Hypermedia Storytelling in the Middle Years of Schooling.

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by

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Student Declaration

Doctor of Philosophy Declaration

"I, Peter George Thomas, declare that the PhD thesis entitled Hypermedia Storytelling in the Middle Years of Schooling is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work".

Signature Date

Acknowledgements

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Dedication

To my parents Dr George Thomas and Nancy Thomas, who didn't live to see it finished, to my brother Paul who told me, "This looks like magic!", and to my wife and children who suffered their way through the last 10 years.

Table of Contents

List of Figures

List of Tables

Abstract

This research is into supporting students to creatively author hypermedia stories. It builds on previous work that focussed on hypermedia as a support to specific content delivery and the development of reasoning with students. The research was conducted using a hypermedia-authoring program with middle-years students at an Australian secondary school. Classroom environments were created in which collaborative and innovative group work built on technical facilities and expertise developed by students outside of school.

Two methods of analysis were used in this research. The teaching of non-linear hypermedia stories and the instruction in software use to create such stories was represented as a case study. The stories themselves were further analysed phenomenographically. An assessment matrix was developed for evaluating hypermedia stories. The aim was to provide an effective feedback mechanism on the hypermedia work and to give teachers guidelines for planning lessons and for making summative as well as formative judgments.

Four dimensions were identified as the key components of hypermedia: image, language, interactivity and structural design, they were mapped against the five-level 'SOLO' taxonomy (Structure of learning Outcomes). This taxonomy consisted of: Pre-structural, Uni-structural, Multi-structural, Relational and Extended abstract.

The findings of the case study suggest that the use of hypermedia is engaging for students, promotes collaboration and allows students to explore aspects of their identity in worthwhile ways. In the phenomenographic study, when the four dimensions mentioned above were mapped against the five qualitatively different levels of response, a series of taxonomies was produced which gives a clear indication of the strengths of each story as well as the variation in quality across all the stories.

Chapter 1: Introduction

Origins of the Study

I became aware of personal computers when I first began teaching in the mid-1980s. At that time they were a relative rarity and often sat unattended in a dusty corner of a crowded staff-room, almost obscured by piles of exercise books and telephone directories (and the odd packed lunch); sometimes they were to be found in a cluster of three or even four, in a 'special' locked room called a laboratory. Only one or two staff members knew how to use them; other staff avoided or ignored them. Everyone knew it took special training to use computers at all, and an extraordinary degree of planning and know-how to even attempt to use them with a class. Nevertheless, occasionally computers were used with a class – and if a young teacher showed sufficient interest and commitment, the local school 'expert' would welcome, encourage and coax them into the very limited ranks of the computer literate, so that they too might be inducted into that small group of enthusiasts willing to take on the daring deed of using computers in their classes.

After a few months of admiring from the sidelines I, as one of those young eager teachers, was admitted into a select cohort and tutored in the wonders of these new devices. I soon became sufficiently familiar with the world of floppy discs, computer commands and printer errors to gain my own reputation as a bit of a local expert, and to have sufficient knowledge and courage to begin thinking of how my English or Social Studies lessons, with students at the younger end of the secondary school, might benefit from the introduction of computers.

At this time, the focus of personal computer activity was on word processing and educational computer games. Sometimes the more able students, who completed work ahead of others, were encouraged to type it up on a computer with the aid of a word processing package so as to produce a 'polished' piece of work. In some other classes educational 'games' were the focus, and were sometimes used as an alternative activity for those with learning and reading difficulties, sometimes as an end of term treat.

One of these educational ‘games’ that particularly took my interest was a crossword puzzle creator. Over six months or so I worked hard with this program to create material for my students (aged between 12 and 14). I used the compulsory weekly spelling list to write up clues with a local flavour, and referenced teachers and students, as well as the school and local neighbourhood.

I was pleased with myself for creating this activity for the students. I saw it as adding extra interest and value to their tedious task of learning set spellings, which most of the students hated. Yet while some of my colleagues also thought it exciting, I found, to my surprise, that on the whole the students treated it as unremarkable, as just another lesson, it seemed.

