Towards a 3D digital multimodal curriculum for the upper primary school

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ABSTRACT

The world which students inhabit is increasingly digital, multimedia and online. A pedagogy is urgently needed to prepare students to be effective authors and participants in such a world. This paper reports on an on-going study which is seeking to develop a 3D multimodal authoring pedagogy in the middle years of schooling. A case study is used to illustrate developments in renovating pedagogy for the digital multimedia age.

A version of this paper was originally published in the ACEC2010 conference proceedings. This is an updated version of the paper. The 'multimodal grammatical design and authoring pedagogy' team is actively seeking schools to participate in the project for 2011, especially schools already using Kahootz. Please contact Paul Chandler (paul.chandler@une.edu.au) for further information (AEC Ed).

INTRODUCTION

The world which students inhabit is increasingly digital, multimedia and online. Unquestionably, students are active consumers of a very wide range of text, including: books, newspapers, magazines, movies, radio, television, DVDs, texting, youtube, Web pages, facebook, blogs, twitter, MSN, podcasts, ipods, and online games. And not merely consumers, but also producers: it has been reported that over half of all American teens, and 57% of those who use the internet, are media creators, having published some form of multimedia such as blogs, webpages or videos (Jenkins, 2006), and it would be reasonable to suggest that the situation is similar in Australia.

There is, however, something of a pedagogic chasm between writing pedagogies of the past still dominating most children's school experience and the multimodal, dynamic publishing practices that increasingly children routinely engage in. Although several studies report sophisticated multimedia authoring by children out of school (eg Chandler-Olcott & Mahar, 2003; Davies, 2006; Hull & Schultz, 2001; Lankshear & Knobel, 2003, 2006; Thomas, 2007), few studies have addressed digital multimedia authoring in schools. Indeed, the kinds of digital-age expressive communication required by emerging knowledge economies, and favoured by school-age students are generally inadequately addressed in writing curricula and in the vast majority of composition work in classrooms (Knobel & Lankshear, 2006). For at least 15 years, it has been argued that "literacy pedagogy now must account for the burgeoning variety of forms that are becoming increasingly significant in the overall communications environment" (New London Group, 1996, p. 60). This 'new reality' has been embraced in the draft Australian Curriculum (2010) for English, which includes both the reading and creation of multimodal texts.

The inclusion of multimodal texts in the nation-wide curriculum may have its difficulties if teachers are not yet be well versed in the field, and the pedagogical practices of that field are still very much emergent. The commitment of some Australian Education Departments (such as the Victorian Department of Education and Early Childhood Development) to provide authoring software such as *Kahootz* (http://www.kahootz.com) to all primary and secondary schools in their jurisdiction, has created an ideal opportunity for literacy-focussed research and development into multimodal authoring, and to begin to bridge that pedagogical chasm. *Kahootz* is Australian-made, 3D multimedia software "designed... to empower children aged from seven to 15 to create fantastic 3D environments that incorporate animation, linking [and] sound. It provides students in the primary and secondary years with an open-ended set of 3D construction tools" (Maggs, 2008, p. 28). The growin g availability and use of software tools such as Kahootz in conjunction with the recognised need for a supportive curriculum and multimodal authoring pedagogy framework has led to the development of an Australian Research Council (ARC) project focussed on the middle years of schooling[1]. This project aims to:

Explicate the design features and characteristic uses of language and images in high quality student 3D multimedia narratives.

1. Describe students' knowledge and compositional processes used in producing quality artefacts
2. Design optimal pedagogic contexts for developing students as 3D multimedia authors

Grammatical Design

To achieve these objectives, the project is grounded in 'grammatical design'. To many teachers – particularly outside of the discipline of English – the term 'grammar' is associated with terms such as nouns, verbs and adjectives and a general sense of 'proper English'. Collerson (1997)

1 The Australian Research Council Linkage Project "Teaching effective 3D authoring in the middle school years: multimedia grammatical design and multimedia authoring pedagogy" (LP0883563) is funded for 2009-2011. The Chief Investigators are Prof. L. Unsworth (University of New England) and Dr A. Thomas (University of Sydney), in conjunction with the Australian Children's Television Foundation.

explains that

> *a language like English (or indeed any language) offers a rich array of resources of making meaning, including words, other structures and the principles by which we select and arrange them to realise our purposes in using language. Grammar is the central organising system for all the meaning-making resources in a language, and it really consists of a series of options – a system of choices for making meaning (p. 2).*

