A learning design for student-generated digital storytelling

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Abstract: The literature on digital video in education emphasises the use of pre-fabricated, instructional style video assets. Learning designs for supporting the use of these expert-generated video products have been developed (e.g. Burden & Atkinson, 2008). However, there has been a paucity of pedagogical frameworks for facilitating specific genres of learner-generated video projects. Informed by two studies, this paper describes the development of a learning design for a popular genre: learner-generated digital storytelling. A particular learning design representation is used to present a structured description of an approach to digital storytelling and issues are raised relating to future iterations of the design.

Keywords: learning design learner-generated digital storytelling video production

Introduction

The value of *learner-generated* digital video projects (referred to subsequently as 'DV tasks' or 'DV projects') has been espoused by numerous education researchers (for example, Schuck & Kearney, 2004; Shewbridge & Berge, 2004). These constructionist learning tasks (Harel & Papert, 1991) can enhance a wide range of learning outcomes from the development of traditional and new literacy skills, to affective benefits. They can support a rich, authentic learning experience, encouraging student autonomy and ownership, meaningful student roles and interactions, especially when students are given an opportunity to discuss and celebrate their products with a relevant audience (Kearney & Schuck, 2006). However, formalised pedagogical frameworks are needed to help teachers leverage these worthwhile outcomes in these often complex, open-ended tasks. Expert teaching and learning practices with DV tasks need to be documented in a consistent and reusable form so they can be adapted to different learning environments. These forms of documentation, describing well-researched sequences of activities and interactions supporting students' learning experiences, are referred to as *learning designs or pedagogical frameworks* in this paper (less formalised, more descriptive advice is referred to as *guidelines*).

Guidelines are emerging around good practice with expert-generated, instructional video. For example, the *Digital Artefacts for Learning Engagement* (DiAL-e) framework (http://dial-e.wetpaint.com/) supports educators in identifying suitable ways to engage learners with externally produced 'video assets' and other digital resources (Burden & Atkinson, 2008), while good practice with video-based cases have also been explored (e.g. see Barnett, 2006). However, more work is needed to develop and document research-based principles of good teaching practices with *learner-generated* video tasks. Guidelines for supporting learner-generated digital video production tend to have a technical focus, often influenced by the professional film-making tradition, with less emphasis on important educational issues such as teacher roles, peer learning structures and support for reflective processes.

Pioneering efforts to develop pedagogical frameworks for supporting learning with student-generated DV tasks have recently emerged. In an early example, Theodosakis (2001) espouses five phases (and associated teacher strategies) for film-making in the

classroom: development; pre-production; production, post-production and distribution. A number of recent projects have emerged focusing on specific genres of DV tasks. Wong, Mishra, Koehler and Siebenthal (2007) provide a rationale and discuss guidelines for supporting *student-generated iVideos* ('idea videos'), especially in the context of teacher education. These advocacy-style videos are short, two-minute, digital videos designed "to evoke powerful experiences about educative ideas" (p. 1). Group learning strategies, formative feedback procedures and a 'coach / mentor' teacher role are important elements of their guidelines. Cooper, Kosta, Lockyer and Brown (2007) describe a learning design to support multi-literacy development for K-12 students working with learner-generated *journalistic DV tasks*. Their design focuses on analysis, construction and deconstruction activities. Analysis activities include students interpreting a variety of media images and comparing news stories across media types. Construction activities include creating a script and editing a digital video news item using professional footage, and also creating their own news item. Deconstruction activities include presentations to the class and comparison of students' new items. More recently, Hoban (2009) describes a four-stage learning design underpinning learner-generated *slow motion animations* (or 'slowmations'). The stages include planning, storyboarding, construction and reconstruction.

This paper introduces an emerging learning design for supporting another specific genre of learner-generated DV projects—*digital storytelling* (Lambert, 2010). The design draws on two recent studies which sought to gain an understanding of the way that teachers and students interact and learn through these projects; one from a K-12 context (Schuck & Kearney, 2004) and one from a teacher education context (Kearney, 2009). Although there were other foci in these studies, they provided an opportunity to test and refine notions of good teaching practice, informed by relevant literature and critical collaborative reflection amongst subject and pedagogical experts. The paper presents a formal representation of the resulting learning design for student-generated digital storytelling and flags potential directions for future iterations.

Background

Learner-generated digital storytelling

A burgeoning genre of learner-generated digital video tasks is digital storytelling. These tasks combine the tradition of oral storytelling with 21st century multimedia and communications tools. Unlike oral stories, they are permanent and can be disseminated widely; making them accessible for reflection and critique (Davis, 2004). In this paper, we refer to the form of digital storytelling defined by the *Centre for Digital Storytelling* in Berkeley, California (Lambert, 2010). This definition of digital storytelling integrates photographs, music, video (optional) and especially the voice of the narrator into a brief (2-6 min.) piece, typically with a strong emotional content. (Hence, they are fundamentally different to similar genres such as the previously mentioned journalistic DV tasks as they are more economic in detail and often autobiographical.) Robin (2006) discusses three sub-genres of learner-generated digital storytelling, namely: personal narratives (the main type used in our study), historical documentaries and stories that inform or instruct. Nilsson (2008) uses a similar taxonomy of digital storytelling tasks, describing four 'sub-genres':

descriptive (usually personal) stories, argumentative (or advocacy) stories, dramatic and poetic stories.