This could easily have been the end of my flirtation with technology. The crossword experiment had taken up a lot of time and energy and I didn’t feel too much like putting myself out again for such meagre reward in terms of student interest and enthusiasm. And my experiments would indeed have ended there, but for the interest of an older and wiser teacher. She enquired why I wasn’t still working with my crossword program and suggested that maybe the lack of student interest had something to do with the considerable control that I had retained for myself during the exercise. She suggested that maybe the students would respond more positively if they had more freedom to design their own crosswords, rather than just complete the ones that I had created.

This was a light bulb moment for me. Of course! What I had enjoyed was the *creation* of the puzzle. Maybe if the students had similarly creative tasks, they too would get excited. It was the *creating* of these things; not the *completing* of them that was exciting. To work in this way would be much more challenging for the students, but also potentially much more fun. There would be more to work with and to learn, and so much more to achieve and be excited about.

This idea that creation is likely to engage most students more powerfully than completion has proven a seminal idea for me in my career as a teacher, and as a teacher of teachers. I have looked for elements of teaching which enable students to take an active role in designing and exploring their own assignments, and which encourage them to take those assignments as far as they can. Often they succeed way beyond my expectations. This key idea, together with my own interest in technology

and the explosion of electronic technology in the lives of students in contemporary schools, has led to an ongoing commitment to the melding of the English classroom with the electronic world. It is an idea that ten years ago took me to the investigation of the English lesson as an adventure in hypertext, and increasingly in hypermedia, and to the beginnings of the study that lies at the centre of this thesis.

'Hypertext' and 'hypermedia' are terms that require explanation. Hypertext is at its core, like English as a subject, about text and texts; about words that are linked to other words. The focus of hypertext, however, is on the linking of words in non-linear ways. Hypertext doesn't necessarily move from word to word along one line and onto another line and then into a sentence as in traditional texts; instead it moves in all directions, though these directions are contextual and conceptual rather than cardinal. One cluster of words and meanings can connect and link in several directions and dimensions and impose new meanings and relationships. It was computer scientists faced with organising large and complex sets of digital information who invented hypertext. We can grasp this idea reasonably easily now because of our familiarity with the Internet and its most common manifestation, the World Wide Web. But fifteen years ago, when the ideas behind this study began to emerge, the Web was not such familiar territory. The concept of a virtual world beyond a computer screen was mostly confined to the pages of science fiction stories and to the minds of those visionary technicians who were putting the rudiments of what we now take for granted into place.

Hypermedia – the term central to this thesis – is similar to hypertext but has its focus not on text, or on words, but rather, on all media: on words certainly, but also on images, icons, colours, places on a screen, and sounds, all of these linked in multi-dimensional ways. Because of this hypermedia can and has been called multimedia, yet multimedia has now developed into such a broad term that it can include hypermedia as well as such linear presentations as a simple slide show of words and pictures (Campbell-Kelly & Aspray 1996; Collins, Hammond & Wellington 1997; Jordan & Packer 2001; Landow 1992; Laurel & Mountford 1990; McKnight, Dillon & Richardson 1991; Negroponte 1995; Nielsen 1990; Snyder 1996a; Wise & Steemers 2000).

Even in those years before they would become known for spending hours locked into the internet centred world of hypermedia, young people had quickly and keenly picked up on and entered into the exciting visual, aural and tactile environments of computer games and hypermedia. These worlds remained largely alien to their parents and indeed, to teachers and schools.

Schools, and particularly the English teachers in those schools, often bemoan the hypermedial and hypertextual aspects of youth culture. Some teachers are willing to make concessions to the popular by displaying an increase in interest in illustration and the moving image as literary techniques, but adamantly draw the line between 'proper' narratives and literature as found in the accepted and 'acceptable' literary canon, and these hypermedia worlds. This occurs even though hypermedia environments do in fact share many common features with literature and cinema (the latter becoming increasingly 'acceptable' as a literary genre). Indeed, from my perspective, the content of hypermedia and the 'stories' that hypermedia were retelling were as much a part of the heritage of both local and a broader global culture as any other media, and I was convinced that schools had an obligation to support students by exploring it.