He further explains that in addition to 'traditional grammar', there are a number of so-called modern grammars, each with a substantive scholarly tradition, not the least of which is the functional grammar of Halliday (1985). This approach to the 'organising system'

> *[begins] with the social context, because this is the basis for the functions of language and their associated meanings. A functional grammar accounts for how these are realised in texts through the choice of grammatical structures and vocabulary (Collerson, 1997, p. 25).*

The teaching of Information and Communications Technology (ICT) typically maintains that an ICT product should be constructed to communicate information to an audience. An emphasis on 'grammatical design' goes beyond a general intention to describe in detail how one might harness the resources available to make meaning in a particular social context (some examples of social purposes are shown in Table 1). At one level (perhaps the most rudimentary), grammatical design emphasises that there will be some identifiable structure to the work. For instance, in the case of story writing in school English (see Table 1), there a several identifiable genres, each with a social purpose with an identifiable structure (or stages) through which that social purpose is typically realised. In order create a manageable project, the one described herein is specifically concerned with narrative (refer to the first goal of the project, listed below), with its particular social purpose and structure. Our goal is not the general one of assisting students create effective products in *Kahootz*, but specifically to have students create quality 3D narratives.

Whilst the identification of social purpose and broad structure is important, grammatical design helps us attend to how the various elements (or codes) available can be combined with the conventions to make meaning. In the case of still images, some examples of codes and conventions are shown in Figure 1. Discussions of a grammar of visual design are perhaps as well advanced as any, aside from the written word, and a key work is Kress and van Leeuwen's (1996) *Reading images: the grammar of visual design*. They observe that "just as grammars of language describe how words combine into clauses, sentences and texts, so our visual 'grammar' will describe the way in which depicted people, places and things combine in visual 'statements' of greater or lesser complexity and extension" (p. 1).

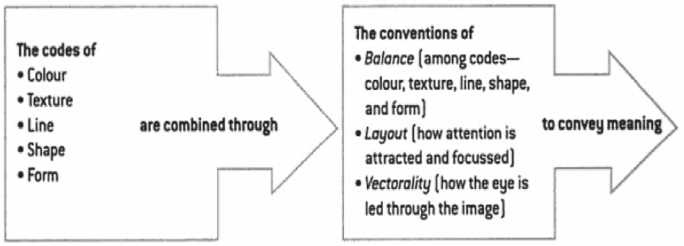


Figure 1: Codes and conventions in still images combine to make meaning (Anstey & Bull, 2006, p. 108)

The 3D multimedia author works with a wider range of resources than the still image, for instance: visual (still or moving image), linguistic (any handwritten or printed text which is present), audio [voice over or dialogue], audio [music and sound effects], spatial design (proximity, layout or territoriality in 3D space) and gestural (body language, gesture and choreography). Some existing accounts of such resources associated with 3D multimedia appear to adopt a mode-by-mode approach and then address a 'combined effect' of complementarity, or cohesion (Burn & Leach, 2004; Burn & Parker, 2003), while others focus more on social purpose (Cope and Kalantzis, 2009b). It is not possible to do justice to a discussion of the complexity of available codes, conventions and grammars associated with each mode in this short article. Moreover, it becomes apparent that use of a tool such as *Kahootz* involves not only inducting the user into the skills required to operate the software but also a very broad and detailed consideration of how meanings are made. Clearly such a venture could be profoundly cross-curricular, harnessing specialist resources in music, drama, dance and art, at least.

Table 1: Some genres of school English [extracted from Unsworth (2001)]

Story Genre	Social Purpose	Stages
Narrative	Dealing with unusual or problematic events and their outcomes	Orientation Complication Evaluation Resolution
Moral tale/Fable	Telling a story with an explicit moral point	
Exemplum	Dealing with events and giving them significance in cultural terms	Orientation Incident and Interpretation Coda
News Story	Dealing with daily newsworthy events	Headline Lead Lead Development
Personal Response	Making a personal response to a culturally significant work	Orientation Text Description Comment

To focus on 'grammatical design' is to focus on students' understanding of how the linguistic, visual, spatial, gestural and audio resources can be ordered and structured to make meaning. In the absence of an explicit understanding of these, it can be argued that the end products will be of variable quality and subject to good fortune rather than deliberate design. Two examples reinforce this point. Thomas (2008) found that one particular piece of *Kahootz* work was "a richly layered text which deploys careful multimodal texturing to convey the meanings of the narrative". In contrast, Chandler (2010) found that in another work, by using the lens of Kress and van Leeuwen's visual grammar, some meanings which were probably unintended but contrary to the explicitly stated purpose of the piece were conveyed. Grammatical design is the means by which the project seeks to address the first goal: to explicate the design features and characteristic uses of language and images in high quality student 3D multimedia narratives.