Use of digital storytelling has been discussed in other fields but has only recently been reported in higher education (e.g. Tendero, 2006). For example, in a growing literature base underpinned by a 'teachers as designer' philosophy (Koehler & Mishra, 2005), there is a significant body of work illuminating learning benefits for pre-service teachers from the process of constructing and sharing these narratives. A common theme in this area includes the facilitation of reflection on experience (e.g. McDrury & Alterio, 2002). These authors usually draw upon the work of scholars such as Schon (1983) and Boud, Keogh and Walker (1985) to explain the potential power of digital storytelling tasks for prospective teachers' development as reflective practitioners. Digital storytelling tasks also can help pre-service teachers' personal and professional identity development (Tendero, 2006). A key to these benefits is the emotional content emphasised in these tasks.

Other benefits are reported in recent literature, ranging from the development of academic skills such as critical thinking, report writing and research skills; to digital, oral and written literacies (Ohler, 2006). Overall, this literature base points to digital storytelling tasks as a valuable, transformative tool for learning in a range of curriculum and discipline contexts.

Staff and students also need to be aware of the intellectual property issues that arise if digital stories include copyrighted media (ELI website, 2007). Langran (2005) provides helpful guidance but the interpretation of educational 'fair use' of media in these types of projects is widely varied and often debated. Teachers need to proceed cautiously in collaboration with intellectual property and copyright experts.

Digital storytelling tasks are accompanied by pedagogical challenges, yet there has been minimal attention paid to aspects such as teacher roles, peer learning structures and assessment procedures in the relevant literature on learner-generated digital storytelling. Digital storytelling tasks are typically open-ended, ill-defined and hence more challenging for students who may be familiar with more traditional written tasks. Given this divergent and open-ended nature, it is helpful if digital storytelling activities are framed carefully and explicitly tied to the core content and process goals encompassed in the curriculum (Hofer & Owings Swan, 2006). Assessing digital storytelling tasks is a major challenge for teachers, particularly as it encompasses a range of skills, processes and content goals. They can be difficult to assess because the digital stories may integrate skills from a range of disciplines, particularly those that relate to creativity components. Use of appropriate instruments such as assessment rubrics has been recommended. Given these types of challenges, a generic learning design underpinning digital storytelling tasks is warranted.

Revisiting a pedagogical framework for facilitating DV tasks

In 2004, Schuck and Kearney conducted a qualitative research study investigating practices with DV tasks in five Australian K-12 schools. Data on teachers' and students' practices were collected and analysed from a socio-cultural perspective, in which the interactions of the group, their past experiences and beliefs, and the impact of being researched, were all seen as part of the research data. A detailed description

of the methodology is presented in Schuck and Kearney (2004). Over sixty different student-generated digital video projects were part of the data in the study, with the majority of projects (77% of cases) involving students' use of DV as a *communication* tool (as distinct from an *observation* or *analysis* tool – see Schuck & Kearney, 2004, p. 80) to basically convey messages, ideas, reflections or information. These projects often involved students acting in roles in a variety of film genres such as news items, interviews, advertisements, and music clips. Findings indicated that well-designed, student-generated digital video projects encouraged student engagement and autonomous learner roles, plus a wide range of other valuable learning outcomes including traditional and new literacy skills. The projects shared characteristics of being student-centred and context-rich and encouraged active group participation. DV tasks were seen to provide students with flexibility and choice, usually creating a strong sense of ownership, self-regulation and self-esteem benefits and personal interest in topics. Students projected their personalities in unique, creative ways, particularly when they were aware of their peers as the target audience for their productions. Further details of findings are reported elsewhere (Kearney & Schuck, 2006; Schuck & Kearney, 2008).

Data were collected from a variety of stages in the DV production process as students made movies in a range of contexts and genres. These stages ranged from the initial brainstorm and storyboard stages through to the important presentation and dissemination stages. Principles of good practice emerged from this data as summarized in Table 1 (from Schuck & Kearney, 2004, p. 84). This summary includes suggestions for teaching strategies and peer support structures at each stage of the DV production process.

The pedagogical framework (see Table 1) emphasises the importance of initial development of ideas and storyboarding stages, as well as teacher scaffolding and modelling. For example, some teachers in our study used segments of past students' work or commercial movies to make pertinent points, spark ideas for new projects and model appropriate language. A wide degree of choice enhanced student ownership of their projects; including choice of content, roles and if appropriate, film genre. The choice of student peers as the target audience was a major source of student motivation in our study, and encouraged use of humour and appropriate language in their final production. Mind maps and other organizers were used as a planning tool to brainstorm ideas and for the storyboard. Students were made accountable for their final storyboard and were prepared for 're-storyboarding'—editing and re-editing their plan before filming.

