CHAPTER 5

From Dewey to Digital: Design-Based Research for Deeper Reflection Through Digital Storytelling

Bonnie Thompson Long and Tony Hall

Introduction

The research reported in this chapter was undertaken on a longitudinal basis, over a period of four years, involving 323 pre-service teachers. Designing digital storytelling (DS) with and for pre-service teachers enabled the authors to examine how it might be conceptualised and implemented to support and enhance learning from practice, especially in their formative and sensitive, early-stage transition into the professional career of teaching in post-primary schools. In this DS research, the authors worked with student teachers from across all subject areas of the Irish post-primary school curriculum, including mathematics, science, history, geography and languages.

From a methodological perspective, we employed design-based research (DBR). We chose DBR because it is itself a reflective approach, particularly well suited to the iterative, participatory and principled design

B.T. Long (✉)
National University of Ireland, Galway, Ireland

T. Hall
National University of Ireland, Galway, Ireland

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of innovations with technology-enhanced learning (Barab and Squire 2004; Reeves et al. 2005; Hofer and Owings Swan 2006).

DBR, action research (AR) and other cognate, change and solution-oriented methodologies belong to the same family of practitioner-based, interventional research modalities in education. In terms of DS, exemplar practitioner-based research is Jamissen and Haug's (2014) longitudinal, multicycle action research to design and develop digital storytelling to support practice learning within early childhood teacher education. Consistent with Jamissen and Haug's (2014) impactful action research, our design-based research process involved three major cycles of design, implementation and evaluation: (1) initial pilot intervention, (2) mainstream/scaling-up of the design and (3) a third, capstone intervention.

The Process

Through our multicycle, accretive and iterative DBR process, we conceptualised and refined R-NEST (reflection, narrative, engagement, sociality and technology), a bespoke framework for the design of DS to support preservice teachers in the creation of multimodal narratives embodying deep reflection. We report here key aspects of R-NEST, namely the significant potential of using second-order reflection (Moon 2004) alongside Tripp's (1993) conception of critical incident, in the situated design and deployment of DS to mediate and augment student teachers' reflective practice.

Our Starting Point: An Initial R-NEST Concept Design

Boyer noted that "teaching is/a dynamic endeavour, involving all the analogies, metaphors, and images that build bridges between the teacher's understanding, and the student's learning" (1990, p. 23). This chapter reports design-based research which sought to explore the use of digital storytelling and its augmented, multimedia affordances, "analogies, metaphors, and images" (1990, p. 23) to help student teachers for the second-level sector reflect more deeply on their learning from practice in schools. Our research was originally inspired by Barrett's (2005) and Moon's (1999) ideas about creative and novel representations of reflection, including the potential of combining narrative and storytelling with digital media and technology. Illustrated in Fig. 5.1, the synthesis of our nascent R-NEST design emerged through four main activities: (1) our biographical reflection as teacher educators, including situational analysis of the constraints and possibilities within our own initial teacher education

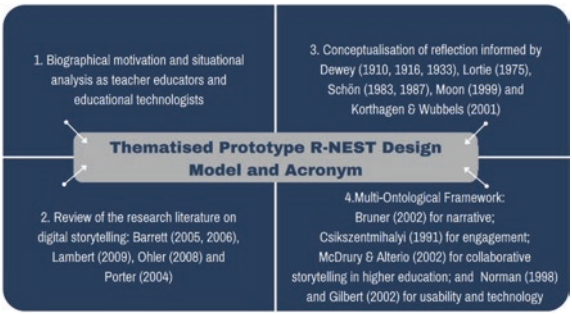

Fig. 5.1 Synthesis of the initial, prototype R-NEST design-based research model

programme in Ireland, (2) review of relevant DS literature, (3) critical conceptualisation of the notion of "reflection", predicated on seminal thinking and writing on the topic, for example, Dewey (1910, 1916, 1933) and (4) the authors' initial theorisation work about digitalising narrative (multi-ontological framework). Our initial conceptualisation of R-NEST encompassed a very broad literature, from Dewey to the digital. We used R-NEST to frame both the design and evaluation of our innovation with digital storytelling over the three cycles.

