e-Learning and Digital Media

Meaning Making Using New Media:
Learning by Design case studies

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ABSTRACT This article discusses a study of three Australian middle-years teachers who deployed Learning by Design principles and practice to support multiliteracies learning through students' production of digital/multimodal texts. The aim of the research was to develop an understanding of how three teachers embraced new e-learning pedagogical designs for teaching and learning about multiliteracies, and to what extent Learning by Design facilitated both the teachers' and students' learning. This qualitative research involved the collection and analysis of the three teachers' curriculum-planning artefacts before and after professional development on Learning by Design, interviews, audio and video recordings, classroom observations and student digital/multimodal products. This article examines Learning by Design as an e-learning pedagogical framework and the dimensions of professional practice that contribute to quality student production of digital/multimedia texts. The study demonstrates the existence of five conditions that are necessary for the Learning by Design pedagogical framework to be effective as a heuristic to enhance digital/multimodal literacy outcomes.

Introduction

Reform work on school effectiveness over the last three decades has found the quality of pedagogy to be linked to a variance of more than 20% in students' performances (Newman, 1996; Lingard et al, 2001, cited in Luke, 2003). It is now well understood that the quality of teaching has more impact on student learning than other indicators such as gross demographics or curriculum (Darling-Hammond, 1998; Rowe, 2003; Hattie, 2009). 'Skillful teaching', according to Darling-Hammond (1998, p. 7), requires an understanding of 'pedagogical content knowledge' and 'pedagogical learner knowledge', which provide the means for improved student understanding. In addition, visible, explicit teaching and learning encompasses teachers as 'learners of their own teaching' and students as confident agents of their own learning (Hattie, 2009, p. 22). Furthermore, recent classroom work deploying Learning by Design theory to support quality teaching and learning, through a digital curriculum-planning tool and the production of digital media texts, has provided additional understanding to the 'what' and 'how' of Learning by Design as an effective approach to quality multimodal literacy teaching and learning (Neville, 2005, 2008).

This article argues that the results of an Australian qualitative research project, designed to determine ways in which the Learning by Design pedagogical framework facilitated quality multimodal literacy teaching and learning, contributes to the evidentiary base for quality teaching and its effect on student achievement. The research was conducted in metropolitan schools in Brisbane, Australia (Neville, 2008). The presentation of this empirical research is primarily intended to determine the salient factors that emerged when three middle-years teachers considered Learning by Design pedagogical principles within the context of new media and technologies to enhance student learning. It includes an examination of the facility of Learning by Design to support explicit digital curriculum plans and how implementation of these contributed to students'

quality production of digital and/or multimodal products to demonstrate curriculum achievement. Another factor to be observed is the varying degrees of expansion of teachers' professional practice to accommodate the design process for quality production of digital multimodal texts in different areas of the curriculum. In the following discussion, first there is a description of the setting and the multiliteracies theoretical context of the research; second, the general aim and scope of the research is presented; and third, there is a summary of findings about teachers' use of Learning by Design as a pedagogical tool and as a theory for enhancing digital/multimodal literacy for improved teacher practice and student learning. The article concludes with a reflection on the conditions under which Learning by Design facilitated quality production of digital media or multimodal student products, prompting readers to consider application in their own contexts.

The Educational Context

During this investigation, three middle-years teachers (Teachers A, B and C) were actively encouraged to implement Queensland state education policy initiatives related to multiliteracies (New London Group, 2000) through planning, teaching and reflecting on the use of the Learning by Design approach to pedagogy to support digital/multimodal literacy learning through students' production of digital/multimodal texts. Teacher A taught a Studies of Society curriculum unit on democracy; Teacher B taught an integrated English and Studies of Society unit on personal identity; and Teacher C taught a Visual Arts unit on multimodal collage making as a lead-up to the production of a short film on humanitarianism in media studies. The findings reported in this article illustrate the significant professional practice requirements (Darling Hammond, 1998; Thompson & Zeuli, 1999) the teachers had in using the Learning by Design theory and ideas to provide intellectually stimulating multimodal literacy learning experiences for the benefit of their students' improved multiliteracies outcomes.