A second reason for a focus on 'grammatical design' is that teaching the systems of options for meaning-making in language, image, sound and movement gives students access to multimodal text analysis as a tool for critical multimedia literacy (Kellner & Share, 2007). A focus on grammatical design introduces a metalanguage incorporating terms such as 'genre', 'social purpose', 'stage', 'codes', 'conventions', 'colour', 'line', 'balance', 'vectorality' and so on. A metalanguage provides a means of comparing texts, of determining what choices were made in constructing meanings, what alternatives might have been chosen, and the effects, therefore, of particular choices. It helps address "the challenges young people face in learning to see clearly the ways that the media shape perceptions of the world" (Jenkins, 2006, p. 3). This is related to the project's second goal: to describe students' knowledge and compositional processes used in producing quality artefacts. Knowledge of multimedia grammatical design will facilitate students' strategic and aesthetic construction of multimedia texts.

A number of studies concerning traditional/written works have demonstrated that explicit teaching of grammatical knowledge has benefited literacy development (Quinn, 2004; Schleppegrell, 2004; Torr & Harman, 1997; Williams, 2000). The need for explicit teaching of multimodal grammatical design has been emphasised in studies of middle school students' use of animation and digital video (Burn & Durran, 2006; Burn & Leach, 2004; Burn & Parker, 2003). This work showed that when grammatical design was taught, students made very sophisticated commentaries on their reformulated movie texts (Burn & Durran, 2006). The students' creative transformation of the uses of software facilitated their development of grammatical design knowledge in an enjoyable manner (Burn & Durran, 2006). We therefore contend that, even though the field is vast, approaching 3D multimedia from the point of view of grammatical design is likely to be a productive exercise. From a practical point of view, the issue, then, becomes the nature of multimedia grammatical design knowledge that can inform multimedia authoring, and how and to what extent, this can be effectively mediated to students. This relates to the project's third goal: to design optimal pedagogic contexts for developing students as 3D multimedia authors. The remainder of this paper describes the efforts so far in developing pedagogical contexts.

Project design

Currently there are no well-established, systematic, classroom-based pedagogic frameworks for developing multimedia authoring. At a time when there is great international concern for how to prepare students for new and continually changing futures, this is both a problem and an opportunity. Creative and strategic use of sophisticated 3D multimedia is considered crucial in emerging media communications (Livingstone, 2002; Seiter, 2005) and to advancement in the rapidly growing knowledge and communications economies (Herbert, 2006, pp. xiv-xvii)

It has thus been necessary to adopt a research/development model which can support the development and refinement of a 3D multimodal pedagogy. We have been working closely with teachers who have varying levels of experience with *Kahootz*, seeking to learn from them and with them. Action research, as described by Dick (1993, p. 2), being participatory and focussed on both action (ie to bring about a change in some community, organisation or program) and research (ie to increase understanding on the part of the researcher or the client, or both) accurately describes our relationship with the teachers and our hopes for the project and for those teachers.

Action research is typically described as a spiral, in which the participants engaged in deliberate cycles of plan/action/observe/reflect. As a three-year project, it would be expected that there would be at least three iterations. This paper concerns work in the first nine months of the project – the first cycle. In particular, we describe the teachers with whom we have worked and the 'new' pedagogy which is borne out of deliberate and conscious reflection, which will lead us into a second cycle of development. We look towards the action research cycles and our engagement with teachers to develop curriculum and pedagogy generatively.

