 February 2010

Lesson 1 with the PGDE students.

Changed the PowerPoint presentation a bit between Wednesday and Thursday. There was just too much in there to get through in one hour. Took out one of the slides on storytelling in education. Still not sure if I even need to include that in there.

Realised I didn’t mention anything about the Center for DST or where DST started. Should include that at the beginning of the slideshow.

Biggest thing that came up today was students wanting to complete the DST, but not wanting to use the macs for various reasons. Sample student email here:

Hi Bonnie,

I am interested in this digital story telling but I have a few questions.

You mentioned in class that iMovie would be better to work with as you can use two audio feeds which would make the movie more interesting. However is there a compatible mode that you can save your work in?

As I do not own an apple computer and I work with Windows Vista, if there isn’t a compatible form then I would prefer to use Windows movie maker as I can edit at home on my own computer. Plus next year I won’t have the luxury of using iMUG apple computers so therefore it might be best to use Windows as I will only have my computer available to me for creating digital story telling.

Regards,

Year 2 implementation log sample, 2010-2011:

10/12/2010

Had the big meeting with the Professional Practice tutors last Thursday, 2 December. Had to explain the digital story assignment brief to them, and show them the assessment rubric for the digital stories.

Patrick and I met the day before to plan the meeting with the tutors. I had put together a PowerPoint presentation to use in the tutorials which I wanted to share with the tutors at the meeting the next day. I think this is the best way to ensure that all the tutors are giving the students the same information. Patrick suggested a few changes to it, and we decided on the agenda for the meeting. He would introduce the meeting, and then I would take it from there, explaining the assignment brief, rubric, and taking them through the presentation I hoped they would use.

We’d met with consternation before from the tutors about how they were going to explain the digital story assignment to the students when they themselves didn’t even know what it was, so I wanted to make it as easy as possible for them to run this tutorial on the critical incident, without getting bogged down in explaining the DST to the students. So I added slides to the presentation stating that the tutorial was about the critical incident, and that they’d learn all about the digital story in Ed Tech.

During the meeting with the tutors, all went more or less according to plan. The slide about learning about the DST in Ed Tech seemed to mollify most of the tutors, and allay what I can only call their anxiety about talking about digital storytelling with the students. Something that keeps popping up in my dealings with other staff members in relation to DST – they’re anxious about it or closed to the idea of it just because they don’t really know what it is. I’ve
Appendices

Year 3 Implementation log sample, 2011-2012:

13/2/12

Had the first official DST sharing sessions in Ed Tech Classes today. They were very well received by the students. They seemed to genuinely enjoy seeing each other’s digital stories.

I sent out the following email to all Ed Tech students the week before sharing, in the hopes of alleviating any reservations they might have had about sharing their DSTs with each other, and to encourage them to come to class and participate in the activity:

2/10/12

Dear Ed Tech Students,

Next week in Ed Tech we’ll be watching each other’s digital stories and giving feedback. I have been really impressed with your Digital Stories so far! So don’t be shy about sharing with your classmates, and getting feedback from them. I think we can all learn something valuable from watching each other’s stories.

Just a few reminders for Ed Tech classes next week:
1. Due to the Development Education seminar on Wednesday, the Wednesday Ed Tech classes are all happening on Monday, 13 February, 2012. Come to your normal class time and room.
2. Please make sure you have available on either your user drive or on a data stick, your final Digital story in *wmv* format. We’ll be giving peer feedback on the digital stories in class the same way we did for the Powerpoint presentations: anonymously, on a PC, and you will move around the room from PC to PC.
3. Don’t forget to bring your headphones/earphones. Our headphone stock is severely diminished as they keep falling apart every time we use them!

Looking forward to seeing you all on campus again next week!

All the best,

Bonnie and Maria

We started the session by watching a digital story from a student teacher in South Africa, and asked the students to give practice feedback on that. Then they gave feedback on each other’s digital stories on an individual basis.

I was contacted by a teacher educator in South Africa, Daniela Cachago, in August 2011, who found one of my conference papers on the internet. They’re using DST with their student teachers as well. We shared notes and talked about possibly setting up a website where our students could share their DSTs with each other. So far we haven’t been able to do that, as their school year is the opposite to ours, being in the southern hemisphere. When we’re starting the year, they’re ending theirs, and visa versa!! But it’s been great talking to her and hearing how they are using DST with their student teachers.

She has put several of her students’ DSTs up on her blog about DST, so I asked her if we could use one of them as the introduction to our DST sharing session this year. She was very enthusiastic about this, and asked for our students’ feedback on her students’ DSTs. I’ve incorporated that into the DST feedback session.

The students were very moved by the South African student teacher’s DST. It dealt with corporal punishment being used on the students by the cooperating teachers she was supposed to be learning from, and her horrified reaction to this. At the end of the viewing, many of our students stated that they were happy they were teaching in Ireland, and some said it made their DST topic seem a lot less difficult than what the student teacher in SA had to go through. A few said to me that it was great to see other student teachers were using DST on their program, and that they weren’t the only ones. I think it also struck them that this was a great way for student teachers to share their experiences with other student teachers around the world, and they might have started to see the wider applications of DST in education.

Talking to a few of the students afterwards, they said they really enjoyed the process, and were happy that they got to see each other’s digital stories. All in all, a great success for our first finished DST sharing session, finally!!
# Appendix 28: Pilot Project Survey Questions, 2010-2010

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Question/Headings</th>
<th>Type of Question:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you consent to participate in this questionnaire?</td>
<td>yes/no</td>
</tr>
<tr>
<td>2</td>
<td>The Digital Storytelling Process: Thank you for choosing to complete a digital story as part of your reflective portfolio. As this was a pilot project, we would appreciate your honest feedback on your digital storytelling experience. The information you supply here will help us to improve the digital storytelling experience for future students.</td>
<td>open ended</td>
</tr>
<tr>
<td>3</td>
<td>Why did you choose to complete a Digital Story?</td>
<td>open ended</td>
</tr>
<tr>
<td>4</td>
<td>What did you like most about the digital storytelling process?</td>
<td>open ended</td>
</tr>
<tr>
<td>5</td>
<td>What did you like least about the digital storytelling process?</td>
<td>open ended</td>
</tr>
<tr>
<td>6</td>
<td>What helped you most in putting your digital story together?</td>
<td>open ended</td>
</tr>
<tr>
<td>7</td>
<td>What advice would you give to someone completing a digital story of their own?</td>
<td>open ended</td>
</tr>
<tr>
<td>8</td>
<td>Heading: The use of the following graphic organisers was very helpful in the creation of my digital story:</td>
<td>open ended</td>
</tr>
<tr>
<td>8</td>
<td>Brainstorming</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>8</td>
<td>Storyboard</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>8</td>
<td>Story map</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>9</td>
<td>Heading: Approximately how many hours did you spend on the following?</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>9</td>
<td>Brainstorming your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>9</td>
<td>Creating a story map for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>9</td>
<td>Writing the script for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>9</td>
<td>Creating a storyboard for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>9</td>
<td>Recording the voice-over for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>9</td>
<td>Sourcing sound or music for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>9</td>
<td>Sourcing images for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>9</td>
<td>Using the video editing software to put your digital story together</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>10</td>
<td>Creating my digital story with the video editing software was a straightforward process.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>10</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>11</td>
<td>Finding the relevant images for my digital story was a straightforward process.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
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<td>11</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>12</td>
<td>Recording the narration for my digital story was a straightforward process.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
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<td>12</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>13</td>
<td>Which movie editing software did you use?</td>
<td>Choice of iMovie, WMM or Other</td>
</tr>
<tr>
<td>13</td>
<td>Please specify other:</td>
<td>open ended</td>
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<tr>
<td>14</td>
<td>Please rate the ease of use for the video editing software you used:</td>
<td>5 point Likert scale, very easy to very difficult</td>
</tr>
<tr>
<td>15</td>
<td>Please rate the ease of use for the Myna audio editing software used in the creation of your digital story:</td>
<td>5 point Likert scale, very easy to very difficult</td>
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<tr>
<td>15</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>16</td>
<td>Did you use software other than the programs introduced to you in class (Windows Movie Maker, Myna) to complete your digital story?</td>
<td>yes/no</td>
</tr>
<tr>
<td>16</td>
<td>If yes, what software did you use, and why did you use it?</td>
<td>open ended</td>
</tr>
<tr>
<td>17</td>
<td>Were you pleased with the outcome of your digital story?</td>
<td>yes/no</td>
</tr>
<tr>
<td>17</td>
<td>Why or why not?</td>
<td>open ended</td>
</tr>
<tr>
<td>18</td>
<td>The story sharing step during the brainstorming process was very helpful.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>19</td>
<td>The steps of the digital storytelling process as explained in the tutorials were clear and easy to follow.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
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<tr>
<td>20</td>
<td>The required length of 3-5 minutes for my digital story was easy to adhere to.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>21</td>
<td>I found the step-by-step handouts for the different software used very helpful.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>22</td>
<td>I enjoyed completing an assignment that was different from the other assignments I have been asked to do this year.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>23</td>
<td>Did you use the group discussion board provided for digital storytelling support?</td>
<td>yes/no</td>
</tr>
<tr>
<td>23</td>
<td>Why or why not?</td>
<td>open ended</td>
</tr>
<tr>
<td>24</td>
<td>What part of the process of creating your digital story gave you the most trouble?</td>
<td>open ended</td>
</tr>
<tr>
<td>25</td>
<td>Was there any part of the process of creating a digital story that you feel needs more instruction?</td>
<td>open ended</td>
</tr>
<tr>
<td>26</td>
<td>What did you think about the digital storytelling process overall?</td>
<td>open ended</td>
</tr>
<tr>
<td>27</td>
<td>Heading: Digital Storytelling and 21st Century Skills:</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Engaging in the digital storytelling process enhanced my 21st Century Skills in the following areas:</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Creativity: Demonstrating originality and inventiveness in work</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>28</td>
<td>Innovation: Developing, implementing, and communicating new ideas to others</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>28</td>
<td>Critical thinking: Framing, analysing, and synthesising information in order to solve problems</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>28</td>
<td>Problem solving: Identifying and asking significant questions that clarify various points of view and lead to better solutions</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>28</td>
<td>Collaboration: Demonstrating ability to work effectively with diverse teams</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>28</td>
<td>Communication: Articulating thoughts and ideas clearly and effectively through speaking and writing</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>29</td>
<td>Information Literacy: Accessing information efficiently and effectively, evaluating information critically and competently, and using information accurately and creatively for the issue or problem at hand; also possessing a fundamental understanding of the ethical/legal issues surrounding the access and use of information.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>29</td>
<td>Media Literacy: Understanding how media messages are constructed, for what purposes and using which tools, characteristics, and conventions.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>29</td>
<td>Technology Literacy: Using technology as a tool to research, organise, evaluate, and communicate information.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>30</td>
<td>Flexibility &amp; Adaptability: Working effectively in a climate of ambiguity and changing priorities.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>30</td>
<td>Initiative &amp; Self-Direction: Defining, prioritising, and completing tasks without direct oversight. Utilising time efficiently and managing workload. Demonstrating commitment to learning as a lifelong process</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>30</td>
<td>Social &amp; Cross-Cultural Skills: Working appropriately and productively with others.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>30</td>
<td>Productivity &amp; Accountability: Setting and meeting high standards and goals for delivering quality work on time. Demonstrating diligence and a positive work ethic (e.g., being punctual and reliable)</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>30</td>
<td>Leadership &amp; Responsibility: Using interpersonal and problem-solving skills to influence and guide others toward a goal. Demonstrating integrity and ethical behaviour. Acting responsibly with the interests of the larger community in mind.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>31</td>
<td>After participating in the digital storytelling process, I feel I am more able to integrate 21st Century Skills into my own teaching.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>32</td>
<td>Heading: Digital Storytelling and Creativity</td>
<td></td>
</tr>
</tbody>
</table>
## Appendixes

