What can you learn in 3 minutes?

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The integration of technology into teaching, learning and assessment has the potential to improve not only student engagement but to encourage higher order thinking and deep learning. However, in order to capitalise on this potential, teachers need to gain the necessary knowledge, competence and, importantly, confidence to implement productive technology-based tasks. This paper describes and evaluates a rich assessment task implemented in a pre-service teaching program. The task, planning and production of a three minute video, modelled an approach to assessment that engages and motivates but also provided the opportunity for students to develop and demonstrate generic and subject specific learning outcomes and gain experience with appropriate technologies. The evaluation draws on student reflections of the task and broader student feedback in the form of unit evaluation reports from two successive cohorts of students. This data has been analysed against the learning outcomes of the unit, broader principles of assessment design and, the extent to which modelling a technology-based task was seen by the students to be transferable to their own practice.

Keywords: *Assessment, Science Education, Video-making*

Introduction

Contemporary thinking about assessment in higher education has moved beyond the measurement model (Biggs, 2003) to a more complex picture where assessment is inextricably linked to not only the quality of learning but also the quality of teaching (Ramsden, 1995). In this model, assessment tasks should be aligned closely with intended learning outcomes (Allen, Brown, Butler, Hannan, Meyers, Monkhouse & Osborne, 2007) and 'authentically represent the knowledge to be learnt' (Biggs, 2003, p156). The notion of active demonstration (Biggs, 2003) or performance assessment (Moss, 1992) is central to such a model, together with close integration with teaching and learning experiences and opportunities for students to receive feedback and to reflect on their learning (Allen et al, 2007).

Despite the increasing body of literature on assessment practice, the reality does not always reflect the ideal picture (Biggs, 2002). In 2007, Boud called for a 'new emphasis on assessment designs that promote learning' arguing that much of the debate around assessment has focused on measurement rather than the role of assessment in learning or its impact upon the students. He went further to define ten characteristics of a great assessment design:

1. The activity is a learning experience
2. It is seen as valid and worthwhile
3. It actively promotes learning and skills beyond the act itself
4. The student is an active agent throughout
5. It has a strong positive backwash effect on learning during the course
6. It enables students to celebrate and portray achievements
7. It is part of a sequence of great designs over the course as a whole

8. It arises from a great learning environment
9. It is not excessively resource-intensive
10. It requires and prompts informed judgment   (Boud, 2007).

The project described in this paper aimed to integrate a performance assessment with teaching and learning experiences in a pre-service teaching course for Secondary Science teachers. Conceived as a Rich Task (Education Queensland, 2001, s1), the project focussed student learning, in Science content, Science pedagogy and technology skill acquisition, around an authentic product (a 3 minute Science video). Importantly, it also modelled a project that could be undertaken in a school classroom hence giving it a real-world application. An important rationale was to allow the pre-service teachers to gain confidence and experience in a technology based project that integrated with the Science curriculum. The task description was:

> In groups of 3-5 you are to plan and produce a three minute video exploring an issue in Science. This will be a hands-on experience encompassing story boarding, filming, editing and presentation. You will be supported in this task through workshops providing you with knowledge and skills to use video making and viewing as one of your teaching strategies - in Science or in an integrated curriculum context.

The video assessment task was designed to align with the learning outcomes of the unit: to develop pedagogical content knowledge particular to the domain of Science; to collaboratively design authentic learning experiences in the Science learning domain; to gain confidence and experience in pedagogies and assessment and to develop skills and understanding for working in collaborative teams. In addition to presenting the finished product, groups were asked to keep a log to outline meetings and tasks undertaken by each member of the group, and to individually write a short reflective essay on the task.

Video-making as an applied technology task, involves use and understanding not only of the video camera, but also of the video-editing software to present a finished product. Increasingly being used in schools (Roblyer, 2006), this technology offers promise as a pedagogy to engage and motivate, draw cross-curricular connections and to develop skills, such as team work that extend beyond the classroom (Nadebaum, 2003; Roblyer, 2006). However, as with other new technologies with potential to enhance student learning outcomes, adoption is not straightforward. A number of barriers to adopting new technologies have been identified, three being teacher beliefs, confidence and expertise in using the technologies (Albion, 1999; Jamieson-Proctor & Finger, 2006; Phelps, Graham & Kerr, 2004). Professional learning, for both pre-service and in-service teachers has been recognised as holding promise to overcome these barriers and provide a catalyst for change (Finger, Russell, Jamieson-Proctor & Russell, 2006). By adopting a technology (video) project assessment task, this unit aimed to provide pre-service teachers with a scaffolded learning experience to develop skills and confidence in this medium.