The Theoretical Context: multiliteracies, design theory and multimodality

'Multiliteracies' was a word created to extend many educators' views of literacy being singularly associated with linguistics and one standard use of the English language. The New London Group claim that multiliteracies is:

> a word we chose because it describes two important arguments we might have with the emerging cultural, institutional, and global order. The first argument engages with the multiplicity of communications channels and media; the second with the increasing salience of cultural and linguistic diversity. (New London Group, 2000, p. 5)

In conceptualising what students needed to learn about multiliteracies, the New London Group (2000) advocated the development of a functional grammar. This need for a set of new 'grammars' was identified in order to describe the patterns of representation in the linguistic and cultural demands of context-specific texts and the six design elements or meaning-making systems present in the texts of our real-world lives. It was claimed that a metalanguage would help students to explain differences in the use of oral and written language, and the visual, audio, gestural and spatial design elements in everyday communication as they appear by themselves or in combination, in other words, multimodal form (Cope & Kalantzis, 2000; Kress, 2000b).

This focus on 'grammar' indicates that the multiliteracies idea does not just acknowledge that texts are increasingly multimodal (Kress, 2000b). It also considers that all modes of meaning (linguistic, visual, audio, gestural and spatial) show regularities or 'grammars' that can be related in certain conceptual ways to written and oral language (Cope & Kalantzis, 2000; Kress, 2000b). For instance, 'being' and 'acting' in a written text are centred on processes, attributes and circumstances which, when positioned in an image, convert to vectors, location and carriers (Cope & Kalantzis, 2000).

However, the analysis and production of digital/multimodal texts cannot be undertaken using current language-based theories alone. As Kress (2000a, p. 153) speculates: 'theories of language can at best offer explanations for one part of the communication landscape only'. The assumption is that, for any mode of meaning, grammar must satisfy the communication of events and circumstances in the world, the relations of power of participants as they interact and the

creation of messages that internally make sense (Kress, 2000b). An adequate theory for multimodal learning and teaching would include 'the description both of the specific characteristics of a particular mode and of its more general semiotic properties' (Kress, 2000a, p. 153). It would also consider how the elements of different modes or the semiotic systems combine to make meaning through the emphasis of production of multimodal texts, as opposed to pure analysis and critique of such texts (Thesen, 2001).

Members of the New London Group (2000) conceptualised these meaning-making systems that exist in digital/multimodal texts in terms of an iterative process of *design*. The first stage of the process begins with *available designs* – here the meaning maker uses existing design elements, for example, the linguistic, visual, audio, gestural and spatial designs in books, on the screen, in still and moving images, etc. The next stage incorporates the process of *designing* – drawing on these available designs to make meaning. Finally, *the redesigned* is transformed and there is extensive understanding of the implied use of available designs (Cope & Kalantzis, 2000; Kress, 2000a).

The description of this process of *design* by the New London Group was accompanied by a reference to the support of a metalanguage to make sense of the *available designs* and *the redesigned*. The New London Group contend that:

> the primary purpose of a metalanguage should be to identify and explain the differences between texts, and relate these to the contexts of culture and situation in which they seem to work. The metalanguage is not developed to impose rules, to set standards of correctness or to privilege certain discourse in order to 'empower students'. More importantly, informally we might ask of any Designing, 'What's the game' and 'What's the angle'? (New London Group, 2000, p. 24)

It is becoming well known that digital, multimodal and e-learning environments will continue to put pressure on existing teaching and learning practices – in particular, the relevance of some practices in print-based classrooms and their worth in assisting effective learning (Zammit & Downes, 2002; Bearne, 2003; Kress, 2005; New Media Consortium, 2005; Kalantzis & Cope, 2008; Lankshear & Knobel, 2008; Hague & Williamson, 2009). These days, individuals are more than likely to be readers and producers of digital/multimodal texts. This is due to a larger percentage of people having access to software that enables digital/multimodal authorship in schools, the home and workplace (Unsworth, 2003). However, pedagogical practices that simply promote the authorship of digital/multimodal texts (adding multimodality on to existing approaches) do not automatically advance effective pedagogy or authentic literacy practices. Effective pedagogy for digital/multimodal literacy requires explicit teaching of strategies for working with the forms, features and cultural contexts of these texts (Cope & Kalantzis, 2000; Lankshear et al, 2000; Zammit & Downes, 2002; Kress, 2003).