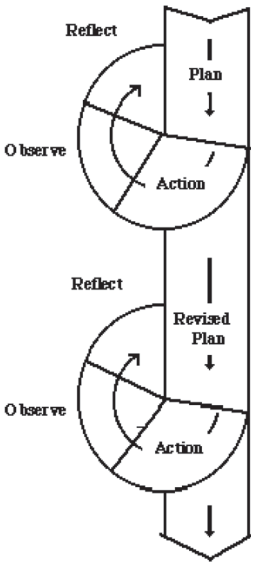


Figure 2: Action research represented as a spiral (O'Brien, 2001, p. 2)

The participants

The research team has been collaborating principally with two level 5/6 classroom teachers (and their classes) from a Catholic primary school in the inner eastern suburbs of Melbourne, which will be identified through the acronym CPH. Their selection was due to several factors. Firstly, the school is geographically convenient for the researchers. Secondly, they had identified for themselves (prior to engagement with this project) the potential of *Kahootz* to enhance the literacy program at the school. Thirdly, they were entirely new users to *Kahootz*, it having not been available in their school prior to them

embarking on the literacy initiative. This contrasts with Victorian Government schools where *Kahootz* has been provided (and thus available) for some years, and may have been used in a structured or informal way by teachers or students. We would thus be involved in the very earliest stages of learning the software; as they started from the beginning, these teachers have very much appreciated a collaborative arrangement with the researchers whether there have been numerous co-teaching and team-teaching opportunities.

Plan / Action

We met the CPH teachers when they attended *Kahootz* training early in the year. At this training, teachers are taught a range of skills, such as those indicated in Table 2. The resources provided are typically used by teachers with their classes on return to the schools, and this was certainly the case with CPH.

Table 2: Objectives for Kahootz Beginners Training

- Navigate confidently through 3D environments
- Distinguish between Word and Object mode
- Manipulate size, texture, perspective, position and text
- Swatch imported images onto surfaces in the World or on Objects
- Add actions and movement to a Scene by creating Object keypoints and internal animation
- Add, import, and record sounds.
- Experiment with soundtracks
- Experiment with special effects such as fire, snow and fog
- Import images into a Scene
- Develop cinematic techniques through the use of World keypoints
- Link between Scenes
- Export *Kahootz* Scenes as a movie

We wondered whether they had any greater plan for how to introduce *Kahootz* beyond engaging students with the introductory tutorials, and the reality was that they were looking for direction. It was at this point that we realised that a genuinely collaborative project would be possible.

Using the "Learning by Design" framework of Cope and Kalantzis (2009a), the second author developed a sample unit of work which would introduce students to *Kahootz* and also to the metalanguage of multiliteracies. "Learning by Design" describes four 'knowledge processes', or recognisable pedagogical acts, of Experiencing, Conceptualising, Analysing and Applying, which are described in Table 3. The framework recognises that engagement with these is not step-wise, but there inevitably a fairly fluid movement backward and forward across and between all four.

Table 3: Outline of initial unit of work

Knowledge processes	Key components
Experiencing	Introduction to *Kahootz* Introduction to the deconstruction of screen text Understanding narrative structure
Conceptualising	Modelled authoring of a multimodal narrative, through the retelling of a existing narrative Planning through storyboarding
Analysing	Introduction to multimodal literacy metalanguage
Applying	Students develop a jointly constructed 3D multimodal narrative

Observe

The realities of school life meant this initial unit of work was too ambitious. Access to computers was limited – there was one, maybe two, hours of access per week in a laboratory, and no access in the regular classroom. As is typical of schools, numerous events such as sports days and musicals have also impacted on the time available. As we progressed through this unit of work, it became apparent that even under ideal circumstances, the quantity of work was considerable – starting early in Term 2, the final piece (jointly constructed narrative) was not completed until midway in term 4.

The range of difficulties encountered covers the full range of realities associated with technology, curriculum and professional development. Teachers have felt uneasy with the technology and some of the metalanguage. Some technical problems due to the age of computers and the version of Kahootz[2] used meant that some students either lost work or found it hard to progress quickly. Teachers were not familiar with an overall production process and the purpose, and potential value, of storyboarding and editing to improve first or rough cuts. When it came to production of their own, jointly constructed narrative, students spent considerable time writing stories. These were all very rich, detailed and commendable, but because the composition had started with the focus on using words to create meaning, rather than the multimodal elements, the process of realising that work in Kahootz became quite laborious.