| 33 | Creating a digital story for part D of my portfolio allowed me to be more creative than writing an essay. | 5 point Likert scale, Strongly agree to strongly disagree |
| 34 | I preferred creating a digital story to writing an essay. | 5 point Likert scale, Strongly agree to strongly disagree |
| 35 | The digital storytelling assignment enabled me to utilise my creativity. | 5 point Likert scale, Strongly agree to strongly disagree |
| 36 | I enjoyed having a chance to be creative with this assignment. | 5 point Likert scale, Strongly agree to strongly disagree |
| 37 | Heading: Digital Storytelling and Technology Self-efficacy |
| 38 | I felt confident that I could successfully complete my digital story. | 5 point Likert scale, Strongly agree to strongly disagree |
| 39 | My experience with digital storytelling has given me a positive outlook toward the use of technology in the classroom. | 5 point Likert scale, Strongly agree to strongly disagree |
| 40 | Creating a digital story has increased my confidence in using technology in the classroom. | 5 point Likert scale, Strongly agree to strongly disagree |
| 41 | I plan to use digital storytelling with my future students. | 5 point Likert scale, Strongly agree to strongly disagree |
| 42 | I can envision ways that I might use digital storytelling with my future students. | 5 point Likert scale, Strongly agree to strongly disagree |
| 43 | If you have envisioned using digital storytelling with your students, in what ways have you thought you might use it? | open ended |
| 44 | I have already used digital storytelling with my students. | yes/no |
| 45 | I have already used some of the skills I gained through digital storytelling with my students. | yes/no |
| 46 | Heading: Digital Storytelling and Engagement |
| 47 | I was so involved in working on my digital story that I lost track of time. | 5 point Likert scale, Strongly agree to strongly disagree |
| 48 | I was really drawn into working on my digital story. | 5 point Likert scale, Strongly agree to strongly disagree |
| 49 | Working on my digital story was fun. | 5 point Likert scale, Strongly agree to strongly disagree |
| 50 | I felt interested in working on my digital story. | 5 point Likert scale, Strongly agree to strongly disagree |
| 51 | Working on my digital story was worthwhile. | 5 point Likert scale, Strongly agree to strongly disagree |
| 52 | I consider my digital story a success. | 5 point Likert scale, Strongly agree to strongly disagree |
| 53 | Working on my digital story was rewarding. | 5 point Likert scale, Strongly agree to strongly disagree |
### Appendix

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>54</td>
<td>I would recommend creating a digital story to my friends and family.</td>
<td>disagree</td>
</tr>
<tr>
<td>55</td>
<td>Heading: Digital Storytelling and Motivation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For each of the following statements, please indicate how true it is for you, using the following scale:</td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>I enjoyed creating my digital story very much</td>
<td>7 point scale from 1=not at all to 7 =very true</td>
</tr>
<tr>
<td>56</td>
<td>Creating my digital story was fun to do.</td>
<td>7 point scale from 1=not at all to 7 =very true</td>
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<tr>
<td>56</td>
<td>I thought creating my digital story was a boring activity.</td>
<td>7 point scale from 1=not at all to 7 =very true</td>
</tr>
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<td>56</td>
<td>Creating my digital story did not hold my attention at all.</td>
<td>7 point scale from 1=not at all to 7 =very true</td>
</tr>
<tr>
<td>56</td>
<td>I would describe creating a digital story as very interesting.</td>
<td>7 point scale from 1=not at all to 7 =very true</td>
</tr>
<tr>
<td>56</td>
<td>I thought creating my digital story was quite enjoyable.</td>
<td>7 point scale from 1=not at all to 7 =very true</td>
</tr>
<tr>
<td>56</td>
<td>While I was creating my digital story, I was thinking about how much I enjoyed it.</td>
<td>7 point scale from 1=not at all to 7 =very true</td>
</tr>
<tr>
<td>56</td>
<td>I feel proud of the digital story I created</td>
<td>7 point scale from 1=not at all to 7 =very true</td>
</tr>
<tr>
<td>56</td>
<td>I feel I could have put more effort into the creation of my digital story.</td>
<td>7 point scale from 1=not at all to 7 =very true</td>
</tr>
<tr>
<td>57</td>
<td>Heading: Digital Storytelling and Reflection</td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>Creating a digital story is a reflective process.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>59</td>
<td>Completing a digital story gave me a chance to make sense of my development as a teacher.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>60</td>
<td>Creating my digital story helped me to better articulate what I’ve learned this year as a pre-service teacher.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>61</td>
<td>Using sound, video, music and images in my digital story made it easier to express myself.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>62</td>
<td>Completing a digital story helped me to bring what I have learned about teaching to a conscious level.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>63</td>
<td>Using images, music, video, and my own voice in my digital story allowed me to express thoughts and feelings that I could not have expressed in an essay.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>64</td>
<td>Creating a digital story really helped me to make sense of my experience as a pre-service teacher this year.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>65</td>
<td>Heading: Please provide the following demographic information about yourself:</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>What age are you? (in years)</td>
<td>open ended</td>
</tr>
<tr>
<td>67</td>
<td>Gender:</td>
<td>male/female</td>
</tr>
</tbody>
</table>
Prior to starting the PGDE, what was your highest level of education?

<table>
<thead>
<tr>
<th>68</th>
<th>Choice from Undergraduate degree to Doctoral. Option to add in Other</th>
</tr>
</thead>
</table>

Please specify other:

| 68 | open ended |

Please tick the teaching practice subject(s) that you are approved to teach by the teaching council:

| 69 | list of TP subjects approved by the Teaching Council, can pick up to 3 |

Do you own your own computer?

| 71 | yes/no |

How would you rate you skill as a computer user?

| 72 | Choice of Beginner, Intermediate and Advanced |

My ICT skills improved while creating my own digital story.

| 73 | 5 point Likert scale, Strongly agree to strongly disagree |

On average, how many hours a week do you use a computer?

| 74 | open ended |

Thank you for completing the questionnaire about your digital storytelling experience.
### Appendix 29: Year 2 Survey Questions, 2010-2011