One thing which disappointed me at this time was that the programs, the games and the software packages available for young people were, on the whole, designed to support them as 'consumers' of the hypermedia, not as creators. Young people entered into a world that had already been created for them and then learned something useful about some aspect of a school subject. This might be reasonable enough in Social Studies, but in English one of the challenges was the creation of text to serve the development of fluency so as to support and enable imaginative communication. I was keen to find or create programs that would enable the 12 to 14-year-olds whom I had taught to be creative and to actively express themselves through hypermedia -not just to be consumers of a pre-designed program. As far as I was concerned hypermedia was a form of literacy that could be explored with complete legitimacy in an English classroom and moreover unlike formal literacy was capable of opening up opportunities for students who were typically excluded, through poor literacy skills, from more traditional creative literacy or English work.

By 1996, in parallel with my interest in working with computers, I was developing and exploring English classroom learning activities that were based on the 'Choose Your Own Adventure' (CYOA) novels. These novels were very popular with young readers from the 1970s to the late 1990s, with publishing companies like Bantam Books producing a different title every month (ChooseCo 2009). They were especially popular with the 'middle school' students I taught, dealing as they did with topics reflecting the interests of the juvenile audience: adventure, fantasy and mystery. Readers were, as the title of the series states, able to choose their own adventures by using various proffered narrative pathways to construct alternate endings. These commercial publications had the characteristics of book/paper versions of hypertext.

As texts for reading, CYOAs had an obvious place in the English classroom. They were the sorts of books – packed with adventure and not too long – that encouraged even challenged readers to persist with their reading. They were explicitly aimed at early secondary school students, and because they were inexpensive and readily available students of all abilities could go through them quickly in several different ways and satisfy vicariously their taste for adventure and action and mystery. Much to my disappointment, however, I found that students were slow and reluctant to emulate hypertext in their own writing. The construction was laborious and the outcomes were disappointing. The amount of time and energy used was not in any way proportionate to the enjoyment and satisfaction of the result.

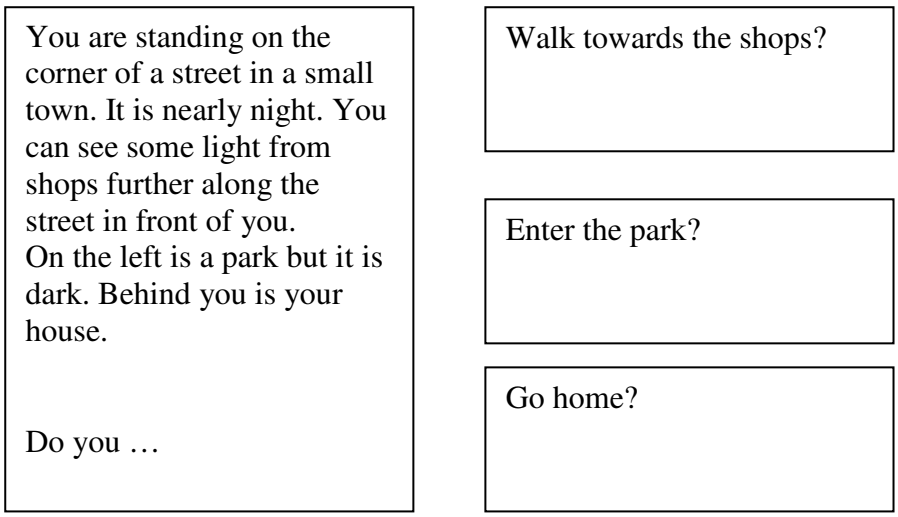
At the same time I was experimenting with the use of computers in the English classroom Snyder (1990) was giving her attention to the different ways students approach the writing process especially when using technology. She suggested that there were noticeable differences in the depths and strength of students' writing when they were engaged in composing arguments and producing reports on a computer. When it came to producing creative narratives, however, students were typically much less effective when using computers than when they used traditional pens and paper. What is more, the students themselves expressed a preference for constructing narratives using pen and paper rather than with a word processor. Snyder's contention was that junior schooling had traditionally valorised narrative writing and working with paper and pen. The secondary school students in Snyder's research were more familiar with working in this way with narrative, having already established a set of skills and preferences there. When it came to more recently-learned genres that had

been introduced later in their school careers – especially those introduced at the same time as they had learned relevant computer and word processing skills – they were more proficient and more at ease working electronically.