Lankshear et al (2000), in their research on teachers' use of technology, discuss the add-on nature of new technologies in primary classrooms. They refer to teachers' use of new technologies to fit their familiar approaches to literacy teaching and learning – for example, children typing up a story on the computer rather than rewriting a final draft – as 'old wine in new bottles' syndrome or a 'digital makeover' (p. 102). The researchers argue that:

> some of the practices raise the question of what counts as effective learning involving new technologies. If we believe that effective learning connects what learners do now 'in meaningful and motivating ways with "mature" (insider) versions of related social practices with what they will be doing in later points in their life trajectories' (Gee, Hull & Lankshear, 1996: 4), we might consider whether the same software applications can be taught via practices that are closer to those that are employed by expert users of presentation software and the internet. (Lankshear et al, 2000, p. 102)

Lankshear et al's (2000) argument is for teachers to consider ways of making classroom practices involving the texts of new technologies more authentic, in similar ways to how experts use them for real purposes. Additionally, the contention is that in this era, a narrow or uniformed view of literacy and a lack of attention to the discourses of the social practices (as experts use certain discourses) involved in using new technologies is not acceptable:

> to operate effectively in a discourse is to become fluent and appropriate in its discourse. This involves more than just coming to grips with technical or skills aspects of encoding and decoding. Learning how to handle the reading and writing components of a discourse requires

being immersed in social practices where participants not only read texts of this type in this way but also talk about such texts in certain ways, hold certain attitudes and values about them, and socially interact with them in certain ways. (Lankshear et al, 2000, p. 29)

Furthermore, Thesen (2001, p. 142) offers the reconsideration of assessment of multimodal learning from analysis to multimodal production: 'Research that describes learning where students have control of production in different modes is often inspiring, and clearly points to the value of different pedagogic space where design plays a stronger role than critique.'

Aim and Scope of the Study

The aim of the research was to develop an understanding of how three teachers embraced new designs for teaching and learning about multiliteracies. Central to this was an analysis of how the design process of using *available designs*, *designing* and *redesigning* (New London Group, 2000) was facilitated by using the Learning by Design digital pedagogical mark-up tags, and how the same teachers established the design process in their pedagogy to support their students' repertoire of digital/multimodal literacy practices. The qualitative research using observation, interviews, artefacts and digital recordings of classroom work through case study methodology was conducted over one semester in metropolitan primary and secondary schools in Brisbane, Australia. At the time of the research, all of the participants were involved in a wider professional learning project on multiliteracies and Learning by Design supported by universities, districts and educational consultants (Burrows, 2005; Kalantzis & Cope et al, 2005; Neville, 2005). The Learning by Design digital curriculum-planning tool (Learning Element) was an object of study, as the teachers employed the knowledge processes of *experiencing*, *conceptualising*, *analysing* and *applying*, as seen in Figure 1, to document their curriculum and pedagogy, as well as implement it in the classroom.
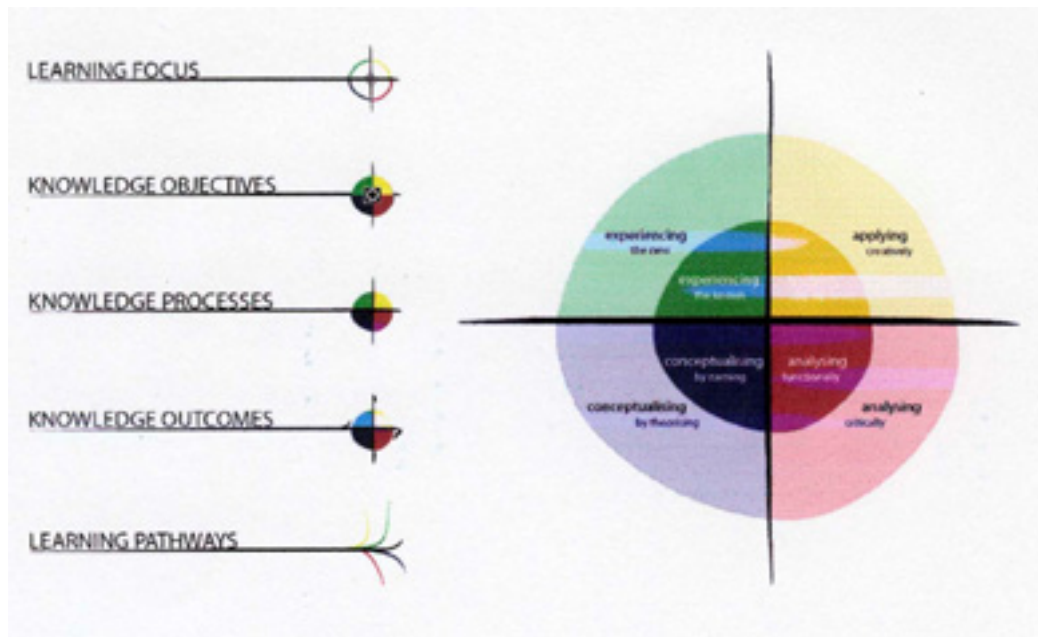

Figure 1. Learning element overview and knowledge processes
(reprinted from Kalantzis & Cope et al, 2005, pp. 118, 73).