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Question</th>
<th>Type of Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you consent to participate in this questionnaire?</td>
<td>yes/no</td>
</tr>
<tr>
<td>2</td>
<td>What did you like most about the digital storytelling process?</td>
<td>open ended</td>
</tr>
<tr>
<td>3</td>
<td>What did you like least about the digital storytelling process?</td>
<td>open ended</td>
</tr>
<tr>
<td>4</td>
<td>What helped you most in putting your digital story together?</td>
<td>open ended</td>
</tr>
<tr>
<td>5</td>
<td>What advice would you give to someone completing a digital story of their own?</td>
<td>open ended</td>
</tr>
<tr>
<td>6</td>
<td>Heading: Approximately how many hours did you spend on the following?</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brainstorming your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Creating a story map for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Writing the script for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Creating a storyboard for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Recording the voice-over for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Sourcing sound or music for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Sourcing images for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Using the video editing software to put your digital story together</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>7</td>
<td>Creating my digital story with the video editing software was a straightforward process.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>7</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>8</td>
<td>Finding the relevant images for my digital story was a straightforward process.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>8</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>9</td>
<td>Recording the narration for my digital story was a straightforward process.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>9</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>10</td>
<td>Which movie editing software did you use?</td>
<td>Choice of iMovie, WMM or Other</td>
</tr>
<tr>
<td>10</td>
<td>Please specify other:</td>
<td>open ended</td>
</tr>
<tr>
<td>11</td>
<td>Heading: Please rate the ease of use for the video editing software you used:</td>
<td>5 point Likert scale, very easy to very difficult</td>
</tr>
<tr>
<td>12</td>
<td>Aviary's Myna</td>
<td>5 point Likert scale, very easy to very difficult</td>
</tr>
<tr>
<td>12</td>
<td>Audacity</td>
<td>5 point Likert scale, very easy to very difficult</td>
</tr>
<tr>
<td>12</td>
<td>Other</td>
<td>5 point Likert scale, very easy to very difficult</td>
</tr>
<tr>
<td>12</td>
<td>Please specify other:</td>
<td>open ended</td>
</tr>
</tbody>
</table>
### Appendices

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Please rate the ease of use for the audio editing software used in</td>
<td>5 point Likert scale, very easy to very difficult</td>
</tr>
<tr>
<td>13 the creation of your digital story:</td>
<td></td>
</tr>
<tr>
<td>14 Did you include music in your digital story?</td>
<td>yes/no</td>
</tr>
<tr>
<td>14 Why or why not?</td>
<td></td>
</tr>
<tr>
<td>15 Heading: If you did include music in your DST, where did you source</td>
<td>Choose from: I did not include music in my digital story</td>
</tr>
<tr>
<td>15 the music from?</td>
<td></td>
</tr>
<tr>
<td>15 Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>15 Did you include music in your DST, where did you source the music</td>
<td>I did not include music in my digital story</td>
</tr>
<tr>
<td>15 from?</td>
<td></td>
</tr>
<tr>
<td>15 Downloaded it from a commercial CD</td>
<td></td>
</tr>
<tr>
<td>15 Downloaded it from a royalty free music site</td>
<td></td>
</tr>
<tr>
<td>15 Created it using Myna</td>
<td></td>
</tr>
<tr>
<td>15 Created it using another on-line music site</td>
<td></td>
</tr>
<tr>
<td>15 Recorded it myself</td>
<td></td>
</tr>
<tr>
<td>15 Other</td>
<td></td>
</tr>
<tr>
<td>15 Please specify other:</td>
<td>open ended</td>
</tr>
<tr>
<td>16 Did you use software other than the programs introduced to you in</td>
<td>yes/no</td>
</tr>
<tr>
<td>16 class (Windows Movie Maker, Myna, Audacity) to complete your digital</td>
<td></td>
</tr>
<tr>
<td>16 story?</td>
<td></td>
</tr>
<tr>
<td>17 The steps of the digital storytelling process as explained in the</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>17 tutorials were clear and easy to follow.</td>
<td></td>
</tr>
<tr>
<td>18 The required length of 3-5 minutes for my digital story was easy to</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>18 adhere to.</td>
<td></td>
</tr>
<tr>
<td>18 Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>19 I enjoyed completing an assignment that was different from the other</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>19 assignments I have been asked to do this year.</td>
<td></td>
</tr>
<tr>
<td>20 Did you use the group discussion board provided for digital</td>
<td>yes/no</td>
</tr>
<tr>
<td>20 storytelling support?</td>
<td></td>
</tr>
<tr>
<td>20 Why or why not?</td>
<td>open ended</td>
</tr>
<tr>
<td>21 What part of the process of creating your digital story gave you the</td>
<td>open ended</td>
</tr>
<tr>
<td>21 most trouble?</td>
<td></td>
</tr>
<tr>
<td>22 Was there any part of the process of creating a digital story that</td>
<td>open ended</td>
</tr>
<tr>
<td>22 you feel needs more instruction?</td>
<td></td>
</tr>
<tr>
<td>23 Were you pleased with the outcome of your digital story?</td>
<td>yes/no</td>
</tr>
<tr>
<td>23 Why or why not?</td>
<td>open ended</td>
</tr>
<tr>
<td>24 What did you think about the digital storytelling process overall?</td>
<td>open ended</td>
</tr>
<tr>
<td>25 Did you participate in the Story Circle/peer feedback session in</td>
<td>yes/no</td>
</tr>
<tr>
<td>25 class?</td>
<td></td>
</tr>
<tr>
<td>25 If not, why?</td>
<td>open ended</td>
</tr>
<tr>
<td>26</td>
<td>The feedback I received from my peers on my story draft was very helpful.</td>
</tr>
<tr>
<td>26</td>
<td>Additional Comments:</td>
</tr>
<tr>
<td>27</td>
<td>Did you receive feedback on your story draft from one of the Ed Tech tutors?</td>
</tr>
<tr>
<td>27</td>
<td>If not, why?</td>
</tr>
<tr>
<td>28</td>
<td>The feedback I received from the tutors on my story draft was very helpful.</td>
</tr>
<tr>
<td>28</td>
<td>Additional Comments:</td>
</tr>
<tr>
<td>29</td>
<td>Creating a digital story for the critical incident section of my portfolio allowed me to be more creative than writing an essay would have.</td>
</tr>
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</tr>
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<td>I enjoyed having a chance to be creative with this assignment.</td>
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<td>I can envision ways that I might use digital storytelling with my future students.</td>
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<td>37</td>
<td>Additional Comments:</td>
</tr>
<tr>
<td>38</td>
<td>If you have envisioned using digital storytelling with your students, in what ways have you thought you might use it?</td>
</tr>
<tr>
<td>39</td>
<td>I have already used digital storytelling with my students.</td>
</tr>
<tr>
<td>39</td>
<td>Additional Comments:</td>
</tr>
<tr>
<td></td>
<td>Statement</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>40</td>
<td>I have already used some of the skills I gained through digital storytelling with my students.</td>
</tr>
<tr>
<td>40</td>
<td>Additional Comments:</td>
</tr>
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</tr>
<tr>
<td>Question</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>I feel I could have put more effort into the creation of my digital story.</td>
<td></td>
</tr>
<tr>
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<tr>
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</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>Creating a digital story helped me to make better sense of my critical incident.</td>
<td></td>
</tr>
<tr>
<td>Did the choosing of images for use in your digital story add to your reflection on your critical incident?</td>
<td>yes/no</td>
</tr>
<tr>
<td>If so, how?</td>
<td></td>
</tr>
<tr>
<td>How important to you was the selection of the right images in the creation of your digital story?</td>
<td></td>
</tr>
<tr>
<td>Why?</td>
<td></td>
</tr>
<tr>
<td>What is the most effective image in your digital story? Why?</td>
<td></td>
</tr>
<tr>
<td>How do you think your choice of images allowed viewers to understand your critical incident better?</td>
<td></td>
</tr>
<tr>
<td>How important to you was the selection of the right music in the creation of your digital story?</td>
<td></td>
</tr>
<tr>
<td>Why?</td>
<td></td>
</tr>
<tr>
<td>How has creating this digital story changed your thinking on the critical incident you wrote about?</td>
<td></td>
</tr>
<tr>
<td>How has creating this digital story changed your thinking on reflecting on your own practice as a teacher?</td>
<td></td>
</tr>
<tr>
<td>What age are you? (in years)</td>
<td></td>
</tr>
<tr>
<td>Gender:</td>
<td></td>
</tr>
<tr>
<td>Prior to starting the PGDE, what was your highest level of education?</td>
<td></td>
</tr>
<tr>
<td>Please specify other:</td>
<td></td>
</tr>
</tbody>
</table>
Please tick the teaching practice subject(s) that you are approved to teach by the teaching council:

<table>
<thead>
<tr>
<th>No</th>
<th>Question</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>74</td>
<td>Please tick the teaching practice subject(s) that you are approved to</td>
<td>list of TP subjects approved by the Teaching Council,</td>
</tr>
<tr>
<td></td>
<td>teach by the teaching council:</td>
<td>can pick up to 3</td>
</tr>
<tr>
<td>75</td>
<td>Do you own your own computer?</td>
<td>yes/no</td>
</tr>
<tr>
<td>76</td>
<td>How would you rate your skill as a computer user?</td>
<td>Choice of Beginner, Intermediate and Advanced</td>
</tr>
<tr>
<td>77</td>
<td>On average, how many hours a week do you use a computer?</td>
<td>open ended, numeric answer only</td>
</tr>
<tr>
<td>78</td>
<td>My ICT skills improved while creating my digital story.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
</tbody>
</table>
### Appendix 30: Year 3 Survey Questions, 2011-2012