Despite these issues, there have been two important, positive outcomes. Firstly, the students have two narratives, and they would be rightly proud of their efforts. The extent to which these reflect an understanding of grammatical design is still subject to analysis, and will be discussed in a separate publication. Secondly, teachers have been closely engaged with using the technology over an extended period, and remain enthusiastic about the possibilities and for the inclusion of 3D multimedia authoring in the curriculum. In order to build on their experience, we established a 'research day' in which guidelines for a substantially revised of a unit of work were developed.

2 Kahootz 3.1.0 is contains a number of important bug fixes over Kahootz 3.0.0

Reflect / Plan

Two researchers (the first and second authors), two teachers from CPH and a third teacher who had been using *Kahootz* for several years met for a whole day to develop the framework for the revised unit of work. We met, as much as possible, as equals – professionals who have had a relatively brief exposure to *Kahootz* and its possibilities for the classroom. Our meeting was the start of our next iteration in our generative development of curriculum and pedagogy.

Our strategy for reflecting on the experience with *Kahootz* was two-fold. Firstly, as an orientating activity, we asked the teachers (and ourselves) simply "what did you learn?" This generated substantial discussion and over four whiteboards full of notes. We then all engaged in a classification exercise – taking the full range of ideas and issues, seeking patterns and to group them under certain headings. Whilst some progress was made with this activity, a clear outcome was a realisation of how vast and interconnected the field is; little wonder that initial unit of work ran for such a long time, and that it would be in some respects easier to write a larger unit of work (incorporating media studies, music, drama, dance and art) rather than a smaller one.

We then drew on work by Loughran, Berry and Mulhall (2006) which considered Pedagogical Content Knowledge, or "the knowledge that teachers develop about how to teach particular content/subject matter in ways that leads to enhanced student understanding of that content" (p. 17), and how to represent that knowledge. We considered the Content Representation grid (pp. 19-29) and the possible value of identifying 'big ideas/concepts'.

Two "big ideas" which we agreed on were:

- Self-management and persistence
- Computer and file management

In other words, grammatical design aside, there would be merit in including 3D multimodal authoring in the curriculum because it provides a vehicle for students to develop these qualities and skills. More closely aligned to grammatical design, the following two 'big ideas' were suggested:

- Development of literacy/thinking
- Development of planning

We thought carefully about these. They certainly seem to be rather different in type to some of the 'big ideas' in Science mentioned by Loughran, Berry and Mulhall (2006), such as "matter is made up of small bits that are called particles" or "organic compounds contain carbon". Is, for instance, 'development of literacy/thinking' really just a separate topic? Or is it a catch-all category, or excuse for treating theory and practice as separate? Does 'development of planning' constitute a 'big idea' in its own right, or is it simply a phase in an overall development plan? Our conclusion, at least for the moment, is that these are some of the big ideas in the domain 3D multimodal authoring, and that students need to have some knowledge and practical capacity related to each.

The implication of this is not that the 'Learning by Design' approach has been found wanting but that it provides a broad framework, and that we now have a better understanding as to how to shape some of the finer details of curriculum and pedagogy for 3D multimodal authoring.

Our (second draft) process for teaching 'Development of literacy/thinking' is shown in Diagram 1. One of its features is the choice of activities which deliberately scaffold both meaning-making and technical skills. It has been argued (Chandler, in press) that what the 3D multimodal author needs is to develop a repertoire of meaning-making in the 3D environment, not simply technical skills, and from the perspective of the psychology of learning, it is important to bring the 'what' (eg design element) and the 'how' (eg software function) together in a simultaneous learning act. Therefore, until such time as the resources for the 'development of literacy/thinking' are fully developed and trialled, we are uncertain of the role of technical-based training (such as outlined in Table 2). We are certainly moving forward on the assumption that the teaching/learning process outlined in Diagram 1 provides for the modelling and explicit teaching of grammatical design.

Diagram 1[3]. Process for teaching 'development of literacy/thinking'

	View	A very short film clip, chosen deliberately to exemplify certain codes/conventions (eg use of camera, framing, colour, sound effects)
	Deconstruct	Review and understand how meanings have been made using certain codes/conventions
	Demonstrate	The teacher to model construction of an element of a Kahootz xpression[4] which uses those codes/conventions to create meaning. Joint construction with the class
	Do	Work on a *Kahootz* xpression to use exactly these codes/conventions to create meaning
	Reflect	Consider how effective each effort has been at creating meaning using these codes/conventions

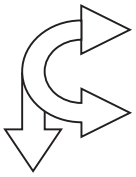
Repeat this process for several pieces of work (possibly up to a dozen), each taking no more than a lesson to complete, which are cumulative in their complexity and deliberately scaffolding the learning in meaning-making and technical skills.