Five major themes emerged in our initial concept design. Expanding these themes, the guiding principles of the initial R-NEST were:

- 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, 2013) and reflection thereon;
- easy-to-use technology and easy to access and use, rich media content; and
- creative engagement in the process.

Each of the three design cycles, pilot, mainstream and capstone, involved iterating through and finessing our DS innovation, informed by the emerging and evolving R-NEST model, continuing review of the extant, relevant research on digital storytelling design, and concepts and theories of educational technology.

From Concept to Pilot: The Emerging R-NEST Digital Storytelling Innovation

Reflecting on practice is a mandatory competency component in many teacher education programmes internationally and constitutes a prevailing paradigm in education globally (Collin et al. 2013). Most reflective assignments required of student teachers are written assignments (Moon 1999). However, as Kajder and Parkes (2012) noted, this might not be the best way for students to evidence their reflection. Similar to findings reported in the literature (see Calderhead 1989; MacLeod and Cowieson 2001; Moon 1999; Moon 2004), there was a lack of depth in our students' reflections, especially when these were expressed through exclusively written formats. Digital storytelling can enhance reflection (Barrett 2005, 2006; Kearney 2009; Matthews-DeNatale 2008). The pilot study was our first step towards designing a DS project to enhance students' reflective practice in our initial teacher education programme.

It is not possible to enumerate all aspects of the design-based research process within the scope and word count of this book chapter. For a complete discussion of the trajectory of the research from initial concept design to full, programme-wide DS implementation, the reader is directed to the doctoral thesis on which this article is based (Thompson Long 2014).

Our DS project was fundamentally inspired by the Center for Digital Storytelling's (CDS), now StoryCenter, Digital Storytelling Workshop Model (Lambert 2010, 2013), and the broad topic for the pilot DS study was in line with other DS exploratory projects reviewed in the literature at the time. These required students to create digital stories based on topics such as, "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). After the five weeks of instruction related to the pilot DS concluded, students who had volunteered to complete a digital story had an additional six weeks to work on their DS on their own. While initially 67 students had volunteered to complete a digital story, 18 students submitted a digital story as part of their professional practice portfolio at the end of the academic year.

Materials used to analyse the DS project included the students' completed digital stories, their "working portfolios" (planning materials), an online discussion board, student emails and a post-DS questionnaire. Of the 18 students who completed a digital story, 16 gave permission for their DS materials to be used for research purposes, and 12 completed the questionnaire. The results of this questionnaire showed that the 12 students

who completed the survey found the DS process to be a positive, motivating and worthwhile experience. They also found it to be reflective, fun, and engaging (Thompson Long 2014). However, their final digital stories, when analysed using a rubric based on Moon's (2004) generic framework for reflection, did not evidence the depth of reflection we had hoped for. Moon's (2004) scale ranges 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)" (Thompson Long 2014). Interestingly, further analysis of the digital stories scoring the highest levels of reflection showed that the students who created these diverged from the assignment brief significantly, and instead of giving a "broad assessment of the year", each told a story of a significant aspect of their developing teacher identity.

During our own reflection on the pilot implementation, couched within the R-NEST framework and relevant literature, we realised that the task set for the students, while allowing for some reflection, was too broad. A critical finding from the pilot intervention was that 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 a particular experience, focusing on the thoughts, feelings and motivations that led to and emerged from that experience.

Principles of Redesigning the Digital Storytelling Project for Deeper Reflection

Most of the students who took the post-DS questionnaire felt that the DS process had enhanced their reflection on practice, even though many of them did not create digital stories that evidenced deep reflection. This led us to the realisation that the product, and depth of reflection evident only in the final digital story, might not be of paramount importance. Gravestock and Jenkins (2009) and Sandars et al. (2008) noted that reflection can take place at all stages of the creation of a digital story. These authors placed the emphasis on the process, not exclusively on the product.