The teachers in our study encouraged the students to take a playful approach to their filming and editing and set up open-ended activities for students to discover their own mistakes and learn from them. The immediate feedback students received when they reviewed their films, as well as the ability to later edit their mistakes, helped students and teachers feel comfortable with this open-ended approach to learning. The autonomous style of learning supported by these open-ended tasks required a significant degree of flexibility from the teacher as students created their own learning pathways at their own pace. Indeed, most of the effective lessons we observed involved the teacher displaying a high degree of flexibility in the classroom to support student-initiatives and self-direction.

Table 1: Pedagogical framework for learner-generated digital video projects (from Schuck and Kearney, 2004, p. 84)

Stage	Teacher Strategies	Peer Learning Structures
1. Developing Ideas. Define film purpose and target audience, film genre, content and context Students research content	Scaffolding e.g. suggestions for purpose, ideas for genre, content, audience, roles etc. If possible, support student choice of genre, film content and context. Modeling of films from teacher, other experts and previous students. Modeling of relevant language.	Groups negotiate own roles based on own expertise / interest Formulate plan to swap and rotate roles through project Discussion of necessary teamwork skills
2. Storyboard / Scripting **3. Re-storyboarding**	Encourage use of mind maps to inform storyboard. Modeling of storyboards from teacher, other experts and previous students. Students have to 'sell' storyboard to teacher (formative assessment of storyboard) or peers before filming and if necessary, edit it.	Collaborative mind maps Group meetings to assess progress and share perspectives.
4. Preparation for filming	Facilitate student preparation of scripts, props, costumes, lighting etc. Modeling of relevant language. Modeling of filming techniques.	Allocation and rotation of roles Group meetings to assess progress and share perspectives.
5. Filming	Give formative teacher assessment (including informal observations) of film quality	Use of peer tutoring / 'expert' system for skills support Possible collaboration in roles (e.g. 2 people share a role.) and possible rotation of roles Peer assessment of film quality.
6. Editing	Scaffolding from teacher (e.g. some media elements – clips, photos, sounds etc. - could be supplied by teacher or from external sources – especially for younger learners. Give formative teacher assessment (including informal observations) and advise on re-filming and re-editing of scenes.	Possible collaboration with OR feedback from online filming communities
7. Small group viewing Reflect and discuss Students' own group as main audience.	Give formative teacher assessment (including informal observations) and possibly encourage re-filming of scenes Mediate small group discussions of film content or film-making process.	Peer assessment Discuss and share perspectives Possible collaboration with OR feedback from online filming communities.
8. General class / school presentation Celebration of Product! Reflect and discuss Class / school peers and teacher as main audience.	Mediate small group discussions of film content or film-making process to extend / review / probe concept and skill development Use feedback from audience to inform teacher assessment Summative teacher assessment of task Encourage student reflection (e.g. use of journal, e-portfolio).	Roles allocated to group for presentation Peer assessment and feedback Roles allocated to audience to encourage audience participation. Discuss and share perspectives.
9. Dissemination and publication. (CD / Web / email / TV) Audience now becomes peers external to class (include international), other teachers, parents, wider school, local or international community.	Use product for reporting to parents (incl. student-lead parent-teacher conferences). Use product to promote subject / class / school. Use product for intra or inter school film festival, competition, or TV show. Share with an online community; Possible feedback from outside experts.	Possible use of film as vehicle for communication / cultural exchange / sharing of perspectives with peers outside class. Possible use of videos as peer conversational artifacts in online communities.

An important part of this pedagogical framework concerned the final stages of the DV project: celebrating and sharing the students' final products and conducting discussions around these artefacts. These presentations provided crucial opportunities for meaningful class discussions centred on the intended learning outcomes of the projects. The importance of the teacher's role here in mediating and directing this discussion was crucial.

Finally, formative assessment procedures were recommended in almost every stage of this pedagogical framework to address learning outcomes. These included peer assessment and encouragement of group discussion and sharing of perspectives at all stages of the process. Teacher observation and feedback was also crucial, especially in the important early stages of the process. For example, to assess language development in foreign language classes, teachers needed to be active observers of students' learning conversations and writing.

A learning design for student-generated digital storytelling tasks

In 2008, the author carried out another qualitative research study investigating potential roles of learner-generated digital video projects incorporating the digital storytelling genre. This project explored aspects relating to the use of digital storytelling in a teacher education context, particularly with respect to suitable pedagogical approaches, student assessment (especially portfolio assessment) and ethical and intellectual property issues. Participants in this study were eleven volunteer pre-service primary education students at an Australian university. Data included student and staff questionnaire responses, student focus groups, staff interviews, observation, and artefact analysis (the students' digital stories). One of the main contexts of the study centred on use of digital stories for e-portfolio development and support of teacher reflection as the student teachers communicated the 'story of their learning' and professional development. Their digital stories helped them to present their learning journeys in compelling ways and enhanced synthesis and analysis of the learning experiences associated with their portfolio artefacts. The digital stories also became an object of reflection in their own right (Kearney, 2009).