The video project has been evaluated against its alignment to the learning outcomes of the unit, the broader principles of assessment design espoused by Boud (2007) and, the extent to the technology-based task was seen to be transferable to the students' own practice.

Methodology

At University of Tasmania (UTAS), teaching staff are encouraged to adopt a systematic approach to evaluating units including consideration of student feedback and assessment outcomes (UTAS, 2003). Although a relatively informal process, with onus on the coordinator, engagement in a critically reflective process is increasingly being adopted by staff in response to a growing awareness of scholarly approach to practice.

In this study, a 'Wisdom of Practice Scholarship' approach (Weimer, 2006) has been adopted to critically analyse an aspect of teaching and learning in which the author has been engaged. This analysis has been primarily undertaken in an effort to inform practice and to identify areas of improvement, consistent with Action Research principles (Kember, 1998). Being grounded in a real world situation, both qualitative and quantitative data has been gathered, compatible with pragmatic knowledge claims (Creswell, 2003).

Data collection and analysis

Data was gathered from two primary sources, a reflective essay assessment task and student feedback on the unit through Student Evaluation of Teaching and Learning (SETL) questionnaires. The participants were two different cohorts of Secondary Science pre-service teachers completing a Bachelor of Teaching degree in two consecutive years. There were 20 students in each cohort.

The reflective essays were a 20% component of the unit assessment. The essays required students to reflect on the task as a pedagogy appropriate to the Science domain by drawing on their own experiences as video-makers as well as relevant literature. As a guide several aspects were suggested for consideration: attainment of Science outcomes; facilitation of cross-curricular integration; development of literacy; development of teamwork skills and; impact on engagement and motivation. Thirteen essays were subjected to analysis, these being essays voluntarily returned to the lecturer (following assessment and feedback) to allow critical review of the task. The essays were representative of the full range of passing grades (Pass, Credit, Distinction and High Distinction).

Essays were read through for meaning and familiarity, and themes emerging from the data were then drawn out through a process of categorisation and collation (Miles & Huberman, 1994; Patton, 1990). Once this categorization had occurred sections of the students' writing were coded to indicate each theme. A second layer of analysis was then applied to designate the theme being considered one of four levels. These were: at a generic level; specifically related to curriculum outcomes; referenced to personal experience through reflection and; extrapolating reflection into what it would mean for practice (application). Examples of each of these levels are presented in table 1.

Table 1: Exemplars of response levels

Level of response	*Exemplar statement from student essays*
Generic	[v]ideo production could be a positive and efficient way for teachers to bring together a variety of subject disciplines.
Curriculum	The attainment of the Key Element Outcome 'being arts literate' in video production is perhaps reflective of its cross-curricular character.
Reflection	Through the process of producing our video we were forced to refine our understanding of the concepts in order to present examples of forces in action.
Application	As a teacher I must monitor the quiet less dominant personalities in the group and encourage them to contribute without negative interference from others. Effective group-work strategies could be raised in class prior to commencement of the activity and a video production checklist (attached) should be made available to each student as a valuable group tool.

Recognising that the essays were written with the assessor in mind, the SETL questionnaires were important to provide an objective data set in terms of student response to the project and the assessment task. The SETL questionnaires yielded quantitative data in form of a Likkert scale response to statement and qualitative data through open-response questions. The Likkert scale operated on a scale of 1-5, with 5 acknowledging strong agreement and 1 strong disagreement. On this scale, scores above 4 indicate a high level of agreement. For the purposes of this evaluation, only questions that directly related to the research questions were scrutinised. Similarly, open ended responses were examined to select those specifically related to the video project.