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Question</th>
<th>Type of Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you consent to participate in this questionnaire?</td>
<td>yes/no</td>
</tr>
<tr>
<td>2</td>
<td>What did you like most about the digital storytelling process?</td>
<td>open ended</td>
</tr>
<tr>
<td>3</td>
<td>What did you like least about the digital storytelling process?</td>
<td>open ended</td>
</tr>
<tr>
<td>4</td>
<td>What helped you most in putting your digital story together?</td>
<td>open ended</td>
</tr>
<tr>
<td>5</td>
<td>What advice would you give to someone completing a digital story of their own?</td>
<td>open ended</td>
</tr>
<tr>
<td>6</td>
<td>Heading: Approximately how many hours did you spend on the following?</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Brainstorming your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Creating a story map for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Writing the script for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Creating a storyboard for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Recording the voice-over for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Sourcing sound or music for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Sourcing images for your digital story</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>6</td>
<td>Using the video editing software to put your digital story together</td>
<td>choice of 0 to 10+</td>
</tr>
<tr>
<td>7</td>
<td>Creating my digital story with the video editing software was a straightforward process.</td>
<td>5 point Likert scale,</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Strongly agree to</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>strongly disagree</td>
</tr>
<tr>
<td>7</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>8</td>
<td>Finding the relevant images for my digital story was a straightforward process.</td>
<td>5 point Likert scale,</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Strongly agree to</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>strongly disagree</td>
</tr>
<tr>
<td>8</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>9</td>
<td>Recording the narration for my digital story was a straightforward process.</td>
<td>5 point Likert scale,</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Strongly agree to</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>strongly disagree</td>
</tr>
<tr>
<td>9</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>10</td>
<td>Which movie editing software did you use?</td>
<td>Choice of iMovie, WMM or Other</td>
</tr>
<tr>
<td>10</td>
<td>Please specify other:</td>
<td>open ended</td>
</tr>
<tr>
<td>11</td>
<td>Please rate the ease of use for the video editing software you used:</td>
<td>5 point Likert scale, very easy to very difficult</td>
</tr>
<tr>
<td>12</td>
<td>Which audio editing software did you use? Please tick all that apply.</td>
<td>choice of Myna, Audacity, Other, both Myna and Audacity</td>
</tr>
<tr>
<td>12</td>
<td>Please specify other:</td>
<td>open ended</td>
</tr>
<tr>
<td>13</td>
<td>Please rate the ease of use for the audio editing software used in the creation of your digital story:</td>
<td>5 point Likert scale, very easy to very difficult</td>
</tr>
<tr>
<td>13</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>14</td>
<td>Did you include music in your digital story?</td>
<td>yes/no</td>
</tr>
<tr>
<td>14</td>
<td>Why or why not?</td>
<td>open ended</td>
</tr>
</tbody>
</table>
15. If you included music in your digital story, where did you source the music from? (Tick all that apply.)

<table>
<thead>
<tr>
<th>Choose from:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I did not include music in my digital story</td>
</tr>
<tr>
<td>Downloaded it from a commercial CD</td>
</tr>
<tr>
<td>Downloaded it from a royalty free music site</td>
</tr>
<tr>
<td>Created it using Myna</td>
</tr>
<tr>
<td>Created it using another on-line music site</td>
</tr>
<tr>
<td>Recorded it myself</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

15. Please specify other:

16. Did you use software other than the programs introduced to you in class (Windows Movie Maker, Myna, Audacity) to complete your digital story? yes/no

16. If yes, what software did you use, and why did you use it?

17. The steps of the digital storytelling process as explained in the tutorials were clear and easy to follow.

<table>
<thead>
<tr>
<th>5 point Likert scale, Strongly agree to strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree to strongly disagree</td>
</tr>
</tbody>
</table>

18. The required length of 3-5 minutes for my digital story was easy to adhere to.

<table>
<thead>
<tr>
<th>5 point Likert scale, Strongly agree to strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree to strongly disagree</td>
</tr>
</tbody>
</table>

19. I enjoyed completing an assignment that was different from the other assignments I have been asked to do this year.

<table>
<thead>
<tr>
<th>5 point Likert scale, Strongly agree to strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree to strongly disagree</td>
</tr>
</tbody>
</table>

20. What part of the process of creating your digital story gave you the most trouble? open ended

21. Was there any part of the process of creating a digital story that you feel needs more instruction? open ended

22. Were you pleased with the outcome of your digital story? yes/no

22. Why or why not? open ended

23. Did you choose to share your completed digital story with your classmates during the in-class sharing session? yes/no

23. Why or why not? open ended

24. If you did share your digital story in class, what did you get from this experience? open ended

25. Did you choose to share your completed digital story with your classmates on the private class website? yes/no

25. Why or why not? open ended

26. If you did share your digital story on the private class website, what did you get from this experience? open ended

27. Did you visit the private class website to view your classmates digital stories? yes/no

27. Why or why not? open ended
Appendices

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>If you did visit the private class website to view your classmates digital stories, what did you get from this experience?</td>
<td>open ended</td>
</tr>
<tr>
<td>29</td>
<td>What did you think about the digital storytelling process overall?</td>
<td>open ended</td>
</tr>
<tr>
<td>30</td>
<td>Did you participate in the Story Circle/peer feedback session in class?</td>
<td>yes/no</td>
</tr>
<tr>
<td></td>
<td>If not, why?</td>
<td>open ended</td>
</tr>
<tr>
<td>31</td>
<td>The feedback I received from my peers on my story draft was very helpful.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>31</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>32</td>
<td>Did you receive feedback on your story draft from one of the Ed Tech tutors?</td>
<td>yes/no</td>
</tr>
<tr>
<td></td>
<td>If not, why?</td>
<td>open ended</td>
</tr>
<tr>
<td>33</td>
<td>The feedback I received from the tutors on my story draft was very helpful.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>33</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>34</td>
<td>Creating a digital story for the critical incident section of my portfolio allowed me to be more creative than writing an essay would have.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>34</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>35</td>
<td>I preferred creating a digital story to writing an essay.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>35</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>36</td>
<td>The digital storytelling assignment enabled me to utilise my creativity.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>36</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>37</td>
<td>I enjoyed having a chance to be creative with this assignment.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>37</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>38</td>
<td>I felt confident that I could successfully complete my digital story.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>38</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>39</td>
<td>My experience with digital storytelling has given me a positive outlook toward the use of technology in the classroom.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>39</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>40</td>
<td>Creating a digital story has increased my confidence in using technology in the classroom.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>40</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>41</td>
<td>I plan to use digital storytelling with my future students.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>41</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
</tbody>
</table>
### Appendices

<table>
<thead>
<tr>
<th>Q</th>
<th>Statement</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>I can envision ways that I might use digital storytelling with my future students.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>42</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>43</td>
<td>If you have envisioned using digital storytelling with your students, in what ways have you thought you might use it?</td>
<td>open ended</td>
</tr>
<tr>
<td>44</td>
<td>I have already used digital storytelling with my students.</td>
<td>yes/no</td>
</tr>
<tr>
<td>44</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>45</td>
<td>I have already used some of the skills I gained through digital storytelling with my students.</td>
<td>yes/no</td>
</tr>
<tr>
<td>45</td>
<td>Additional Comments:</td>
<td>open ended</td>
</tr>
<tr>
<td>46</td>
<td>I was so involved in working on my digital story that I lost track of time.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>47</td>
<td>I was really drawn into working on my digital story.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>48</td>
<td>Working on my digital story was fun.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>49</td>
<td>I felt interested in working on my digital story.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>50</td>
<td>Working on my digital story was worthwhile.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>51</td>
<td>I consider my digital story a success.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>52</td>
<td>Working on my digital story was rewarding.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>53</td>
<td>I would recommend creating a digital story to my friends and family.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>54</td>
<td>I enjoyed creating my digital story very much.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>55</td>
<td>Creating my digital story was fun to do.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>56</td>
<td>I thought creating my digital story was a boring activity.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>57</td>
<td>Creating my digital story did not hold my attention at all.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>58</td>
<td>I would describe creating a digital story as very interesting.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td>Likert Scale</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>59</td>
<td>I thought creating my digital story was quite enjoyable.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>60</td>
<td>While I was creating my digital story, I was thinking about how much I enjoyed it.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>61</td>
<td>I feel proud of the digital story I created.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>62</td>
<td>I feel I could have put more effort into the creation of my digital story.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>63</td>
<td>Creating a digital story is a reflective process.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>64</td>
<td>Creating a digital story on a critical incident allowed me to be more reflective than writing an essay would have.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>65</td>
<td>Completing a digital story gave me a chance to make sense of my development as a teacher.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>66</td>
<td>Creating my digital story helped me to better articulate what I’ve learned this year as a pre-service teacher.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>67</td>
<td>Using sound, video, music and images in my digital story made it easier to express myself.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>68</td>
<td>Creating a digital story helped me to make better sense of my critical incident.</td>
<td>5 point Likert scale, Strongly agree to strongly disagree</td>
</tr>
<tr>
<td>69</td>
<td>Did the choosing of images for use in your digital story add to your reflection on your critical incident?</td>
<td>yes/no</td>
</tr>
<tr>
<td>70</td>
<td>If so, how?</td>
<td>open ended</td>
</tr>
<tr>
<td>71</td>
<td>How important to you was the selection of the right images in the creation of your digital story?</td>
<td>5 point Likert scale, very important to very unimportant</td>
</tr>
<tr>
<td>72</td>
<td>Why?</td>
<td>open ended</td>
</tr>
<tr>
<td>73</td>
<td>What age are you? (in years)</td>
<td>open ended, numeric answer only</td>
</tr>
</tbody>
</table>

Appendices
| 77  | Gender:                              | male/female |
| 78  | Prior to starting the PGDE, what was your highest level of education? | Choice from Undergraduate degree to Doctoral. Option to add in Other |
| 78  | Please specify other:               | open ended  |
| 79  | Please tick the teaching practice subject(s) that you are approved to teach by the teaching council: | list of TP subjects approved by the Teaching Council, can pick up to 3 |
| 80  | Do you own your own computer?       | yes/no       |
| 81  | How would you rate you skill as a computer user? | Choice of Beginner, Intermediate and Advanced |
| 82  | On average, how many hours a week do you use a computer? | open ended, numeric answer only |
| 83  | My ICT skills improved while creating my digital story. | 5 point Likert scale, Strongly agree to strongly disagree |
Appendices