In the middle 1990s I was exploring the possibilities of CYOAs (with my crossword puzzles, for instance) and I found Snyder's work very exciting. I speculated that if I could present new genres of narrative such as the CYOA type stories, together with a new form of creative production an electronic program and a computer, I would have a way of supporting the production and development of new types of narratives with my students. Some of my students didn't take to writing different forms of stories (even though they enjoyed reading them) when working with pen and paper, but maybe it would be different if they worked with computers to produce this new form of narrative. I reasoned that this work might assist some stronger students to think in different and more complex ways about the development of plot and other aspects of their story writing. Equally important to me was the hypothesis that it would also assist students who typically produced little or nothing when it was 'creative writing' time to work towards creating a story.

In the mid 1990s before the ubiquity of the World Wide Web, I came across a simple hypertext program called ButtonTalk (Linhart 2000) that allowed for the creation of nodes containing blocks of text that describe a scenes or characters. From each node led several possible paths to follow to other nodes that contained further elements of the narrative. Below (Figure 1) is a mock-up of the interface. The program did the work of creating the links, prompting the would-be hypertext author to enter choices for their stories.

Figure 1. ButtonTalk mock up



ButtonTalk was a significant discovery for me because it raised a large variety of questions and possibilities. I introduced it into my English class of Year 9 students (14 and 15-year-olds) and was encouraged by their responses. The students engaged with the exercise and created a range of hypertext stories, some elaborate, some simple. More than that though, they connected with the demands of the task: with the way of thinking that was required; with the choices that were necessary in the linking of their brief descriptions; and with the possibility of moving along multiple pathways. Yet one aspect that struck me was the difficulties faced by those students who had poor reading and writing skills. While these students were able to understand the concept and they had no problem creating a series of choices for a reader to follow, they were not skilled enough to write them out. I could act as a scribe, but this was hardly satisfactory for the class as a whole, or even for the individuals concerned. I knew that this way of working had potential but was not clear about exactly what needed to be done and how I should go forward. I resolved to find out more, to try other approaches to go beyond my existing professional expertise, knowledge and judgement in the area.

The hypertext program I had used (which came from a compact disc (CD) of shareware programs provided free with a computer magazine) was alluring to many students, but it did not take advantage of images, sounds or animations. What I was looking for was a hypermedia program: one that allowed for the manipulation of a range of media. I chose HyperCard (Atkinson, 1987). Initially, still not confident of the appropriateness of using the programs with my students I had used my own self-

created documents: multimedia as teaching aids, electronic work sheets with spaces for answers and hyperlinks to other areas, images and sounds.

The students really surprised me; they went on and used the tools that I had used in creating my electronic work sheets to produce their own material. I soon gave up holding them to the task at hand and helped them use the tools of drawing, link creating and animating that I had not planned for them to use. It was an impromptu burst of creative energy, something I had never really experienced before in teaching.

I was keen to better understand what was happening with my students' learning, with their literacy, and with their potential to communicate in the larger world and be engaged by the world of school. I decided to make the students' use of a hypermedia program into an assignment based around the creation of stories. The hypermedia world of a story created on a computer can be an engaging and liberating place to explore because it is not just related through text; it can be produced through images and icons and sounds. An image of a girl can say something through the linking of a sound file or with the addition of simple comic-like captions, which respond to a keyboard entry or mouse click. Their level of involvement in this activity seemed greater than with their usual classroom activities.