Our (second draft) process for teaching 'development of planning' is shown in Diagram 2. It reflects the value of several things which we have learnt in our early engagement with *Kahootz* and classes. Firstly, the value of collaboration is reflected in the need for brainstorming, the 'sandpit' (see below) and the benefit of early work being jointly constructed pieces. It has become apparent that when students are developing ideas and how these might be represented, 'two heads are better than one'. Secondly, the need for planning is considered. Whilst a storyboard was included in the initial unit of work we looked for ways to make this tool as valuable

3 This process is deliberately shown in the diagrammatic form of a Nassi-Schneiderman Diagram, familiar to computer programmers. It shows a sequential set of four steps and the conditions under which they are repeated.

4 A *Kahootz* file is called an 'xpression'

Diagram 2[4]**:** Process for teaching 'development of planning'

<table>
<tr><td colspan="2">Brainstorm</td><td>Generate ideas for a narrative</td><td rowspan="2">Include scoping/limitations to scaffold student learning.[6]</td></tr>
<tr><td colspan="2">Story outline</td><td>Produce a story outline (theme, plot, characters)</td></tr>
<tr><td rowspan="2">  </td><td>Kahootz 'sandpit'</td><td>Need to 'play' to effectively develop scene selection, choose characters, develop work-arounds and swatching.</td><td></td></tr>
<tr><td>Storyboard</td><td>A storyboard which identifies scenes, shots, camera directions and sound effects is a vital thinking tool.</td><td rowspan="2">Voice, point-of-view, characters and dialogue will be identified and 'rehearsed' to a limited extent in the planning phase. They should be fully understood, if not in physical form, by the end of the planning. Dialogue or narration should be scripted.</td></tr>
<tr><td colspan="2">Plan</td><td>The plan will be fully developed 'somewhere between the page and the head'. The storyboard is necessarily 2 dimensional and cannot capture all details.</td></tr>
</table>

as possible, rather than laborious. It seems that a large story board is better than a small one, both from the point of view of physically drawing and also visualising how things might look when one is deliberately planning to use 'depth' and carefully constructed camera angels and framing in a 3D space. It is also the case that students planning should be made manageable and focussed through clear scoping.

Our view of planning has two novel inclusions. Firstly, that it is unrealistic to expect upper primary school students to plan every last detail on paper before moving to a phase of 'production'. It is laborious and unproductive to spend lesson after lesson insisting that every last character, camera shot, sound effect, sentence of dialogue etc be scripted or written down before 'moving forward'. We recognise that students who move prematurely into production are likely to generate a piece of work which has limitations, and so we recognise that a 'good level of planning' may exist 'somewhere between the page and the head'. How students and teachers may be guided to recognise that this milestone has been achieved is something which will need to be worked on in the next cycles of the project.

A second novel inclusion is that of *Kahootz* as a sandpit. There is a need, as Rieber (2001) has discussed in an article entitled *designing learning environment that excite serious play,* to promote "experience first, explain later" (p. 4). Indeed, when students have had the opportunity to simultaneously explore characters, swatching and other ideas in *Kahootz,* they have done so in conjunction with the prescribed storyboard. We have therefore come to see this dynamic interaction between the computer environment and 2D planning as beneficial, and indeed a continued 'playful' interaction is important for the psychology of learning associated with this a 3D authoring environment (Chandler, in press). Our work moves forward on the assumption that planning is important, but is non-linear and not constrained to one form of representation. Grammatical design is not only learnt through explicit teaching in the 'development of literacy/thinking' phase but also through this kind of playful interaction.

Our research day shed light on other aspects of the whole development process, but in relatively incomplete ways. Identification of what other 'big ideas' of 3D multimodal authoring might be, the importance of rough cuts and particular thinking skills which students find helpful (for instance) also need to be further developed. However, refinement of the teaching/learning processes associated with 'development of literacy/thinking' and 'development of planning' alone makes a substantial contribution to the next phases of the project.