Appendix 31: Codebooks from SPSS data analysis, years 2 and 3

**Codebook from year 2, 2010-2011, SPSS analysis**

<table>
<thead>
<tr>
<th>Q #</th>
<th>Description of Variable</th>
<th>SPSS Variable Name</th>
<th>Coding Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>identification number</td>
<td>ID</td>
<td>survey ID number</td>
</tr>
<tr>
<td>2a</td>
<td>like most about the process</td>
<td>var2a</td>
<td>0=no answer, 1=choosing music, 2=deeper reflection, 3=alternative assessment, 4=sense of achievement, 5=gaining ICT skills, 6=creating a story, 7=freedom of expression, 8=creativity, 9=creating voiceover, 10=choosing images, 11=produce something personal</td>
</tr>
<tr>
<td>2b</td>
<td>like most about the process</td>
<td>var2b</td>
<td>0=no answer, 1=choosing music, 2=deeper reflection, 3=alternative assessment, 4=sense of achievement, 5=gaining ICT skills, 6=creating a story, 7=freedom of expression, 8=creativity, 9=creating voiceover, 10=choosing images, 11=produce something personal</td>
</tr>
<tr>
<td>2c</td>
<td>like most about the process</td>
<td>var2c</td>
<td>0=no answer, 1=choosing music, 2=deeper reflection, 3=alternative assessment, 4=sense of achievement, 5=gaining ICT skills, 6=creating a story, 7=freedom of expression, 8=creativity, 9=creating voiceover, 10=choosing images, 11=produce something personal</td>
</tr>
<tr>
<td>3a</td>
<td>like least about the process</td>
<td>var3a</td>
<td>0=no answer, 1=not enough marks, 2=time consuming, 3=need more class time, 4=lack of ICT skills, 5=reflective essay unnecessary, 6=brief too confining, 7=conflicting deadlines, 8=listening to own voice, 9=finding the story, 10=Technical Difficulties, 11=lack of programme support for alternative assessment, 12=can't use as a classroom resource, 13=copyright restrictions, 14=timing, 15=liked everything, 16=lack of useful images on WWW, 17=can't see value of DST process, 18=too easy</td>
</tr>
<tr>
<td>3b</td>
<td>like least about the process</td>
<td>var3b</td>
<td>0=no answer, 1=not enough marks, 2=time consuming, 3=need more class time, 4=lack of ICT skills, 5=reflective essay unnecessary, 6=brief too confining, 7=conflicting deadlines, 8=listening to own voice, 9=finding the story, 10=Technical Difficulties, 11=lack of programme support for alternative assessment, 12=can't use as a classroom resource, 13=copyright restrictions, 14=timing, 15=liked everything, 16=lack of useful images on WWW, 17=can't see value of DST process, 18=too easy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>4a</td>
<td>helped most with the process</td>
<td>var4a</td>
<td></td>
</tr>
<tr>
<td>4b</td>
<td>helped most with the process</td>
<td>var4b</td>
<td></td>
</tr>
<tr>
<td>4c</td>
<td>helped most with the process</td>
<td>var4c</td>
<td></td>
</tr>
</tbody>
</table>

No number 5. Text answer, didn’t need it

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>6a</td>
<td>time spent brainstorming</td>
<td>var6a</td>
</tr>
<tr>
<td>6b</td>
<td>time spent creating storymap</td>
<td>var6b</td>
</tr>
<tr>
<td>6c</td>
<td>time spent writing script</td>
<td>var6c</td>
</tr>
<tr>
<td>6d</td>
<td>time spent creating storyboard</td>
<td>var6d</td>
</tr>
<tr>
<td>6e</td>
<td>time spent recording voiceover</td>
<td>var6e</td>
</tr>
<tr>
<td>6f</td>
<td>time spent sourcing sound/music</td>
<td>var6f</td>
</tr>
<tr>
<td>6g</td>
<td>time spent sourcing images</td>
<td>var6g</td>
</tr>
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</table>
### Appendices

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<table>
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<tr>
<th></th>
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<tbody>
<tr>
<td>6h</td>
<td>time spent editing movie</td>
<td>var6h</td>
</tr>
<tr>
<td>7</td>
<td>Creating DST straightforward process</td>
<td>var7</td>
</tr>
<tr>
<td>8</td>
<td>finding images straightforward</td>
<td>var8</td>
</tr>
<tr>
<td>9</td>
<td>recording narration straightforward</td>
<td>var9</td>
</tr>
<tr>
<td>10</td>
<td>movie editing software used</td>
<td>var10</td>
</tr>
<tr>
<td>11</td>
<td>ease of use video software</td>
<td>var11</td>
</tr>
<tr>
<td>12</td>
<td>audio editing software used</td>
<td>var12</td>
</tr>
<tr>
<td>13</td>
<td>ease of use audio software</td>
<td>var13</td>
</tr>
<tr>
<td>14</td>
<td>music included?</td>
<td>var14</td>
</tr>
<tr>
<td>15</td>
<td>music source?</td>
<td>var15</td>
</tr>
<tr>
<td>16</td>
<td>use other software?</td>
<td>var16</td>
</tr>
<tr>
<td>17</td>
<td>DST steps clear in tutorials</td>
<td>var17</td>
</tr>
<tr>
<td>18</td>
<td>length easy to adhere to</td>
<td>var18</td>
</tr>
<tr>
<td>19</td>
<td>enjoyed different assignment</td>
<td>var19</td>
</tr>
<tr>
<td>20</td>
<td>used discussion board?</td>
<td>var20</td>
</tr>
<tr>
<td>21a</td>
<td>gave most trouble</td>
<td>var21a</td>
</tr>
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</table>
## Appendices

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>21b</td>
<td>gave most trouble</td>
<td>var21b</td>
</tr>
<tr>
<td></td>
<td>0=no answer, 1=recording voiceover, 2=editing story, 3=editing soundtrack, 4=burning to CD, 5=deciding on images, 6=importing voiceover to WMM, 7=finding story, 8=editing in WMM, 9=editing voiceover, 10=sourcing images, 11=technical difficulties, 12=file management, 13=record of learning as a teacher, 14=Other</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. 22 not included. Text answer, not needed.</td>
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<tr>
<td>23a</td>
<td>pleased with outcome?</td>
<td>var23a</td>
</tr>
<tr>
<td></td>
<td>0=no answer, 1=yes, 2=no</td>
<td></td>
</tr>
<tr>
<td>23b</td>
<td>Why/why not pleased?</td>
<td>var23b</td>
</tr>
<tr>
<td></td>
<td>0=no answer, 1=successfully conveyed thoughts, feelings, 2=high quality product, 3=put in lots of time and effort, 4=enjoyed the process, 5=personal achievement, 6=lessons learned, 7=record of learning as a teacher, 8=deeper reflection, 9=surprised by high quality product, 10=need more experience with the process, 11=needed more time, 12=could be improved, 13=Other</td>
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<tr>
<td>23c</td>
<td>Why/why not pleased?</td>
<td>var23c</td>
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<td>0=no answer, 1=successfully conveyed thoughts, feelings, 2=high quality product, 3=put in lots of time and effort, 4=enjoyed the process, 5=personal achievement, 6=lessons learned, 7=record of learning as a teacher, 8=deeper reflection, 9=surprised by high quality product, 10=need more experience with the process, 11=needed more time, 12=could be improved, 13=Other</td>
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<tr>
<td>25a</td>
<td>Participate in story circle?</td>
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<tr>
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<td>0=no answer, 1=yes, 2=no</td>
<td></td>
</tr>
<tr>
<td>25b</td>
<td>If no, why not?</td>
<td>var25b</td>
</tr>
<tr>
<td></td>
<td>0=no answer, 1=didn’t want to share with strangers, 2=story wasn’t ready, 3=didn’t feel ICT skills were proficient, 4=couldn’t make it to class</td>
<td></td>
</tr>
<tr>
<td>26a</td>
<td>Story draft feedback helpful</td>
<td>var26a</td>
</tr>
<tr>
<td></td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree, 6=Not Applicable</td>
<td></td>
</tr>
<tr>
<td>26b</td>
<td>Story draft feedback helpful, add. Comments</td>
<td>var26b</td>
</tr>
<tr>
<td></td>
<td>0=no answer, 1=peers not comfortable critiquing, 2=wasn’t ready because of other assignments, 3=received guidance on story development</td>
<td></td>
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<tr>
<td>27a</td>
<td>feedback from tutors?</td>
<td>var27a</td>
</tr>
<tr>
<td></td>
<td>0=no answer, 1=yes, 2=no</td>
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<tr>
<td>27b</td>
<td>If no tutor feedback, why?</td>
<td>var27b</td>
</tr>
<tr>
<td></td>
<td>0=no answer, 1=didn’t collect feedback, 2=didn’t have story done</td>
<td></td>
</tr>
<tr>
<td>28a</td>
<td>Tutor feedback helpful</td>
<td>var28a</td>
</tr>
<tr>
<td></td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree, 6=Not Applicable</td>
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<tr>
<td>28b</td>
<td>tutor feedback add. Comments</td>
<td>var28b</td>
</tr>
<tr>
<td></td>
<td>0=no answer, 1=helped with rewrite, 2=gave confidence with project, 3=changed story topic completely after feedback</td>
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</tbody>
</table>
### Appendices