Results

A total of 16 themes were identified from the essays, 12 of which were mentioned by at least three students. The frequency of each of these themes is presented in figure 1. Development of technological skills emerged most frequently, followed by team work and collaborative skills, development of literacy, general communication skills and critical literacy through the process as well as Science content. The ability of the project to enhance cross-curricular links was also commonly mentioned, as was the engagement and motivation such a task generated. Other themes of note were the development of problem solving skills and personal qualities such as creativity and responsibility. The task was also seen as one that could promote hands-on, active learning and as a pedagogy that was inclusive and valuable in a repertoire of classroom strategies. Comments from students at the reflective level (see table 1) indicated that their own experience in making a video was influential in recognising the promise of the project. The relative frequency of reflective comments is seen in figure 1.
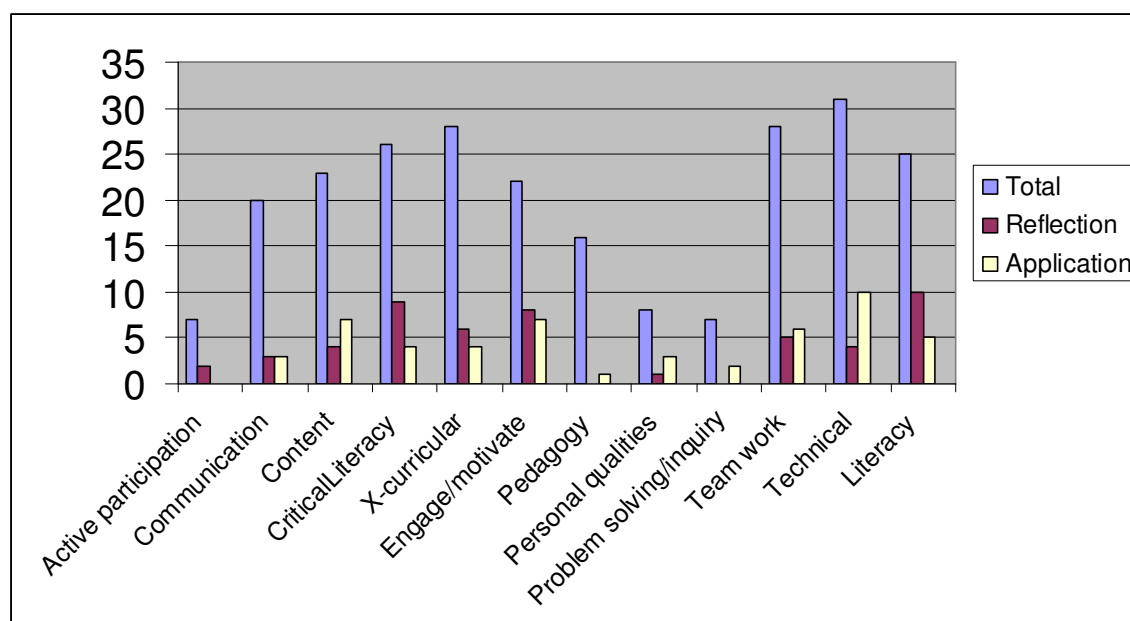
Figure 1: Frequency of themes

Although not specifically asked for in the essay brief, a majority of students moved beyond reflecting on the task towards a consideration of how this type of project could be implemented in their own classrooms (Application, see fig 1). The most common themes that arose in the application category were: issues around applying the technology ('…the teacher would need to be conscious of the need to teach the skills required to enable the students to use the media'); engagement and motivation ('… students with learning difficulties or that [sic] struggle with academic pursuits are able to get involved and enjoy a form of study that is removed from traditional pen and paper'); and content ('…successful communication of a scientific concept through video production necessitates a high level of conceptual understanding').

A recognised limitation of this project is the ability to track whether this has had an impact on the pre-service teacher's practice after graduation. Nevertheless it is worth noting that one student actually carried out a video project (a laboratory safety video) during her own internship and used this as a reflective focus in her essay:

> The outcome of this experience in largely a personalised journey; one in which Year 7 taught me more than I taught them. Fortunately, before it was too late, I also realised that it was not about making a good or perfect video, … it was about the students constructing their own learning and presenting their product in a way that meant something to them.

The SETL results indicated students had a high level of agreement with each of the statements (Table 2). The value of the video project was particularly supported (Table 2).

Table 2: Results of SETL questions

SETL Question	Average (1-5 scale)
The unit addressed the learning outcomes stated in the unit outline	4.10
I was actively involved in the unit	4.12
I see links between this unit and my works as a teacher	4.25
The video was valuable	4.44
Relevant to future profession*	4.23
I developed skills needed by professionals in this field*	4.54

*This question related to future relevance was phrased differently in the two successive years.