Conclusion

The rationale for a project to develop curriculum and pedagogy for 3D multimodal authoring has been described, as has the contribution which a focus on 'grammatical design' would make to such a venture. Through a case study of an action research project, we have described how teachers have reframed their thinking about the teaching of 3D multimodal authoring. Their 'next generation' revisions contribute to the next phases of the project, which will lead to students creating quality 3D narratives (including knowledge of grammatical design).

More broadly, in the context of a complex environment where the focus is on making meaning, these developments encourage a wider teacher audience to adopt pedagogy and curriculum which closely couple 'learning' and 'doing' and value non-linear and incomplete conceptions of planning. The vision of the Australian Curriculum (2010) to include both the reading and creation of multimodal texts heightens the importance of developing such pedagogical approaches and to document valuable teaching procedures.

BIOGRAPHY

The three authors contribute to the Australian Research Council project 'Multimedia grammatical design and authoring pedagogy', which is a collaboration between the University of New England, the University of Tasmania and the Australian Children's Television Foundation.

Paul Chandler *is Research Fellow in 3D Multimodal Pedagogy at the University of New England. He has previously been a teacher and administrator in Victorian government and independent schools, specialising in Information Technology, Science and teacher's professional development. Paul also teaches in undergraduate science education courses. His doctoral study considered the relationship between teachers' knowledge and use of technology in classroom contexts.*

Annemaree O'Brien *is undertaking a PhD in multimodal literacy and authoring pedagogy through the University of New England. Previously, at the Australian Centre for the Moving Image she was responsible for developing a range of innovative screen literacy and multimodal programs for teachers and students including digital storytelling and film making. Prior to this Annemaree was the Education Manager for the Australian Children's Television Foundation, a senior regional curriculum consultant, university lecturer and teacher*

Len Unsworth *is Professor in English and Literacies Education and Head of the School of Education at the University of New England, Armidale, Australia. His research interests include literacy and technology; visual literacy; literacy across the curriculum; children's literature; functional grammar and literacy; and multiliteracies. Len is the Principal Investigator of the 'Multimedia grammatical design and authoring pedagogy' project*

5 This diagram does *not* take form of a Nassi-Schneiderman Diagram.

6 For instance: no more than 5 scenes; total duration of no more than 1 min; must use a close-up; and must use lighting effects

References

Anstey, M. & Bull. G. (2006). *Teaching and learning multiliteracies: changing times, changing literacies*. International Reading Association and the Australian Literacy Educators' Association: Kensington Gardens, South Australia.

Australian Curriculum (2010). Australian curriculum consultation portal. Retrieved 01.07.10 from http://www.australiancurriculum.edu.au/

Burn, A., & Durran, J. (2006). Digital anatomies: analysis as production in media education. In D. Buckingham & R. Willett (Eds.), *Digital Generations: Children, Young People and New Media*. Malwah, New Jersey: Erlbaum.

Burn, A., & Leach, J. (2004). ICT and moving image literacy in English. In R. Andrews (Ed.), *The impact of ICT on literacy education* (pp. 151-179). London and New York: Routledge Falmer.

Burn, A., & Parker, D. (2003). Tiger's big plan: multimodality and the moving image. In C. Jewitt & G. Kress (Eds.), *Multimodal literacy* (pp. 56-72). New York: Peter Lang.

Chandler, P. (2010). Not always as it first seems: thoughts on reading a 3D multimodal text. *Literacy Learning: the Middle Years, 18(1), 11-18*.

Chandler, P. (in press). Using an "instrumental approach" to inform 3D multimedia authoring pedagogy. Submitted to Journal of Interactive Media in Education.

Chandler-Olcott, K., & Mahar, D. (2003). "Tech-saviness" meets multiliteracies: exploring adolescent girls technology-related literacy practices. *Reading Research Quarterly, 38* (10), 356-385.

Collerson, J. (1997). *Grammar in teaching*. Newtown, NSW: Primary English Teaching Association.

Cope, B., and Kalantzis, M. (2009a). "Multiliteracies": new literacies, new Learning. *Pedagogies: An International Journal, 4* (3), 164-195.

Cope, B., and Kalantzis, M. (2009b). A grammar of multimodality. *The International Journal of Learning, 16* (4), 361-426.

Davies, J. (2006). Escaping to the borderlands: An exploration of the Internet as a cultural space for teenaged Wiccan girls. In K. Pahl & J. Rowsell (Eds.), *Travel notes from the New Literacy Studies* (pp. 55-71). Clevedon: Multilingual Matters.