Like our earlier 2004 study, data were collected from a variety of stages in the video production process as learners (the student teachers) designed and created their digital stories. Although the study primarily focused on the pre-service teachers' professional learning (Kearney, 2009) in their role as 'teacher-designers' (Koehler & Mishra, 2005), feedback and critical collaborative reflection (Bullough & Gitlin, 1991) amongst the researcher and critical friends of the project (academics from Teacher Education) assisted in formation of principles of good practice, building on our previous pedagogical framework for student-generated digital video projects (shown in Table 1). Informed further by relevant literature and support websites, a learning design for learner-generated digital storytelling tasks emerged, represented by a graphic formalism in Table 2. Although it is text-based and tabular in style, the structure of the notation system used in this formal representation is based on the visual learning design representation system espoused by Agostinho, Harper, Oliver, Hedberg and Wills (2008). The table is divided into three categories: *resources*—digital facilities that learners interact with; *tasks*—activities the learners participate in; and *supports*—usually teacher-mediated procedures assisting learners' engagement with resources and tasks (Agostinho, Oliver, Harper, Hedberg & Wills, 2002). Arrows

in the representation depict the sequence of activities and interactions between these three categories.

Apart from reiterating the crucial mediation role of the teacher at key points in the sequence, other features of this learning design (see Table 2) include:

- Identification and modelling of appropriate digital storytelling 'categories' (e.g. see Robin, 2006) and modelling of exemplary digital stories from relevant contexts (stage 1);
- Emphasis on support of students' affective domain, especially for reflection purposes (stages 1 and 4);
- Sharing of perspectives in a 'mini conference' session (stage 1);
- Explicit support for use of own or creative commons licensed media (with correct attributions) for projects to help avoid copyright issues, especially if publishing stories in public web-based galleries and forums (stage 1);
- Mediation of class-based and online discussions (possibly with international colleagues) stimulated by students' digital stories (stage 4);
- More opportunities for students to review and change their work as necessary after teacher facilitated class discussions and peer feedback (e.g. stage 3)

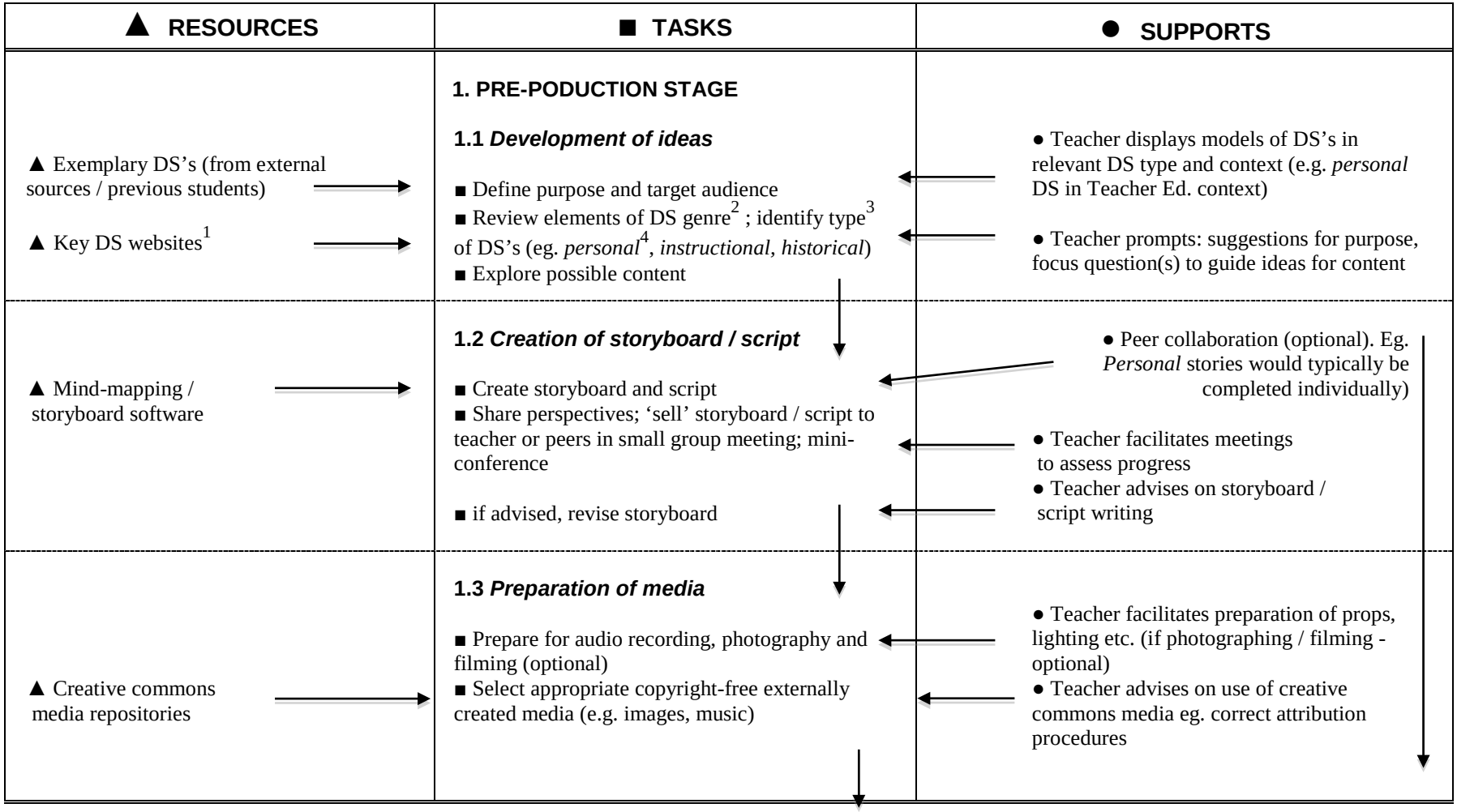
Due to the typically individual nature of the student teachers' digital stories, the initial 2004 pedagogical framework (see Table 1) had to be refined to cater for these types of more personal DV tasks. Indeed, with portfolio development and teacher reflection as a main focus in the recent study (Kearney, 2009), pertinent teacher strategies relating to reflective practice were included.