Some students chose to work individually and were able to produce small hypermedia stories. These students shared their discoveries with each other, trading examples of the techniques required to produce effects with animation or sound. Many stayed behind after class to work more on their stories. Male students who had previously shown only the most superficial interest in the usual subject matter of the English class began asking questions and getting involved without prompting. They planned ideas, came up with alternatives and created small hypermedia stories, some producing creative work for the first time in their school careers (I was told). Equally many tasks were never finished: the limitations of the technology and the time available beat them. Nevertheless there was clearly something significant happening.

Reflecting later, I felt my role could have been better thought through: the objective of the project could have been presented more clearly so that the students had an understanding of what they could achieve; the software explained in a fuller and more understandable way (or perhaps software better suited to the tasks I was planning could be created or found); and the hypermedia stories modelled so that

students were aware of ideas, areas and directions they could take. I felt that if I could explore some of these issues, I had in my hands a valuable tool for use in the English classroom. A tool that could excite and inspire; that could draw and hold their attention and see them creating original work that would not only accomplish the task of skills building but instil a sense of accomplishment and self-worth, especially in those students not used to producing work at a level comparable to some of their more able classmates.

As a teacher I was excited about how the class was interacting with the technology and each other in such a positive way. I was impressed with the enthusiasm that the students brought to the classroom. My hunch was that their enthusiasm extended beyond the novelty of using computers.

As I interrogated my classroom experience I noticed that though many were, not all students were using an interactive, hypermedia approach; some were developing linear multimedia stories. As Buckingham and Sefton-Green (1995) found in their study of hypermedia making, some students created a series of screens, one passing on to the next in a line, just like the words, sentences, paragraphs and pages of a printed book. I felt that whilst this was certainly a valid approach to the technology, the students were, as a consequence of taking a linear approach not fully appreciating the multi-dimensionality of the software and their tasks; they were not using interactivity.

I assumed the fault lay in the lack of effective modelling, of examples that the students could experience and upon which they could base their own work, and I realised that more effective modelling had to become a part of my teaching. In my search for more suitable software programs I uncovered a conference paper by Josh Peretti (1997) that mapped his process of teaching students to create hypermedia versions of their school environments. This broke the artificial and repetitious “you have two choices, the path on the left or the right” approach that I had followed since I developed an interest in the CYOAs. I saw how the interactivity could be produced by the creation of a scene, or a world: if a story’s character was in a room the doors might lead somewhere, the window might hold a view, a book might have text. These potentials were familiar to the students, having already been employed in the commercial world in games that were like novels and films. The adventure video

game *Myst* (Miller 1996) and its sequel *Riven* (as well as many others) offered created worlds with the player always facing the scene, experiencing the story in the first person, and able to achieve different outcomes dependent on the choices made during game play. I decided that this was a model of a hypermedia story that was transferable to a classroom: it was familiar and accessible to the students, and could serve as a starting point for their own creations. I developed such a story myself, using as a created world a hotel (a place with a multitude of rooms, corridors, doors and windows) and added a mystery search element to encourage the students to explore not just this virtual space, but also the possibilities presented for their own work.

The project

The self-constructed 'project' that forms the basis of this thesis involves the introduction of a hypermedia story making exercise into two classes of Middle School students, and my examination, exploration, reflection and analysis of this project. I wanted to know how such a project might be received by the students and by the school. Specifically I was keen to know what it was they would learn from such a project and how what they learned might compare to the more traditional storytelling, exercises that they were familiar with in their usual English classes.

I was aware that many of the students in these middle years were not proficient story-tellers. I knew their limitations with traditional literacy classes and exercises. I was after all, one of their English teachers, but I also suspected, from informal conversations with them and other overheard conversations between them, that storytelling, which is an important part of the English curriculum, was very much a part of their interest – though in a different form. They were interested in stories as expressed in and through computer games, or comics or videos and movies. This idea that students who were failing with traditional literacies and minimally engaging in the average English 'story-telling' 'composition' class could work well with hypermedia was one informal hypothesis that I had formed and wanted to test and explore.