<table>
<thead>
<tr>
<th>Question</th>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>29  Allowed more creativity than essay</td>
<td>var29</td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree</td>
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<tr>
<td>30  Preferred DST to Essay</td>
<td>var30</td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree</td>
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<tr>
<td>31  DST enabled to use creativity</td>
<td>var31</td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree</td>
</tr>
<tr>
<td>32  enjoyed chance to be creative</td>
<td>var32</td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree</td>
</tr>
<tr>
<td>33  confident to complete DST</td>
<td>var33</td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree</td>
</tr>
<tr>
<td>34  DST gave positive outlook to tech in classroom</td>
<td>var34</td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree</td>
</tr>
<tr>
<td>35  DST increased confidence with tech in classroom</td>
<td>var35</td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree</td>
</tr>
<tr>
<td>36a plan to use DST with future students</td>
<td>var36a</td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree</td>
</tr>
<tr>
<td>36b add comments to 36a</td>
<td>var36b</td>
<td>0=no answer, 1=good for class project, 2=if opportunity arises, 3=if hardware/software available, 4=very time consuming, 5=student creations for use with future students</td>
</tr>
<tr>
<td>37a can envision ways to use DST with future students</td>
<td>var37a</td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree</td>
</tr>
<tr>
<td>37b add. Comments to 37a</td>
<td>var37b</td>
<td>1=good for TY class project</td>
</tr>
<tr>
<td>38a how would you use DST with students?</td>
<td>var38a</td>
<td>0=no answer, 1=Class project, 2=TY project, 3=Introducing a topic, 4=schools wouldn't have resources necessary, 5=assist them with expressing their feelings</td>
</tr>
<tr>
<td>38b how would you use DST with students, 2nd answer</td>
<td>var38b</td>
<td>0=no answer, 1=Class project, 2=TY project, 3=Introducing a topic, 4=schools wouldn't have resources necessary, 5=assist them with expressing their feelings</td>
</tr>
<tr>
<td>38c 38a answer coded for strength of idea for using DST</td>
<td>var38c</td>
<td>0=no answer, 1=definite idea, 2= somewhat of an idea, 3=no idea,</td>
</tr>
<tr>
<td>39  already used DST with students</td>
<td>var39</td>
<td>0=no answer, 1=yes, 2=no</td>
</tr>
<tr>
<td>40  already used DST skills with students</td>
<td>var40</td>
<td>0=no answer, 1=yes, 2=no</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Var</td>
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<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>41</td>
<td>lost track of time working on DST</td>
<td>var41</td>
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<tr>
<td>42</td>
<td>drawn into working on DST</td>
<td>var42</td>
</tr>
<tr>
<td>43</td>
<td>working on DST was fun</td>
<td>var43</td>
</tr>
<tr>
<td>44</td>
<td>interested in working on DST</td>
<td>var44</td>
</tr>
<tr>
<td>45</td>
<td>working on DST was worthwhile</td>
<td>var45</td>
</tr>
<tr>
<td>46</td>
<td>consider DST a success</td>
<td>var46</td>
</tr>
<tr>
<td>47</td>
<td>working on DST was rewarding</td>
<td>var47</td>
</tr>
<tr>
<td>48</td>
<td>recommend creating a DST</td>
<td>var48</td>
</tr>
<tr>
<td>49</td>
<td>enjoyed creating DST very much</td>
<td>var49</td>
</tr>
<tr>
<td>50</td>
<td>creating my DST was fun</td>
<td>var50</td>
</tr>
<tr>
<td>51</td>
<td>creating my DST was boring</td>
<td>var51</td>
</tr>
<tr>
<td>51a</td>
<td>51 recoded positively</td>
<td>var51a</td>
</tr>
<tr>
<td>52</td>
<td>creating my DST did not hold attention</td>
<td>var52</td>
</tr>
<tr>
<td>52a</td>
<td>52 recoded positively</td>
<td>var52a</td>
</tr>
<tr>
<td>53</td>
<td>describe creating DST as interesting</td>
<td>var53</td>
</tr>
<tr>
<td>54</td>
<td>creating DST was enjoyable</td>
<td>var54</td>
</tr>
<tr>
<td>55</td>
<td>while creating DST, thinking how much enjoyed it</td>
<td>var55</td>
</tr>
<tr>
<td>56</td>
<td>feel proud of DST created</td>
<td>var56</td>
</tr>
<tr>
<td>57</td>
<td>could have put more effort into DST</td>
<td>var57</td>
</tr>
<tr>
<td>58</td>
<td>creating a DST is reflective process</td>
<td>var58</td>
</tr>
<tr>
<td>Appendix</td>
<td>Description</td>
<td>Variable</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>----------</td>
</tr>
<tr>
<td>59</td>
<td>Creating DST more reflective than essay</td>
<td>var59</td>
</tr>
<tr>
<td>60</td>
<td>Creating DST chance to make sense of development as teacher</td>
<td>var60</td>
</tr>
<tr>
<td>61</td>
<td>Creating DST better articulation of learning</td>
<td>var61</td>
</tr>
<tr>
<td>62</td>
<td>Using sound, music, images made it easier to express myself</td>
<td>var62</td>
</tr>
<tr>
<td>63</td>
<td>Creating DST helped make sense of Critical Incident</td>
<td>var63</td>
</tr>
<tr>
<td>64</td>
<td>Did choosing images add to reflection</td>
<td>var64</td>
</tr>
<tr>
<td>65</td>
<td>Importance of right images</td>
<td>var65</td>
</tr>
<tr>
<td><strong>66</strong></td>
<td>Not included - text answer</td>
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</tr>
<tr>
<td><strong>67</strong></td>
<td>Not included - text answer</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>Importance of right music</td>
<td>var68</td>
</tr>
<tr>
<td><strong>69</strong></td>
<td>How has creating DST changed thinking on incident</td>
<td>var69</td>
</tr>
</tbody>
</table>
### Appendices

| 70 | how has creating DST changed thinking on reflecting on own practice | var70 | 0=no answer, 1=didn't change thinking, 2=better sense of perspective, 3=emphasised importance of reflection, 4=made feelings clearer, 5=helped reflect on development as a teacher, 6=made reflecting on practice easier, 7=more in-depth process, 8=put theory into practice, 9=deeper reflection, 10=revealed hidden meanings, 11=adds to caring for students, 12=realised responsibilities of a teacher and the impact a teacher has on the lives of students, 13=increased awareness of different levels of reflection, 14=broadened awareness of teacher's role, 15=deeper awareness of impact of one incident, 16=trust own teaching instincts more, 17=emphasised importance of professionalism |
| 71 | age | var71 | number |
| 71a | age recoded | var71a | 0=no answer, 1=21-25, 2=26-30, 3=31-35, 4=36-40, 5=41-45, 6=46-50 |
| 72 | gender | var72 | 0=no answer, 1=male, 2=female |
| 73 | level of education prior to PGDE | var73 | 1=undergraduate degree, 2=postgraduate diploma, 3=Master's Degree, 4=Doctoral degree, 5=other |
| 74a | teaching practice subject1 | var74a | 0=no answer, 1=accounting, 2=biology, 3=Business Studies, 4=Catechetics, 5=Chemistry, 6=CSPE, 7=SPHE, 8=Economics, 9=Geography, 10=History, 11=ICT, 12=Mathematics, 13=Music, 14=Physics, 15=English, 16=French, 17=Gaeilge, 18=German, 19=Italian, 20=Spanish, 21=Modern Languages |
| 74b | teaching practice subject2 | var74b | 0=no answer, 1=accounting, 2=biology, 3=Business Studies, 4=Catechetics, 5=Chemistry, 6=CSPE, 7=SPHE, 8=Economics, 9=Geography, 10=History, 11=ICT, 12=Mathematics, 13=Music, 14=Physics, 15=English, 16=French, 17=Gaeilge, 18=German, 19=Italian, 20=Spanish, 21=Modern Languages |
| 74c | teaching practice subject3 | var74c | 0=no answer, 1=accounting, 2=biology, 3=Business Studies, 4=Catechetics, 5=Chemistry, 6=CSPE, 7=SPHE, 8=Economics, 9=Geography, 10=History, 11=ICT, 12=Mathematics, 13=Music, 14=Physics, 15=English, 16=French, 17=Gaeilge, 18=German, 19=Italian, 20=Spanish, 21=Modern Languages |
| 75 | own your own computer | var75 | 0=no answer, 1=yes, 2=no |
| 76 | skill as computer user | var76 | 1=beginner, 2=intermediate, 3=advanced |
| 77 | hours a week on computer | var77 | number |
## Appendices