Dick, R. (1993). *So you want to do an action research thesis?* Interchange Publishing: Brisbane.

Halliday, M. A. K. (1985). *An introduction to functional grammar*, Edward Arnold: London.

Herbert, S. (2006). *Education in the Net age - new needs new tools (Report of the Inquiry into the Effects of Television and Multimedia on Education in Victoria*. Melbourne: Parliament of Victoria Education and Training Committee.

Hull, G., & Schultz, K. (2001). Literacy and learning out of school: A review of theory and research. *Review of Educational Research, 71*, 575-611.

Jenkins, H. (2006). Confronting the challenges of participatory culture: media education for the 21st century [Electronic Version]. *Occasional Paper, The MacArthur Foundation*. Retrieved 29.06.07 from http://www.digitallearning.macfound.org/site/c.enJLKQNlFiG/b.2029291/k.97E5/Occasional_Papers.htm.

Kellner, D., & Share, J. (2007). Critical media literacy is not an option. *Learning Inquiry, 1,* 56-69.

Knobel, M., & Lankshear, C. (2006). Weblog worlds and constructions of effective and powerful writing: cross with care, and only where signs permit. In K. Pahl & J. Rowsell (Eds.), *Travel notes from the New Literacy Studies* (pp. 73-92). Clevedon/Buffalo/Toronto.

Kress, G., & van Leeuwen, T. (1996). *Reading images: the grammar of visual design*. Routledge: London.

Lankshear, C., & Knobel, M. (2003;2006). *New literacies: changing knowledge and classroom learning*. Buckingham/Philadelphia: Open University Press.

Lemke, J. (2006). Towards critical multimedia literacy: technology, research and politics. In M. McKenna, L. Labbo, R. Kieffer & D. Reinking (Eds.), *International Handbook of Literacy and Technology* (Vol. II, pp. 3-14). Mahwah, N.J.: Erlbaum.

Livingstone, S. (2002). *Young people and new media: childhood and the changing media environment*. London: Sage.

Loughran, J., Berry, A., & Mulhall, P. (2006). Understanding and developing Science teachers' Pedagogical Content Knowledge. Sense Publishers: Rotterdam.

Maggs, P. (2008). Kahootz 3.0: Developing software for the classroom. *Teacher, March*, 28-31.

New London Group (1996). A pedagogy of multiliteracies: designing social futures, *Harvard Educational Review, 66* (1), 60-92.

O'Brien, R. (2001). An overview of the methodological approach of action research. In Roberto Richardson (Ed.), *Teoria e Prática da Pesquisa Ação [Theory and Practice of Action Research]*. João Pessoa, Brazil: Universidade Federal da Paraíba. (English version) Retrieved 23.09.09 from http://www.web.net/~robrien/papers/arfinal.html

Quinn, M. (2004). Talking with Jess: looking at how metalanguage assisted explanation writing in the Middle Years. *Australian Journal of Language and Literacy, 27* (3), 245-261.

Rieber, L.P. (2001, December). *Designing learning environments that excite serious play*. Paper presented at the annual meeting of the Australasian Society for Computers in Learning in Tertiary Education, Melbourne, Australia.

Schleppegrell, M. (2004). *The language of schooling: A functional linguistic perspective*. Mawah, New Jersey: Erlbaum.

Seiter, E. (2005). *The internet playground: children's access, entertainment, and mis-education*: Peter Lang.

Thomas, A. (2007). *Youth online: identity and literacy in the digital age*. New York, Peter Lang.

Thomas, A. (2008). Machinima: Composing 3D multimedia narratives. In L. Unsworth (Ed.), *New Literacies and the English Curriculum: Multimodal Perspectives*. London: Continuum.

Torr, J., & Harman, J. (1997). Literacy and the language of science in year one classrooms: Implications for children's learning. *Australian Journal of Language and Literacy, 20* (3), 222-237.

Unsworth, L. (2001). *Teaching multiliteracies across the curriculum: changing contexts of text and image in classroom practice*. Buckingham, United Kingdom, Open University Press.

Williams, G. (2000). Children's literature, children and uses of language description. In L. Unsworth (Ed.), *Researching language in schools and communities: A functional linguistic perspective* (pp. 111-129). London: Cassell.