Having a desire to work in this way with hypertext in a middle years English class and challenge the class to create new skills and open up the possibilities of a different way of storying and communicating was one thing; thinking about what this might look like as a coherent research project was quite another. I knew that I would

have to open up my teaching and my assumptions and my students' learning and experience to a level of reflection and scrutiny that is rarely undertaken in the classroom. I would have to be clear about what it was I wanted to know and how I was proceeding and what would count as evidence of success or otherwise, and I would have to get the support of the school and the staff as well as the confidence of the students – and if I really did want to make this a bona-fide research exercise I would likely need to get support and advice from a local University and its School of Education. At times, very often, all of this seemed just too daunting, but slowly the project began to gather steam and take on a life of its own.

In seeking to reflect upon my practice I was influenced by Schön (1983). His ideas of "reflection-in-action" and "reflection-on-action" offered me then and continue to offer me valuable insights into my own practice and into my observations of the practices of my students. I found that I was like the practitioner who:

> allows himself to experience surprise, puzzlement, or confusion in a situation which he finds uncertain or unique. He reflects on the phenomenon before him, and on the prior understandings, which have been implicit in his behaviour. He carries out an experiment, which serves to generate both a new understanding of the phenomenon and a change in the situation. (Schön 1983, p. 68)

That Schön's words should resonate with my interest in introducing hypermedia into the classroom – definitely an 'uncertain and unique' situation – was obvious to me, but I was still very concerned with my perceived need for measurable outcomes and a tight control of variables. As a classroom teacher whose practice was contingent on the day-to-day practicalities of teaching the standard curriculum, I knew it would be difficult to match those preconceived procedural requirements of dedicated research in this field, such as the ability to replicate the whole activity again and again in order to derive meaningful 'new understanding of the phenomenon'. I was required to perform a role involving the "improvisational pedagogical-didactical skill of instantly knowing, from moment to moment, how to deal with students in interactive teaching-learning situations" (van Manen 1995, p.41). I took much heart from Schön's admonition to "search, instead, for an epistemology of practice implicit

in the artistic, intuitive processes which some practitioners do bring to situations of uncertainty instability, uniqueness, and value conflict" (Schön 1983, p. 49).

The focus of the research changed several times, and I explain this more fully in the Methodology chapter, in brief, however, the focus moved from looking at me as the teacher and my teaching and the nature of the classroom and lessons and materials I created to a greater focus on what the students did and what they created and how they seemed to develop. To this end I grew increasingly enthusiastic about adopting a constructivist epistemology in my research, a pedagogical view that sees the efficacy of learning driven by students' abilities to engage with their own learning process, rather than being the passive receptacles of a "banking" education (Freire 1972).

I was encouraged along this avenue of thought by Goodlad's (1984) research in several schools in California in the 1980s, which showed that teachers spent more of their teaching time in the day talking to their classes than on other activities such as demonstrating or even listening. The findings, from detailed surveys of students, found those 'talking' subjects (such as English, Social Science subjects and foreign language studies) were considered to be the least interesting, although they were deemed to be the more important. When asked what they preferred, the students selected what are termed in the United States the vocational subjects, such as Art and Physical Education. These subjects are formed around engaging activities in which the students could become involved in either doing or constructing.

When I critically considered my own teaching practices, I realised that I too was talking most of the time, requiring my students to pay attention to me, to consider me as the source of knowledge, and that it was through me that the students could understand the subject. I observed that in technology-based vocational subjects, such as Woodwork and Metalwork, the teachers and the students were in a different relationship. The teacher might engage in some talking but only for an initial period (though sometimes not at all), and that most of the time the students were occupied manipulating tools, preparing materials, constructing objects or completing processes. The teacher appeared as a source of knowledge (and probably the most important), but the students were also sources for each other. They appeared to be enjoying themselves and their tasks, and they looked forward to the subjects and often voluntarily stayed behind to complete extra work. I wanted that enjoyment for *my*

classes; I wanted them to stay behind after the bell had gone because they were so involved in what they were doing. I felt that English should be like this.

My initial plan began with this desire to investigate the effects on my students, particularly but not only those who were challenged by more traditional literacies, if I were to introduce computers and hypermedia software into an English class and instruct them in the use of the technology through which they could produce short hypermedia stories.