Learning by Design and Digital/Multimodal Literacy Teaching and Learning

The teachers' curriculum-planning artefacts before and after the Learning by Design project, the interviews, audio and video recordings, classroom observations and student digital/multimodal products generated accounts of the facility of Learning by Design to enhance quality teaching and learning via the production of digital/multimodal texts in various curriculum areas. For two of the three teachers (Teachers A and C), these accounts were surprisingly similar in terms of the high

impact on professional practice and student learning. For the other teacher (Teacher B), the data revealed factors that limited the impact of Learning by Design on the teacher's professional practice and student learning. Specifically, the data revealed how the Learning by Design pedagogical framework either facilitated or did not facilitate quality digital/multimodal student literacy practices (Table I), as well as demonstrated a set of five professional practice dimensions (Table II) that supported quality teaching and learning in this project.

Teacher	How Learning by Design pedagogical approach facilitated digital/multimodal literacy	Strengths of Learning by Design materials to facilitate digital/multimodal literacy
A	Facilitated the conscious documentation of the pedagogical variations for the discourse of film production. Facilitated a broad range of pedagogical variations and rich dialogue. Intellectual work of students increased. No traces of previously preferred language-based framework in planning.	Can be used reflectively to document rich learning post teaching phase.
B	Did not facilitate – documentation too scant and not enough depth of the conceptual and analytical knowledge of the expected discourse evident in teaching and learning. Privileging of language-based practices was still evident. Overly focused on consumption and critique of popular culture texts.	Helped 'tighten up' planning practices.
C	Facilitated the documentation of a Learning Element about creating a multimodal collage. Pedagogy was broad and enabled students to produce sophisticated texts.	It is possible and not onerous to capture rich pedagogy when teachers commit to higher intellectual engagement about learning the new terminology and the discourse of social practice if not already known to the teacher.

Table I. Potential of Learning by Design curriculum planning e-learning tool.

Professional practice	Teacher A	Teacher B	Teacher C
Classroom organisation	Created new production spaces for learning about multimodal literacy. Dedicated time devoted to film production. Collaborative group work. New relationships with students – teacher as co-learner.	Formal 'desk-work' classroom arrangement in all but one lesson. Individual work. Dedicated time for multimodal text production was minimal.	Art room production furniture. Collaborative group work. Dedicated time devoted to collage production.
Repertoire of literacy practices –plan of digital/ multimodal textual design cycle	*A focus on digital media textual production leading to a documentary on Australian justice systems.*	*A focus on contextualisation and multimodal textual critique.*	*A focus on multimodal textual production leading to a short film on humanitarianism.*

	Available Designs Experiential knowledge about texts on the Redfern Riots (indigenous justice issues) and documentary film-making.	*Available Designs* Experiential knowledge about meaning making in popular culture texts.	*Available Designs* Experiential knowledge about artists' use of artistic devices to portray meaning.
	Designing *Predominantly production pedagogy.* Metalanguage of documentary film production. Theorising the multimodal design elements of documentary film production. Analysing the potential impact of film and choices about 'take-home messages'.	*Designing* *Predominantly consumption pedagogy.* Experiential knowledge about critical literacy metalanguage. Theorising about how to combine images and text at a surface level. No inclusion of the specific and detailed teaching and learning related to production of a hybrid text.	*Designing* *Predominantly production pedagogy.* Conceptual knowledge about artistic devices and metalanguage. Theorising about how to combine images, colour, lines, texture and print. Analysing functions and interests in collage production using a humanitarian theme.
	The Redesigned Applying conceptual and analytical multimodal knowledge to newly designed film.	*The Redesigned* Applying mainly experiential knowledge to newly designed poster.	*The Redesigned* Applying deep conceptual and analytical knowledge to newly designed collage.
Impact on personal and student learning	Personal learning was reported to be high in terms of the meaning of multiliteracies and combining aspects of literacy pedagogy which were previously disparate. Identified sophisticated intellectual student learning outcomes.	Learned more about herself than the students. Disappointed that students could not use a metalanguage to describe the design choices in their posters.	Captured in Master of Education assignment. Substantiated student learning through annotations of student work samples. Identified sophisticated multimodal literacy practices in students' work. Substantiated professional learning through links to the theory and ideas of Learning by Design pedagogical choices in relation to productive pedagogies.
Understanding of Learning by Design theory and ideas	Pedagogical tags were confusing. Difficulty understanding the meaning of the knowledge processes. Initial attempts were to list a sequence of activities then tag them later. No evidence of sustained use of Learning by Design guide. Required collaborative help to use knowledge processes. Increased understanding of multimodality and diversity.	Difficulty understanding the pedagogical choices. Attempted to sequence activities in a prescribed order. No evidence of use of Learning by Design guide. Collaborative help needed to document the pedagogy onto the Learning Element template.	Evidence of use of Learning by Design guide in assignment. Understood the knowledge processes. Did not require collaborative help to document the pedagogy onto the Learning Element template.