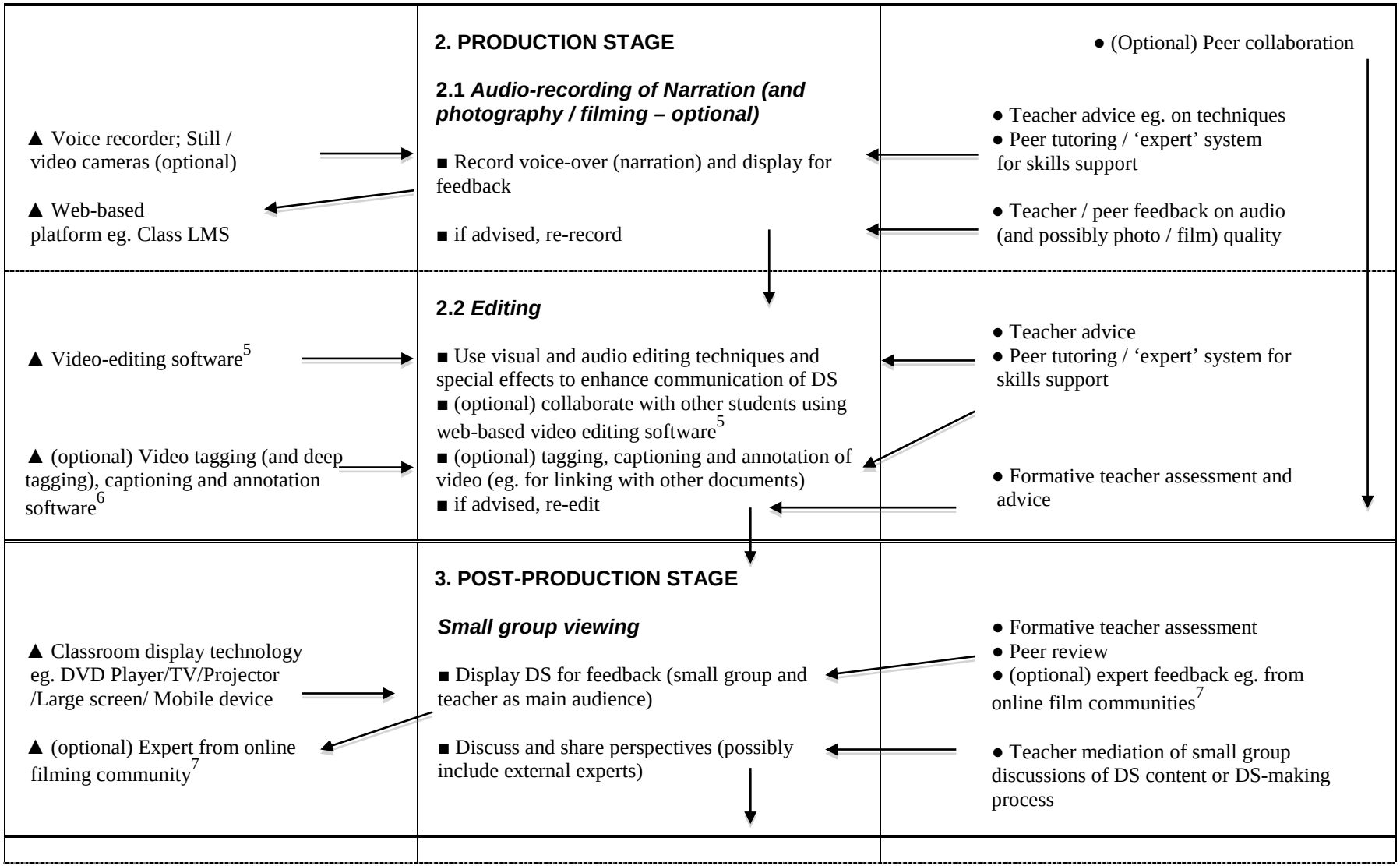
Key teacher and peer interactions and review processes were again highlighted in this new pedagogical framework. As discussed in Kearney (2009), significant learning opportunities again emerged in the final distribution stage of the process: celebrating and sharing the students' final products and conducting (face-to-face and online) discussion around these artefacts. These presentations provided significant opportunities for learning conversations, fostering peer critique and further student-teacher dialogue. The importance of the teacher's role here in mediating and directing this discussion cannot be over-emphasised, as these discussions and subsequent reflective opportunities potentially determined the overall quality of learning outcomes and professional growth.