A discussion of the pertinent areas of the reflective literature, and their effect on the second DS design implementation led us to focus on characteristics of the reflective process. These included issues such as the intent or

disposition of the learner, and how to scaffold and structure the reflective process, in particular as a collaborative narrative process. We also needed to understand degrees of reflection and how to encourage and recognise deep reflection and, perhaps most importantly, its mediation through both the process and product of designing a digital story. Contextualised critically in terms of the R-NEST design model and relevant DS research, we now outline the key aspects we focused on in the redesign of the pilot DS project for the second, mainstream iteration of the DBR process. These included both the processes and products of reflection, framed and organised in a focused manner using Tripp's (1993) concept of critical incident, engaged and positive learner intent/disposition, reflection as structured, social storytelling and the central importance of second-order reflection.

Reflective Products and Processes

After investigating many different types of possible story prompts in the literature, we realised that the possible answer to the focus of the students' digital stories lay in an existing section of the students' coursework: their Professional Practice Portfolio, specifically the critical incident analysis essay. This compares closely with the findings of Jamissen and Skou (2010, p. 187) that "creativity as a quality can be learned and prompted by the conscious use of tools and processes". In particular, Tripp (1993) promotes the use of critical incidents in teaching as ways of developing an understanding of, and control over professional judgement and practice. Tripp sees everything that happens in a classroom as a potential critical incident, indeed: "we just need to analyse it critically to make it one" (Tripp 1993, p. 28).

Our critical incident analysis assignment brief defined a critical incident as "a happening, an incident or an event involving you or observed by you that has made you subsequently think and/or act differently about that particular issue" (NUI Galway School of Education 2010). 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 reflect critically on the incident; discuss emotions, feelings and reactions related to it. It also asked them to draw on academic literature germane to the subject of the incident.

We felt that using this task as the basis for the digital story assignment could lead the students through the reflective process as envisioned by Dewey (1933), allowing them to undergo the steps necessary for deeper reflection.

Learner Disposition

Many students can be resistant to participating in reflective assignments (Moon 1999). Boud et al. (1985) emphasised that the intent of the learner has an impact on the reflective process. They stated that "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" (Boud et al. 1985, p. 24).

Dewey believed strongly that the attitudes that an individual brings to bear on the act of reflection can either open the way to learning or block it (Rodgers 2002). Dewey (1933) saw our tendency to jump to conclusions, the failure to examine our own attitudes, and the powerful social influences of parents or the beliefs of a group one belongs to as influences that could inhibit reflective thinking. He named three main attitudes that lead to a readiness to engage in reflective thinking: (1) open-mindedness, (2) whole-heartedness and (3) responsibility (Dewey 1933). Other attitudes mentioned by Dewey as encouraging a readiness to engage in reflection are directness (1916), curiosity (1910, 1933) and a sense of playfulness in one's work (1933). Dewey felt that an interest exclusively in the outcome could lead to drudgery (1933). Pointedly, he wrote,

> 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)

Engaging our students in the reflective process and helping them to get the most out of their reflection on practice was a major goal of our DS project. Encouraging a positive attitude towards the process of reflection would be important to our R-NEST redesign. Furthermore, as Jamissen and Skou (2010) have similarly found, we needed to use prompts and tools that would engage our students to work "in a creative mode and a poetic form", which "may bring out reflections and associations that are not relevant in an analytic-rationalistic mode (Kaufmann 2006). There is also a dimension of energy involved in creative work as described by the concept of *flow* (Csikszentmihalyi 1997)" (2010, p. 187). We aimed to redesign the DS process so that it would hopefully facilitate these more profound levels of engagement and thus deeper reflection.