<table>
<thead>
<tr>
<th>Q#</th>
<th>Description of Variable</th>
<th>SPSS Variable Name</th>
<th>Coding Instructions</th>
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<tr>
<td>77a</td>
<td>hours a week on computer recoded</td>
<td>var77a</td>
<td>1=0-14 hours, 2=15-30 hours, 3=31-45 hours, 4=46+ hours</td>
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<tr>
<td>78</td>
<td>ICT skills improved by creating DST</td>
<td>var78</td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree</td>
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<tr>
<td>79</td>
<td>sum of engagement scores</td>
<td>var79</td>
<td>scale, raw numbers</td>
</tr>
<tr>
<td>80</td>
<td>engagement score coded</td>
<td>var80</td>
<td>0=no answer, 1=high level of engagement, 2=Medium level of engagement, 3=low level of engagement</td>
</tr>
<tr>
<td>81</td>
<td>sum of self-efficacy scores</td>
<td>var81</td>
<td>scale, raw numbers</td>
</tr>
<tr>
<td>82</td>
<td>self-efficacy scores recoded</td>
<td>var82</td>
<td>1=no answer, 2=high self-efficacy, 3=medium self-efficacy, 4=low self-efficacy</td>
</tr>
<tr>
<td>83</td>
<td>sum of motivation scores</td>
<td>var83</td>
<td>scale, raw numbers</td>
</tr>
<tr>
<td>83a</td>
<td>mean of motivation scores</td>
<td>var83a</td>
<td>average score for motivation variables</td>
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<tr>
<td>84</td>
<td>motivation scores recoded</td>
<td>var84</td>
<td>0=no answer, 1=high motivation/enjoyment, 2=medium motivation/enjoyment, 3=low motivation/enjoyment</td>
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### Codebook from year 3, 2011-2012, SPSS analysis

<table>
<thead>
<tr>
<th>Q #</th>
<th>Description of Variable</th>
<th>SPSS Variable Name</th>
<th>Coding Instructions</th>
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<td>identification number</td>
<td>ID</td>
<td>survey ID number</td>
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<td>2a</td>
<td>like most about the process</td>
<td>var2a</td>
<td>0=no answer, 1=choosing music, 2=deeper reflection, 3=alternative assessment, 4=sense of achievement, 5=gaining ICT skills, 6=creating a story, 7=freedom of expression, 8=creativity, 9=creating voiceover, 10=choosing images, 11=produce something personal, 12=learning from each other's DSTs, 13=being so engaged in the process, 14=putting it all together, 15=story circle</td>
</tr>
<tr>
<td>2b</td>
<td>like most about the process</td>
<td>var2b</td>
<td>0=no answer, 1=choosing music, 2=deeper reflection, 3=alternative assessment, 4=sense of achievement, 5=gaining ICT skills, 6=creating a story, 7=freedom of expression, 8=creativity, 9=creating voiceover, 10=choosing images, 11=produce something personal, 12=learning from each other's DSTs, 13=being so engaged in the process, 14=putting it all together, 15=story circle</td>
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### Appendices

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<tr>
<th>3a</th>
<th>like least about the process</th>
<th>var3a</th>
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<tbody>
<tr>
<td>0</td>
<td>no answer</td>
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</tr>
<tr>
<td>1</td>
<td>not enough marks</td>
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</tr>
<tr>
<td>2</td>
<td>time consuming</td>
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</tr>
<tr>
<td>3</td>
<td>need more class time</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>lack of ICT skills</td>
<td></td>
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<tr>
<td>5</td>
<td>reflective essay unnecessary</td>
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<tr>
<td>6</td>
<td>brief too confining</td>
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<tr>
<td>7</td>
<td>conflicting deadlines</td>
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<tr>
<td>8</td>
<td>listening to own voice</td>
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<tr>
<td>9</td>
<td>finding the story</td>
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<td>10</td>
<td>Technical Difficulties</td>
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<td>11</td>
<td>lack of programme support for alternative assessment</td>
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<td>12</td>
<td>can't use as a classroom resource</td>
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<td>timing</td>
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<td>liked everything</td>
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<td>16</td>
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No number 5. Text answer, didn't need it
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### Appendices

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<td>Share on class website?</td>
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<td>Why/why not shared?</td>
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<td>Get from sharing on website?</td>
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<td>while creating DST, thinking how much enjoyed it</td>
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<td>feel proud of DST created</td>
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<tr>
<td>70 importance of right images var70</td>
<td>1=very important, 2=important, 3=Neutral, 4=unimportant, 5=very unimportant</td>
<td></td>
</tr>
<tr>
<td>71 not included - text answer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72 not included - text answer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73a importance of right music var73a</td>
<td>0=no answer, 1=very important, 2=important, 3= Neutral, 4=unimportant, 5=very unimportant, 6=not applicable</td>
<td></td>
</tr>
<tr>
<td>73b why music important? var73b</td>
<td>0=no answer, 1=set the tone, 2=allows viewer to feel intended emotion, 3=created dramatic effect, 4=set theme of the movie, 5=enhances images and text,</td>
<td></td>
</tr>
<tr>
<td>74 how has creating DST changed thinking on incident var74</td>
<td>0=no answer, 1=caused deeper reflection, 2=clarified incident, 3=learned from mistakes, 4=better understanding of topic, 5=clarified emotions, 6=deeper analysis of incident, 7=helped to develop confidence</td>
<td></td>
</tr>
</tbody>
</table>
### Appendices

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Value Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>var75</td>
<td>How has creating DST changed thinking on reflecting on own practice</td>
<td>0 = no answer, 1 = didn't change thinking, 2 = better sense of perspective, 3 = emphasised importance of reflection, 4 = made feelings clearer, 5 = helped reflect on development as a teacher, 6 = made reflecting on practice easier, 7 = more in-depth process, 8 = put theory into practice, 9 = deeper reflection, 10 = revealed hidden meanings, 11 = adds to caring for students, 12 = realised responsibilities of a teacher and the impact a teacher has on the lives of students, 13 = increased awareness of different levels of reflection, 14 = broadened awareness of teacher's role, 15 = deeper awareness of impact of one incident, 16 = trust own teaching instincts more, 17 = emphasised importance of professionalism</td>
</tr>
<tr>
<td>var76a</td>
<td>Age</td>
<td>number</td>
</tr>
<tr>
<td>var76b</td>
<td>Age recoded</td>
<td>0 = no answer, 1 = 21-25, 2 = 26-30, 3 = 31-35, 4 = 36-40, 5 = 41-45, 6 = 46-50, 7 = 51-55</td>
</tr>
<tr>
<td>var77</td>
<td>Gender</td>
<td>0 = no answer, 1 = male, 2 = female</td>
</tr>
<tr>
<td>var78</td>
<td>Level of education prior to PGDE</td>
<td>1 = undergraduate degree, 2 = postgraduate diploma, 3 = Master's Degree, 4 = Doctoral degree, 5 = other</td>
</tr>
<tr>
<td>var79a</td>
<td>Teaching practice subject 1</td>
<td>0 = no answer, 1 = accounting, 2 = biology, 3 = Business Studies, 4 = Catechetics, 5 = Chemistry, 6 = CSPE, 7 = SPHE, 8 = Economics, 9 = Geography, 10 = History, 11 = ICT, 12 = Mathematics, 13 = Music, 14 = Physics, 15 = English, 16 = French, 17 = Gaeilge, 18 = German, 19 = Italian, 20 = Spanish, 21 = Modern Languages</td>
</tr>
<tr>
<td>var79b</td>
<td>Teaching practice subject 2</td>
<td>0 = no answer, 1 = accounting, 2 = biology, 3 = Business Studies, 4 = Catechetics, 5 = Chemistry, 6 = CSPE, 7 = SPHE, 8 = Economics, 9 = Geography, 10 = History, 11 = ICT, 12 = Mathematics, 13 = Music, 14 = Physics, 15 = English, 16 = French, 17 = Gaeilge, 18 = German, 19 = Italian, 20 = Spanish, 21 = Modern Languages</td>
</tr>
<tr>
<td>var79c</td>
<td>Teaching practice subject 3</td>
<td>0 = no answer, 1 = accounting, 2 = biology, 3 = Business Studies, 4 = Catechetics, 5 = Chemistry, 6 = CSPE, 7 = SPHE, 8 = Economics, 9 = Geography, 10 = History, 11 = ICT, 12 = Mathematics, 13 = Music, 14 = Physics, 15 = English, 16 = French, 17 = Gaeilge, 18 = German, 19 = Italian, 20 = Spanish, 21 = Modern Languages</td>
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<tr>
<td>var79d</td>
<td>TP recoded</td>
<td>0 = no answer, 1 = Maths/Science background, 2 = Arts Background, 3 = Business background</td>
</tr>
<tr>
<td>var80</td>
<td>Own your own computer</td>
<td>0 = no answer, 1 = yes, 2 = no</td>
</tr>
<tr>
<td>var81</td>
<td>Skill as computer user</td>
<td>1 = beginner, 2 = intermediate, 3 = advanced</td>
</tr>
<tr>
<td>var82a</td>
<td>Hours a week on computer</td>
<td>number</td>
</tr>
</tbody>
</table>
### Appendices

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Variable</th>
<th>Coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>82b</td>
<td>hours a week on computer recoded</td>
<td>var82b</td>
<td>1=0-14 hours, 2=15-30 hours, 3=31-45 hours, 4=46+ hours</td>
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<tr>
<td>83</td>
<td>ICT skills improved by creating DST</td>
<td>var83</td>
<td>1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree</td>
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<tr>
<td>84</td>
<td>sum of engagement scores</td>
<td>var84</td>
<td>scale, raw numbers</td>
</tr>
<tr>
<td>85</td>
<td>engagement score coded</td>
<td>var85</td>
<td>0=no answer, 1=high level of engagement, 2=Medium level of engagement, 3=low level of engagement,</td>
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<td>86</td>
<td>sum of self-efficacy scores</td>
<td>var86</td>
<td>scale, raw numbers</td>
</tr>
<tr>
<td>87</td>
<td>self-efficacy scores recoded</td>
<td>var87</td>
<td>1=no answer, 2=high self-efficacy, 3=medium self-efficacy, 4=low self-efficacy</td>
</tr>
<tr>
<td>88a</td>
<td>sum of motivation scores</td>
<td>var88a</td>
<td>scale, raw numbers</td>
</tr>
<tr>
<td>88b</td>
<td>mean of motivation scores</td>
<td>var88b</td>
<td>average score for motivation variables</td>
</tr>
<tr>
<td>89</td>
<td>motivation scores recoded</td>
<td>var89</td>
<td>0=no answer, 1=high motivation/enjoyment, 2=medium motivation/enjoyment, 3=low motivation/enjoyment</td>
</tr>
</tbody>
</table>
Appendices

Appendix 32: Samples of student work - working portfolios

The following are examples of student work from one student’s (Student 2010-2011 10) working portfolio during year 2 of the project:

**Brainstorming Sheet**

![Brainstorming Sheet Image](image)

**Story Map**

![Story Map Image](image)
Appendices

*Story Draft – first page*

“When did bullying become just another word?”