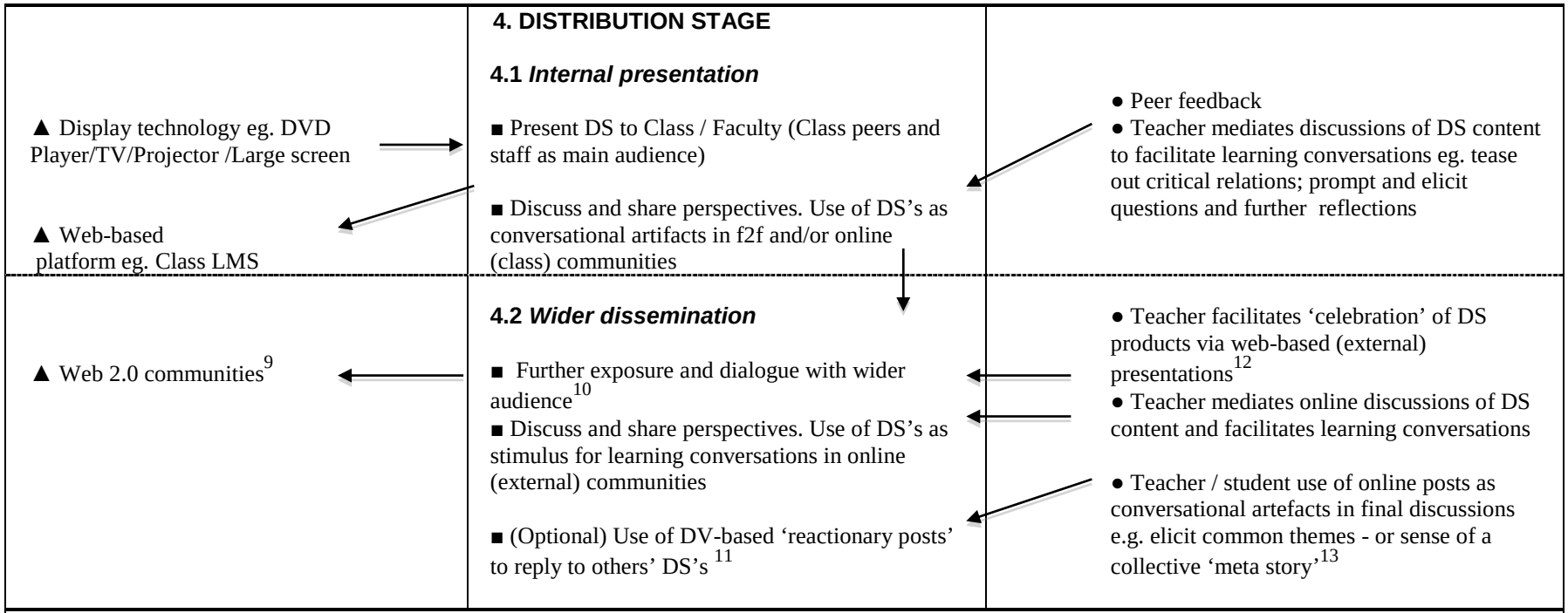
Another development was the use of online galleries and communities to promote online interactions. There are a growing number of web-based outlets for digital videos and the pedagogical affordances of these spaces need to be carefully evaluated before selecting a suitable platform for dissemination (e.g. facilities for peer and expert discussion). Seven participants from our study chose to display their digital story in the project's online gallery (via http://teacherenarratives.wetpaint.com/) for viewing and comment by other pre-service teacher peers (and other experts) around the world.