Of the small number of written comments on the SETL forms, three related directly to the video project. Of these two were extremely positive, whilst the third expressed some doubt as to its value:

> Truly showed how a project could be integrated across the curriculum.

> The experience of actually doing the video was terrific, worthwhile

> I cant imagine making many videos with my class

Discussion

The results from both the reflective essays and the SETL questionnaires indicate that the video project was, on the whole, well received by the pre-service teachers. The SETL results indicated students saw a link between the learning outcomes and the unit. In addition, the learning outcomes themselves were expressed in student essay responses. In particular, comments in the essays reflected the students' developing understanding of, and confidence in, the pedagogies important to the domain. They also reflected skills and understanding in working collaboratively, and importantly included consideration of how this could be facilitated in their own classrooms. The constructive alignment (Biggs, 2003) of the unit therefore appears strong.

The scaffolding of the technical aspects of the project allowed students to gain confidence and experience in a new pedagogy in a supported environment. Without exception, students saw benefits far beyond any subject specific outcomes, and in the majority of cases, indicated they would introduce a similar project into their own classrooms. Students made links between the project and school curriculum (including cross-disciplinary links and critical literacy), pedagogy, engaging and motivating students and creative use of technology. In addition SETL data indicated they saw strong links between this project and their future profession. The call from Finger et al (2006) for technology-related professional learning in pre-service programs is certainly supported from this project.

Although not all elements of a great assessment design (Boud, 2007) were able to be evaluated, a significant number of them were present in the video project (Table 3). Nevertheless, the resource requirements of this project are worthy of attention, particularly in terms of teaching staff. Although contact hours were not excessive in comparison with traditional lecture/tutorial formats, the need for staff availability at different times, especially to support the editing phase was important. Another consideration is staff expertise to enable students to be scaffolded and supported in developing skills in using the technology. Without this important element, the success of the project would be jeopardised.

Table 3: Evaluation against Boud's (2007) principles

Design characteristic	*Evidence*
The activity is a learning experience	High measure of agreement on SETL in terms of relevance to future profession. Individual comments reflecting learning.
It is seen as valid and worthwhile	High measure of agreement on SETL; High number of comments implying future application.
It actively promotes learning and skills beyond the act itself	High number of responses indicating benefits beyond curriculum area outcomes and student comments relating the project to their future work in the classroom.
The student is an active agent throughout	High level of agreement on SETL. High number of essay responses indicating hands-on nature of learning.
It has a strong positive backwash effect on learning during the course	Course-wide judgement beyond the scope of this project. Close alignment of the learning outcomes with assessment task meets the requirements for positive backwash (Biggs, 2003)
It enables students to celebrate and portray achievements	Embedded in task through the Premiere Film Night
It is part of a sequence of great designs over the course	Beyond the scope of this project
It arises from a great learning environment	Not specifically addressed however above average SETL scores for unit.
It is not excessively resource-intensive	Need appropriate technology and software. Stages of intensive staff time required, including working with groups in editing phase
It requires and prompts informed judgment	Students given assessment criteria, opportunities for feedback and reflection from staff through project

Conclusion

The project was well received by the students, who saw a connection between the project and the learning outcomes of the unit, together with an application in their future work as teachers. It addressed the majority of Boud's (2007) characteristics for a great assessment design, however it needs to be noted that the availability of expertise to scaffold students' technical skills is an important precursor to the success of such a project, as is the ability of academic staff to work with students in ways that may not be supported by traditional timetables.

Notwithstanding the positive outcomes of the project as a component of university coursework, whether the outcomes have lasting influence on practice is largely unknown and worthy of investigation. Nevertheless student comments provide reason for optimism and support the power of professional learning in technology-related pedagogy:

> I was initially sceptical about the project, particularly its relevance to us as secondary/science maths teachers. Looking back I think some of this scepticism was founded on a lack of understanding and confidence using the technology in questions. After having completed this project my views have completely reversed. I now recognize the value in such a project for both myself and for use in the classroom. I am looking forward to the opportunity to develop such a project for use in my own teaching.

Acknowledgements

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