Transfer of theory and ideas	Documented a record of the multimodal literacy learning after implementation. No traces of former language-based 'genre' framework in final draft of Learning Element. Learning by Design could accurately document the pedagogical variations. Effective multiliteracies approach. Discourse of social practice evident.	Documentation in Learning Element was brief. Multimodal makeover – added multimodal texts to Learning Element without a detailed course of teaching and learning about the design elements needed to produce a multimodal poster. Discourse of social practice was not evident.	Wrote an assignment at Master of Education level about professional practice using the Learning by Design approach. Effective multiliteracies approach.

Table II: Dimensions of professional practice in teaching multimodal literacy using the Learning by Design approach.

The potential of the Learning by Design pedagogical curriculum-planning tool – the Learning Element template – as an approach to documenting and implementing digital/multimodal teaching and learning is displayed in Table I. The tool has shown that it can capture the tacit knowledge of experts in effective examples of pedagogy and multimodal learning, as in the cases of Teacher A's film production and Teacher C's visual arts collage production Learning Elements.

The strengths of the tool's potential displayed in Table I resided firstly in its versatility. In this study, the tool proved to be able to be used as a curriculum-planning tool to prompt and document appropriate pedagogical choices for Teacher C's previously unrecorded professional knowledge (this point is related to the teacher's previous curriculum-planning artefacts) about multimodal literacy teaching and learning within the visual arts. In contrast to Teacher C, Teacher A's use of the tool proved that it could be used as a heuristic to document the teaching and learning central to the documentary film production as a reflective practice after implementation (Burrows, 2005; Cloonan, 2005; Kalantzis & Cope et al, 2005; Neville, 2005). In Teacher B's case, it was reported that the tool's strength was its ability to help 'tighten up' existing teaching practices.

The second strength to emerge out of the findings related to the potential of the tool was that it facilitated a broad range of pedagogical variations and rich dialogue for teachers and students surrounding the production of sophisticated digital and/or multimodal texts. In the cases of Teachers A and C, the depth of pedagogical variations was reported by each teacher to have supported the convergence of previously disparate literacy teaching practices (visual literacy and critical literacy) into a more 'purposeful intent', as well as 'scaffolding action in the middle years' in the form of collaboratively produced, intellectually rigorous multimodal texts. At the end of the project, Teacher A spoke of Learning by Design's facility to support digital/multimodal literacy as setting up a more authentic learning environment:

> Using the Learning by Design materials provided me with a new way of considering the teaching of literacy. I acquired a new repertoire of language, or rather, new dimensions of meaning for terms I already knew. I found this challenging. My involvement in this project really cemented my understanding of what is meant by the term 'multiliteracies' and forced me to embrace all the challenges that are implied by it. This project allowed me to focus previously disparate competencies in my teaching of literacy – for example, critical literacy, visual literacy – into a more unified and purposeful intent. In this way, the learning context felt less contrived and more authentic.

This last point steers the discussion to the findings on broadening professional practice (Table II), in particular the dimensions of professional practice that were evident in the analysis of the teachers' involvement in the project.