Table 2: Learner-generated digital storytelling: Visual learning design representation

NB. The following abbreviations are used: *DS: Digital Story; DV: Digital Video; f2f: face-to-face; LMS: Learning Management System; CC: Creative Commons*




2. PRODUCTION STAGE
2.1 Audio-recording of Narration (and photography / filming – optional)
▲ Voice recorder; Still / video cameras (optional)
▲ Web-based platform eg. Class LMS
■ Record voice-over (narration) and display for feedback
■ if advised, re-record
● (Optional) Peer collaboration
● Teacher advice eg. on techniques
● Peer tutoring / 'expert' system for skills support
● Teacher / peer feedback on audio (and possibly photo / film) quality
2.2 Editing
▲ Video-editing software[5]
▲ (optional) Video tagging (and deep tagging), captioning and annotation software[6]
■ Use visual and audio editing techniques and special effects to enhance communication of DS
■ (optional) collaborate with other students using web-based video editing software[5]
■ (optional) tagging, captioning and annotation of video (eg. for linking with other documents)
■ if advised, re-edit
● Teacher advice
● Peer tutoring / 'expert' system for skills support
● Formative teacher assessment and advice
3. POST-PRODUCTION STAGE
Small group viewing
▲ Classroom display technology eg. DVD Player/TV/Projector /Large screen/ Mobile device
▲ (optional) Expert from online filming community[7]
■ Display DS for feedback (small group and teacher as main audience)
■ Discuss and share perspectives (possibly include external experts)
● Formative teacher assessment
● Peer review
● (optional) expert feedback eg. from online film communities[7]
● Teacher mediation of small group discussions of DS content or DS-making process



Footnotes:

[1] eg. Centre for Digital Storytelling: http://www.storycenter.org/index1.html; Uni of Houston DS site: http://digitalstorytelling.coe.uh.edu/ [2] eg. see Lambert (2010) [3] eg. see Robin (2006) [4] If a main purpose of *personal* DS task is to support *student reflection* (e.g. part of portfolio), emphasise emotional connection (Lambert, 2010); encourage positive affective state (Boud et al., 1985) and encourage a supportive environment where learners can safely express themselves (Boud & Walker, 1998) [5] eg. Desktop-based software such as *iMovie*, *Moviemaker*, *Photostory*; web-based applications such as *Jaycut* [6] eg. see Johnson, Levine & Smith, 2008; Rich & Hannafin, 2009. [7] eg. partner Faculties / local / international film communities. [8] eg. Faculty presentation; (internal) gala night, film festival, local DS competitions. [9] e.g. Youtube, Teachertube, Wikis, Blogs. [10] eg. staff from other Faculties / institutions; international peers & staff; local or international community, outside experts. [11] e.g. in YouTube or TeacherTube communities [12] eg. via video sharing site such as Teachertube, community-based film festival, national and international DS competitions etc. [13] eg. see McKillop (2005)

Discussion

A learning design for learner-generated digital storytelling tasks has emerged, drawing on data from two recently completed studies focusing on learner-generated DV tasks in both K-12 and teacher education contexts (Schuck & Kearney, 2004; Kearney, 2009) and an iterative cycle of consultation with the literature and critical collaborative reflection amongst subject and pedagogical experts. Although there were other foci in these two studies, they leveraged the opportunity to test and refine notions of good practice.

The learning design discussed in this paper is by no means prescriptive—while such a pedagogical framework provides a guide to structure learning experiences for learner-generated digital storytelling tasks, account still needs to be taken of learners' specific characteristics and needs, the environments in which the learning could potentially take place and the preferences and characteristics of teachers, including their epistemological beliefs. Like any teaching role, expertise is needed in mediating the learning experience. For example, the digital video products in both our studies became " 'things to think with', constructed objects which foster dialogue and discussion" (Freidus & Hlubinka, 2002, p. 24). There were opportunities for peer critique (Jenkins and Lonsdale, 2007) and student-teacher dialogue and these discussions involved both formative feedback (e.g. on the learners' script and also pilot versions of their digital videos) and summative feedback (e.g. final showcase sessions). Class discussions in both studies often emphasised the fundamental importance of the 'teacher as listener' role (Russell, 2005) in reflective dialogue. These types of complex, spontaneous 'teaching moments' are difficult to capture, describe and document in a visual learning design representation such as the one presented in this paper – particularly one with such large granularity. To help teachers and researchers interpret and make sense of such extensive learning design representations, associated case studies and rich descriptions of teaching episodes embedded in real teaching contexts are needed.

Dissemination and publishing of students' digital storytelling video products needs careful consideration to maximise peer learning opportunities and there are an increasing number of outlets at this final stage, including school film festivals, external film competitions, international cultural exchanges and web-based TV shows. An interesting development here is the use of online galleries and digital video communities (e.g. see Ugoretz & Theilheimer, 2006) to promote reflective online interactions. McKillop (2005) discusses interesting extensions here. Firstly, the notion of responding to a published digital story in video mode: "responding to stories with a similar story is a most common way to respond" (p. 6). Indeed, this is easily facilitated in video-based galleries such as *YouTube* and *Teachertube* where people can make video-based responses to already published videos. Secondly, she suggests students making a final 'what I learnt' overall response where they think about what they have learned from the initial video *and* from responses to it. This could easily be done in online galleries using facilities such as the discussion forum in *WetPaint*. Students need to take ownership of this type of gallery to empower them and provide them with a collective voice; potentially forming a sense of 'metastory'—a story of the collected stories (of the group) with connected emerging themes (McKillop, 2005).