Collaborative Reflection

Reflecting with others can deepen reflection on practice (Dewey 1916; Hatton and Smith 1995; McDrury and Alterio 2002; Moon 2004; Rodgers 2002; Schön 1987). Dewey (1916) firmly believed that collaborative reflection could surface and lead to further understanding of the strengths and weaknesses in one's own thinking. McDrury and Alterio (2002) felt that, in getting their students to tell stories of practice, both tellers of stories and listeners can be transformed, and this story-sharing can bring about changes in the practicum. However, in order for this to happen, they proposed that the manner in which stories are told is of the utmost importance. They suggested a formal setting, with multiple listeners and a predetermined story to tell as the most appropriate format for sharing stories of practice. Following the CDS's DS process, once a rough draft of the digital story is written, it is shared with peers during the "Story Circle" (Lambert 2013). During the pilot project, this was undertaken rather informally, and also during only one class session. Looking back on this part of our DS process in the context of McDrury and Alterio (2002), we felt that students did not get as much out of it as they could have, given the emphasis in the literature on the benefits of reflecting with others. We therefore decided to redesign the "story circle" activity for the second iteration of the DS design completely. A formal story-sharing process was devised, based on McDrury and Alterio's (2002) storytelling pathways, that would allow students to share a predetermined story in a formal setting, and with multiple listeners.

Second-Order Reflection

Moon (2004) defined second-order reflection as techniques that require a learner to look through previous reflective work, such as private reflective journals, and to write a deeper reflective overview. She felt it was better to get students to use these original reflections, or "raw material" (p. 156), as the basis for deeper reflections on the topic or experience. Just as we would not assess students on the notes they take in class, Moon felt we should not assess students on their initial reflective writings. She held that students' second-order reflections are more valuable and are "likely to yield deeper levels of reflection with improved learning" (Moon 2004, p. 156). Affording opportunities to expand their original reflective writing through working with others to share their ideas, standing back from

oneself to take a broader look at the situation, and investigating different viewpoints of the same situation can assist students in deepening their primary reflections.

In redesigning the DS assignment, we felt it was necessary to create a specific opportunity for students to engage in second-order reflection. Students were asked to choose a critical incident from their reflective journal that they originally wrote about while off-campus on their teaching practice in schools.

Outcomes of Reflection

There can be many outcomes of reflection when used for learning, depending on the purpose of the reflective activity. Moon saw one of the possible outcomes of reflection as action: "To reflect on action is to reflect on an event in the past, reprocessing or reorganising the meaning that has been made of that event with the possibility of improving future performance" (Moon 1999, p. 157). Boud et al. (1985) felt that some of the benefits of reflection may be lost if they are not linked to action or application. They stated 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" (1985, p. 34). They discussed how 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.

The redesigned critical incident analysis assignment asked students to investigate an incident from their teaching practice that subsequently changed their views and or actions in the classroom. It was hoped that deep reflection on a particular, significant incident would lead students to taking action on the situation, prompting a change in their practice.

Evidencing Depth of Reflection

While reflection is a goal in most teacher education programmes, difficulties lie in describing what different levels of reflection actually look like (Hatton and Smith 1995). While educators have noted a lack of depth of reflection in student work (Calderhead 1989; MacLeod and Cowieson 2001; Moon 1999), sometimes it is difficult to describe what "depth" of reflection looks like. Moon (2004) discussed the difficulties that educators can encounter in getting their students to achieve a measure of depth in their reflections. She stated 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)

Hatton and Smith (1995) and Moon (2004) created models to elucidate depth of reflection. These frameworks proved instrumental in our redesign of the digital storytelling process, particularly in terms of characterising what depth of reflection entails.

In their work creating a model against which evidence of reflection in student teachers' reflective writings could be evaluated, Hatton and Smith (1995) identified four types of writing, three of which can be described as reflective:

- *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 and Smith 1995, pp. 40–41).

Moon (2004), building on Hatton and Smith's (1995) earlier framework, investigated the concept of depth in students' written reflections. Moon's generic framework for reflective writing described four levels of reflective writing in a continuum, from superficial and descriptive, to deep levels of reflective writing (Moon 2004). At the highest level of her generic framework, Reflective (2), Moon characterised deep reflective writing as including key elements, such as:

- 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);
- recognition 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.