Firstly, one of the dimensions of the professional practice findings suggests that when the teachers used existing expertise or acquired new found expertise in digital/multimodal text production, it affected the way they organised the classroom for learning (see Table II). Teacher C had the creative production space for students to construct their multimodal collages within the art classroom. The furniture and resources for production were able to accommodate collaborative

workspaces for intellectual engagement of multimodality to occur. This allowed dedicated time to be devoted to production learning activities. In Teacher A's case, the impact of an expert film-maker's masterclasses changed the classroom organisation into more open collaborative workspaces. Desks and the blackboard were discarded for open-plan and circular meeting spaces where students could develop a new intellectual relationship with their teacher – who was a co-learner with them in the production of a documentary film. Thus, the classroom space became a meeting place for a team of engaged apprentices learning from a master of film-making.

In Teacher B's case, where the teacher did not acquire new expertise on the graphic design/multimodality of poster production on personal identity, the change in the classroom organisation was minimal. Teaching and learning arrangements, with students sitting at desks listening to Teacher B at the front of the room, remained mostly unchanged. The exception was in one learning activity when students went to the computer laboratory to find online resources for their posters. Interestingly, student engagement was higher in the lesson conducted in the computer laboratory than any of the lessons conducted in the usual, traditionally arranged Year 8 classroom.

Secondly, Table II illustrates that the impacts of the use of the Learning by Design approach to pedagogy (using the Learning Element curriculum-planning tool) on teacher and student learning were highly successful in two cases. Both Teacher A's and Teacher C's planning, teaching and professional learning experiences in the study had an impact on their own and their students' learning. In both cases, the teachers reported students as having produced sophisticated digital/multimodal texts with high intellectual engagement. The metalanguage, deep understanding and deep knowledge associated with Teacher A's students' production of a video documentary and Teacher C's students' multimodal collages – documented under conceptual and analytical knowledge processes – are consistent with the domain of intellectual quality within the productive pedagogies (Queensland Government, 2001). This intellectual depth was also substantiated in audiotaped lesson transcripts, where the expertise of the discourse of the social practices (documentary film-making and visual arts productions) and a deeper understanding of Learning by Design to transform students' lifeworlds was observed and recorded. As Teachers A and C observed:

> My students and I really enjoyed being involved in this project. It gave them a context in which to engage, intellectually, with some really higher-order thinking. It gave them a sense of purpose and focus – a way of channelling their collaborative intellectual efforts into a single and fairly complex intent. It was stimulating for us all, not only because of the nature of the content, but also because it required new skills and competencies. The students loved the filming days and learning how to use the camera and sound equipment. My favourite part of the process was in the editing suite – watching the students quickly become very competent in using the editing software, listening to their decision making about the text they were creating, considering alternatives, watching it all come together, playing it back and feeling the impact of our decisions, watching how the students reacted. When we had our world premiere in front of our small audience of parents, the students were justifiably proud of their film and the parents were vocal in their praise of the students' efforts. I felt quite emotional. I think part of that was a degree of frustration – watching a film is one thing, but the audience doesn't really gain an insight into the students' intellectual growth that I see, and value so much, as their teacher. It's hard to put all that into words – you have to be there and listen to their conversations and appreciate the complexity of how these 11- and 12-year-old students were thinking and behaving. (Teacher A)

> The structure of the Learning by Design framework is such that the problem is posed from the onset and the scaffolding of knowledge processes directs one to a solution. This particular Learning Element has a strong focus on active citizenship as the goal of the project is to enlighten community perception about humanitarian issues, thereby transforming how people respond to such an issue on a daily basis. Critical and reflective thinking skills have been integral to this process ... The journey into visual literacy took students on a journey into the unfamiliar, away from their comfort zone. It was, however, through the explicit criteria that the learner knew the expectation, the direction to where they were destined, and the road to be taken. This

is not, however, a single lifeworld destination. What they didn't know was the specific details of the things they would encounter along the way. What they did know was that it was important to venture into the unknown, and that such risk taking was both safe and to be encouraged. (Teacher C)