The next cycle in the development and refinement of this learning design for digital storytelling will incorporate further evaluation—involving teachers, students and feedback from professional learning communities such as the *Learning Activity Management System* (LAMS) community (Dalziel, 2007). This process will inform refined documentation of this learning design representation and also support the creation of accessible, malleable 'e-templates' for other teachers to use in a similar fashion to the e-templates created by Kearney and Wright (2002) for the *multimedia-based POE* design. Indeed, the LAMS pedagogical planner (Cameron, 2008) holds promise to support the sharing of effective pedagogy and content as well as a user-friendly system for re-use and enactment of specific contextualised learning designs. The learning design representation presented in this paper (in Table 2), plus these (LAMS-based) templates and associated pedagogical notes, will then be used as a starting point—or at least a 'talking point'—for teachers wanting to adapt this learning design to inform their context-specific digital storytelling tasks.

This paper raises three main issues about documenting learning designs, relating to language used in the documentation, granularity of designs and associated emerging technologies. Firstly, digital storytelling draws on a variety of disciplinary traditions and is relevant to a wide range of curriculum areas. This wide appeal creates further challenges for documenting and accurately communicating the digital storytelling learning design—the language used to describe it (or any representation of a learning design in the area of student-generated DV projects) not only needs to be faithful to the film-making tradition and but also needs to be easily interpreted by an audience from a variety of disciplinary backgrounds.

The second issue concerns learning designs with a large granularity. It is challenging to 'do justice' to these rich, potentially authentic digital storytelling tasks and document all variables succinctly in a graphic learning design representation. Unlike many learning designs documented in the literature, digital storytelling tasks are open-ended and constructionist in nature, with a long timeline for completion, and are enacted in both online and face-face settings. Hence, there is a wide range of possible pedagogical variations that need describing at all steps of the design, as well as a plethora of ethical and legal issues that also need consideration. For this reason, the system of representation formalism used to document the learning design in this paper (see Table 2) became less graphical and more text-based (including use of footnotes and bullet points). In future developments of this learning design, it may be helpful to further reduce the granularity by considering subtle variations in designs for different digital storytelling sub-genres (personal, instructional, historical etc.) This reduction in granularity should enhance clarity of documentation and relevant teaching notes. For example, the teacher strategies for supporting the crucial reflective processes involved in e-portfolios ('telling a story of personal learning') are unique to this particular type of digital storytelling task; instructional (or advocacy) and historical digital storytelling tasks require an extra level of research into a topic in the early phase of the process and are more likely to be created in groups than personal digital storytelling tasks.

The third issue concerns the dynamic nature of learning designs involving rapidly changing technologies such as digital video. Further work is needed exploring the affordances of emerging technologies such as collaborative online editing (Blackall, 2008), 'deep tagging' of video (creating direct links to small parts of a video—see

Johnson, Levine & Smith, 2008) and annotated video (Rich & Hannafin, 2009). Fresh investigations should explore how these capabilities might contribute to more interactive formats of the video medium (eg. see Girod, Bell & Mishra, 2007) and new pedagogical strategies. For example, the ability to hyperlink sections of text-based documents to reference key frames of learners' digital stories opens up a range of opportunities for e-portfolio tasks. Applications such as *Videopaper*, or free web-services such as *Viddler*, can assist learners in making these explicit links to exact points in their digital stories, potentially creating new possibilities for scholarly discussion and reflection around learners' digital story artefacts. Indeed, further research is needed to investigate fruitful links between digital stories, portfolio assessment and reflective online dialogue—for example, in Web 2.0 communities (Albion, 2008). In this way, the learning design presented in this paper needs to be considered as an evolving design in order to stay relevant in the field and to cater for the reciprocal relationship between emerging educational technologies and pedagogical approaches (Salomon & Almog, 1998).

Conclusion

The literature points to digital storytelling tasks as a valuable, transformative tool for learners in a range of curriculum and discipline contexts and the learning design described in this paper will foster sound pedagogical approaches associated with these complex and often time-consuming tasks. The digital storytelling genre comes with its own unique characteristics. These tasks are often autobiographical and use succinct multi-modal communications to provoke a strong sense of emotion. As scholars become more familiar with relevant emerging technologies and pedagogies, this genre of student-generated digital video is expected to find favour across the curriculum.

This paper highlights some challenges in documenting learning designs of this nature. There is a tension between producing a succinct representation and over-simplifying the complex nature of the learning activities involved in tasks such as digital storytelling tasks. Documentation needs to effectively capture the intricate nature of teaching and an optimum level of granularity is needed before subtle variations in teaching approaches can be meaningfully communicated. Supplementary case studies and context-rich descriptions will facilitate this process. Representations of designs in domains such as filmmaking need to use carefully selected language that clearly communicates principles to an audience from a potentially wide range of disciplinary backgrounds. Finally, designs involving rapidly changing technologies such as digital video are essentially fluid and dynamic in nature and regular revisions are needed to explore and document future pedagogical developments.

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