In the redesigned DS brief, students were asked to choose an incident from their reflective journal to expand upon, and to present this in the structure of a personal narrative. As advocated by Moon (2004), students were provided questions in the new DS brief to help them to include all aspects of the critical incident analysis. These questions were structured in a way that emphasised the reflective elements of the critical incident, and illustrated for the students what reflective writing should include. Students were guided to include alternative viewpoints, consider the academic literature related to their topic, and to contemplate the incident along different time frames, among other things. The assessment rubric was also changed completely, both to include assessment elements for the critical incident/reflective content and in order to incorporate elements of the DS rubric devised by the CDS, which is based on their seven elements of an effective digital story (Center for Digital Storytelling 2010).

Findings

The redesign of the DS assignment resulted in many positive outcomes. The completed digital stories showed significantly deeper levels of reflection. The students found the DS process a different and engaging way to reflect, and a refreshing alternative to the traditional essay assignment (Thompson Long 2014).

As part of the DS assignment, students in the second implementation were asked to include a reflective feedback piece on what they thought about creating their digital stories. This gave us valuable feedback on how the students experienced the assignment, as well as what they thought about the process and the product, their completed digital stories. Many students reported that the DS enabled them to reflect more deeply than they had done in other reflective assignments on the course. They noted 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 (Thompson Long 2014, p. 231).

Not only did students feel that the DS 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.

Finally, students articulated the way they felt the use of multimedia, such as images, music and sound, as well as the recording of their own voice, added significantly to their reflection. Describing the different ways they reflected while incorporating multimedia into their DS, students used terms such as "focused", "intensified", "greater clarification" and "greater insight" (Thompson Long 2014, p. 234). The words of one student aptly sum up the comments of many:

> 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 DS Assignment Now

The analysis and redesign of the DS project continued for a third year as part of the first author's doctoral research (see Thompson Long 2014). Similarly, positive findings emerged from the third "capstone" year of the research. At the time of writing this article, we have recently completed our seventh year of the DS project with our students. Each year, we ask students for their feedback and we make slight adjustments to the assignment, with the intent of enhancing students' depth of reflection through their engagement with the digital storytelling process.

The DS assignment today is very similar to the second iteration of the design. The formal story circle process has worked very well, in both enhancing reflection for students and building camaraderie within the cohort, an unanticipated bonus. Using a critical incident as the focus of the digital story has proven very successful as well. The most significant change since the second design iteration is the timing of the project. The assignment now takes place much earlier in the year, at the end of the first semester, immediately after the students' first teaching practice block placement in schools. Feedback from the students regarding the reflective skills they gained from the digital storytelling process encouraged us to complete the process as early in their first year of the programme as possible, so as to give them the reflective skills necessary for the remainder of the course. The whole process is also much quicker; students return from their first teaching placement with a rough draft critical incident, and submit their digital story three weeks later. We found that giving them months to work on the project, as we did in the first two iterations, only led to students putting the assignment off, as other assignment deadlines took precedence. The current three-week process is intensive, but manageable.

Conclusion

Crucially, teachers are not merely technicians (Zeichner and Liston 1996). As Dewey (1933) has described, they must be able to meet and respond to challenges and problems holistically, with intuition, emotion and passion. This necessitates significant, expansive capacity for deep reflection,

practical knowledge, and learning from experience. Under its five main headings or themes, reflection, narrative, engagement, sociality and technology, R-NEST enumerates key criteria and principles for developing and implementing DS to deepen reflection among pre-service teachers (see Fig. 5.2). It also identifies key stakeholders, design informants, and

Fig. 5.2 R-NEST design model: criteria and guidelines

resources that should be consulted in designing DS to enhance reflective practice in teacher education.

Boyer called the informed and principled, transformative possibilities afforded by methodological approaches such as AR and DBR, "the serious study that undergirds good teaching" (1990, p. 23). As we continue to teach and finesse DS as a core element within our teacher education programme, we are constantly striving for what Boyer described as "not only transmitting knowledge, but transforming and extending it as well", where "professors themselves will be pushed in creative new directions" (1990, p. 23). Boyer noted, "good teaching means that faculty, as scholars, are also learners" (1990, p. 24). DBR has enabled us to facilitate our own reflective practice as faculty, alongside the improvement of our student teachers' capacity for deeper, critical reflection through powerful digital storytelling design.

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