I’m 25 years old now but it wasn’t so long ago that bullying was a very real part of my life.

I was both bullied…...and a bully in my time….and I can’t say exactly when it happened, it wasn’t overnight that’s for sure, but somewhere along the way it became a part of my past, not my present.

When I began the PGDE and we had a series of lectures that focused on bullying I thought to myself “Ah, I know all about this stuff” And didn’t I?

Hadn’t I been through both sides of the story myself?

But that’s just it, I’ve been through it. It had been years since bullying had been a part of my life and it had become a distant memory, which time had dulled. (OLD DUSTY PICTURE OF CHILD CRYING, DUST GOES OFF LATER AND U SEE THE CHILD)

I began my teaching practice block in November and everything was going better then I could have hoped for. My favourite class was a first year class who were really full of beans and eager to learn. They’d bombard me with stories and questions before I could even make it in the door but for the most part they were very well behaved.

Everything was going along nicely until the Monday of my third week. I walked into class and instead of the usual fanfare there was a gloomy silence hanging over the room. It was the class after small break so usually they were still riding a sugar rush and hopping around the place.

I was a little taken aback but a quiet class is no reason to complain so I had them get their books out and I was just starting the lesson when I noticed one of the boys near the back left of the class wasn’t paying any attention.

I was about to call him up on it but then I saw that he was visibly upset. He had his head down and his eyes were red, you could see he had been crying.

MORE!! on feelings My first reaction was to find out what was wrong but I managed to stop myself. I remembered a discussion in a Teaching and Learning lecture about dealing with difficult situations and how it was best if possible not to make an issue of things in the middle of class. Doing so only draws attention to the problem and can make it worse.

I decided, as long as the boy did not get any more upset, that I would leave it until the end of class. During the lesson when I had them all writing one of the girls came up to my desk and waved me towards her so that she could whisper. She told me that during the break some boys from another class had been teasing Phillip, saying that he was gay for another boy in the year. To make matters worse they had then snuck into the classroom and wrote Phillip loves XXX on his desk. It was obvious that all the students in the class, not just Phillip, had been affected. The young girl asked me to do something to help and I assured her I would.
Appendices

Story board – first page
Digital Story Script for

“When did Bullying become just another Word?”

by [Name Redacted]

When did bullying become just another word?

I’m 25 now but it wasn’t so long ago that bullying was a very real part of my life.

When I began the PGDE and had Psychology lectures on bullying I thought to myself
“I know all about this stuff”…..and didn’t I?

Hadn’t I been through it?

But that’s the problem…. I’ve been through it…and now it was just a distant
memory….that time had dulled.

When I began Teaching Practice in November, my favourite class was the 1st Year 1X
class who were so full of beans and eager to learn.

They’d bombard me with questions and stories before I even made it in the door.

Everything was going great until the 3rd week.

I walked into 1X and immediately….knew something was wrong.

You could hear a pin drop.

I was about to ask what’s up when I noticed a couple of students glancing back at a
boy called Phillip, who was sitting at the back of the class.

He was leaning over his desk, with his head down and face hidden from view.

Then he looked up….and I saw his eyes were red with tears.

This really threw me, seeing this kid so upset. My mind started racing.
Appendices

Music/Sound List

Soundtrack of Digital Story – In order of appearance

All music clips were found in Myna’s library except the final 30 seconds during credits which was taken from Adele’s 2010 album “21”, the 11th song “Someone like you”.

1. transitions_intro01a.mp3
2. transitions_intro05a.mp3
3. transitions_loop01a.mp3
4. transitions_end01a.mp3
5. adventurous_intro07a.mp3
6. instability_loop10a.mp3
7. instability_loop12a.mp3
8. instability_end01a.mp3
9. even_in_youth_intro05a.mp3
10. even_in_youth_loop04a.mp3
11. even_in_youth_loop12a.mp3
12. i_remember_you_loop01a.mp3
13. transitions_loop05a.mp3
14. me_and_you_intro01a.mp3
15. sinister_intro01a.mp3
16. me_and_you_intro01a.mp3
17. me_and_you_loop03a.mp3
18. me_and_you_loop11a.mp3
19. transitions_intro01a.mp3
20. transitions_loop05a.mp3
21. transitions_loop06a.mp3
22. transitions_end01a.mp3

23. 11 Adele - Someone Like You.mp3

(30 second clip taken from Adele’s 2010 album “21”, the 11th song “Someone like you”)
Appendices

Image/Shot List

Links to images used for Digital Story

In order of appearance.

Word cloud created using http://www.wordle.net/ and the following words

“Bullying Parents Teacher Student Obligation Responsibility Authority Respect In-Loco-Parentis Care Growing-Up Life Money Rent Sports Learning Studying Exams Tests Assignments Friends Love Sex Cars Drugs Inclusive-Teaching SEN Dyslexia ADD Alcohol Games Sports Football PGDE Philosophy EDSJ Ed-Tech History Professional-Studies Teaching-Practice Lectures Worries”

http://www.gettyimages.ie/detail/103050428/Photographers-Choice-RF
25th birthday picture

http://www.gettyimages.ie/detail/200276596-001/Digital-Vision
Picture of boy being left out

http://www.gettyimages.ie/detail/dy1313033/Digital-Vision
A picture of a lecture to illustrate the beginning of the PGDE

http://www.gettyimages.ie/detail/CB9076-003/Stone
A picture of a sad looking boy

http://www.gettyimages.ie/detail/sb100660208-001/Digital-Vision
A picture of a teacher having fun to illustrate beginning teaching practice

http://www.gettyimages.ie/detail/104881490/The-Image-Bank
A picture of happy kids

http://www.gettyimages.ie/detail/82562939/Cultura
A picture of kids eager to learn

http://www.gettyimages.ie/detail/200564692-001/Iconica
A picture of really quiet students working with heads down

http://www.gettyimages.ie/detail/200319888-001/Taxi-Japan
A picture of a student looking backwards
Appendices

References

List of Resources used during the making of my Digital Story

4. All pictures were sourced from http://www.gettyimages.ie/
5. My Reflective Learning Journal & 3rd Weekly Reflection on “Bullying”
8. Microsoft Word 2003, my laptop & headset/microphone

References for the 3 academic quotations used in my Digital Story

1. Howard I (2010/11), Teaching & Learning lectures, PGDE, N.U.I.G
Appendices

Reflective Feedback Essay – first page

Portfolio Part B: Reflective Write-Up

The making of my Digital Story (DS) was both a rewarding and a frustrating experience. When I first saw the brief for Portfolio Part B, I was really excited and it was the only assignment this year that I have genuinely looked forward to doing. It was something different, out of the ordinary, which would give me the chance to flex my creative muscles which have been atrophying for the past few years of my science-focused college career. Things began really well! My Teaching Practice (TP) was full of “critical incidents”, e.g. a girl fainting into my arms, a girl breaking her nose and a boy with ADD who was a real struggle to teach, so I had no shortage of choices. However, without a doubt, the standout incident was a bullying incident and so there was never any doubt that this would be the focus of my DS. Words have always come easily to me so actually writing the script for my DS was perhaps the easiest part of the process. Yet it was the most difficult in the sense that I had to reflect not only on a critical incident, but also on a time in my own childhood which bullying had made very difficult and painful to recall.

The allotted time to record my DS voiceover in February arrived and, although I had the best of intentions, two huge methodology assignments were crucifying me at the time so I didn’t have a chance to perfect my script or to record it. Time passed and suddenly it was the end of April already. Finally, I had no more distractions, so I decided to get back to my DS. Although the option of recording my voiceover in college was still available, I had a headset microphone at home so I decided to record the voiceover myself and, in hindsight, this was a great choice. I could relax, take as long as I wanted and make as many attempts as I liked in the familiar territory of my own room. I think this definitely helped make my voiceover more natural and allow me to convey my emotions. Using Audacity to record the voiceover wasn’t that difficult at all. It was fairly intuitive and user friendly and the experience of using it in Ed Tech tutorials really made a difference. I found it easiest to record my whole script in one go non-stop, saying each line twice, and then editing out the worst of each repeated line afterwards. This was much easier and better then stopping and starting after every line which, on my first attempts, had made my voiceover seem disjointed.

Using Myna to create the music soundtrack and sync it with my voiceover took much longer. It was tough getting the hang of fading in and out the music tracks and lining the clips up so that they blended well but the most difficult part was