In Teacher B's case, the Learning by Design approach to pedagogy (using the curriculum-planning tool) did not have a marked impact on student learning. The metalanguage, deep knowledge and understanding about the particularities and technicalities of the production of the students' multimodal posters about their worlds was not evident in this teacher's Learning Element or in the observed and recorded lesson transcripts. What was evident was the missing link between Teacher B's chosen pedagogical focus, which was mainly experiential knowledge (determined by an analysis of the knowledge described in the Learning Element), and when students had to apply their knowledge. The pedagogy was generally devoted to the consumption of popular culture multimodal texts. Teacher B's reference to students, 'Well, I've explained all this to you [a predetermined list of items to look for when viewing multimodal texts] and that's basically it', was followed by the expectation that students would transport this knowledge to the production of their posters. The missing link in the teacher's pedagogical choices was the mindful consideration of the discourse of producing multimodal posters and, with that, the metalanguage, deep knowledge and understanding that the students needed to engage in these literacy practices. Thoughtful depth of planning to bridge students' experiential knowledge to help them produce sophisticated multimodal texts under the conceptual and analytical knowledge processes did not occur in Teacher B's case. This finding supports the need for teachers to have the depth of understanding of multimodality and the knowledge processes if improved student multiliterate outcomes are to be realised by using the Learning by Design pedagogical approach.

Although Teacher B claimed that Teacher B earned more about themself as a teacher in the project than about the students, Teacher B was disappointed that the work that had been undertaken with the students did not eventuate in their performance in the final assessment task. Specifically, in a final interview after the project, Teacher B stated that the students were unable to use the metalanguage Teacher B had taught them to justify their multimodal designs in their oral presentations:

> That could largely have been a language thing, too [sorting through the posters Teacher B was displaying and indicating one created by a girl in the class]. So, that's, you know. We were to go on from there to look at, um, autobiographical writing and having these posters and stuff like that while she was explaining how the layout affects all of this, yes, she did, in fact, use this. The classes are not academic students but the really frustrating thing was that I knew that they understood it, but they just couldn't give me the language when they presented the posters.

In the cross-case analysis of the teachers' deployment of the range of knowledge processes in their Learning Elements and in their interviews, classroom observations and student artefacts, it is clear that the teachers' pedagogical choices determined either quality student outcomes or disappointing student outcomes. In Table II, a review of the repertoire of multimodal literacy practices that students were engaged in throughout the Learning Elements indicates a marked difference in pedagogical choices between, on the one side, Teacher A's and Teacher C's strong emphasis on pedagogy for the production of multimodal texts (production-instructive pedagogy) and, on the other side, Teacher B's strong emphasis on pedagogy for the consumption and critique of multimodal texts (consumption-instructive pedagogy). In all three cases, the pedagogical emphases in the multimodal text-design cycle determined the repertoire of multimodal literacy practices that students engaged. Multimodal text-production pedagogy incorporating field-specific (for example, documentary film-making, graphic design, visual arts teaching) multimodal literacy expertise within conceptual and analytical knowledge processes, or lack of it, accounts for some of the reasons why the intellectual depth was evident or absent in students' final products.

Conclusion

The generated accounts of Teacher A's and Teacher C's successful deployment of Learning by Design to facilitate quality digital/multimodal literacy outcomes make available indicators of

successful professional practice. These indicators are highly suggestive of effective professional practice and provide a description of the conditions that allowed successful digital/multimodal literacy teaching and learning to prevail during the project.

The research demonstrated the existence of five conditions necessary for the Learning by Design framework to be effective as a heuristic to enhance digital/multimodal literacy outcomes:

- the existence of deep, *field-specific* literacy knowledge;
- the provision of *dedicated time* for professional learning and a willingness to engage with research breakthroughs and new knowledge;
- the desire and facility to select from, and document explicitly, a broad *range of knowledge processes* and an awareness of the degree to which pedagogical designs can shift from experiential learning to conceptual and analytical processes;
- the capacity to enable a *production-house* classroom environment;
- the orientation to a *collaborative-production* approach to designing learning and engaging learners.

It is worth noting at this point that evidence of student transformation in multiliteracies in Queensland classrooms is often assessed through the production of digital/multimodal texts. Therefore, based on this research, the pedagogical implications for the existence or absence of expert production-instructive pedagogy rest with initial pedagogical consideration of a broad set of knowledge processes in Learning by Design Learning Elements designed for any planned student production of digital/multimodal texts. The gaps in students' knowledge (due to an absence or superficial scaffolding of production techniques) about meaning making in their digital/multimodal assessment products could be anticipated and amended by teachers through more premeditated consideration of the knowledge processes and the field-specific design knowledge required at the curriculum-planning stage. Finally, readers are invited to critique other e-learning pedagogical curriculum plans for digital/multimodal literacy in their own contexts against the backdrop of the professional practice outlined in this article.

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