As already explained, this was a time when hypermedia was not as much a part of everyday life as it now is. The internet was not unknown, but not so every-day as it is now and the introduction of the idea of hypermedia was not as non-problematic as a similar exercise might be nowadays. I was interested in how I might take students with me on this journey into a new way of thinking and working with story- telling. This levelling exercise where every student in the class has little or no existing expertise, where all started from a similar point with a lack of previous experience or success excited and motivated me.

The Research Questions

More detailed information regarding my move from being a classroom teacher of English who occasionally did interesting things with computers in his lessons to a teacher/researcher, undertaking a serious research project is offered in the early stages of the 'Case Study' chapter. I began the journey with a focus on the following questions:

1. Can middle year students develop the necessary skills to tell short stories using computer technology and hypermedia software?

2. Can this development be supported through a four-week teaching program of the sort that might reasonably fit into an overall teaching plan for English students in the middle years?

3. Does working in this way and supporting the development of hypermedia story telling skills and completed short stories affect their confidence and attitude in the classroom more broadly.

Over the life of the project, a fourth question became significant and this related to the assessment and evaluation of the students' work and can be summarised as:

4. How might a hypermedia story be reliably evaluated and assessed in a contemporary middle school classroom?

Organisation of the thesis

The thesis is presented in eight chapters. The following chapter, 'The Literature Review', has four major sections. First the chapter explores the broad notion of literacy; second it considers the question 'what is hypermedia?' It then looks at hypermedia in schools, and it finally attends to literature on schooling in the middle years.

Chapter 3, 'The Methodology', describes the search for an appropriate theoretical base for the work and the emergence of direction in terms of theory and practice around a case-study approach for recounting and exploring the classroom intervention itself. This chapter also explains the development and use of an adapted form of phenomenography for working on the evaluation and assessment of the stories the students produced.

Chapter 4, 'The Case Study', is structured using the headings of Yin's (2003) approach to a case study and through a series of 'snapshots'.

Chapter 5 discusses what might be said or claimed as the consequences and impact of the Case Study.

Chapter 6, 'Assessing and evaluating' the hypermedia stories', provides a close up of each of the stories produced by the students describes how the evaluation matrix was structured and interpreted and how it interrogated the understanding and development of the students' insight into hypermedia story construction.

Chapter 7 discusses the assessment and evaluation matrix and the achievement of the students, as seen through the perspective of the matrix.

Chapter 8 is the concluding chapter, it summarises the journey of the thesis and looks at how now, ten years after the research was initially undertaken, insights gained might be taken into contemporary schools.

Chapter Two: Literature Review

Introduction

This thesis is about working with hypermedia as a literacy, about exploring the ways in which young people at the junior end of secondary school might develop and share literacies other than the one traditionally taught and explored in our English classrooms.

The existing literature on the nature of literacy is expansive and contested, and this review begins with a focus on some of the key arguments and ideas in the area. The second section of the review explores and examines what has been written and what is consequently known about hypermedia, and also about hypermedia as it is used in the classroom.

The topic highlighted in the final section is the nature of the middle years of schooling: sometimes it is a middle school, sometimes a junior secondary school, often in Australia it is simply the lower end of the secondary school, but it is that structured place of education that hosts twelve to fourteen year old students. This is the group of students in which I have particular interest. I needed to examine and explore what is already known about the appropriateness of this level of schooling for doing creative hypermedia work to write stories, as part of an English class.

Literacy- definition, purpose and function

Literacy is the employment of a set of techniques and tools – technologies – that people use to communicate when they are not speaking together directly (Victor 1995). This set has evolved over time as technological change has taken place. Literacy is not something innate; it must be acquired and learned, and so in this way it is like language. Unlike language, though, instances of literacy can exist over time; an implication of this is the ability to record and pass on the elements of culture. Literacy has two interrelated aspects: ‘writing’ and ‘reading’; sending out, taking in. The set of tools and techniques – once again, the technology – that constitute literacy today can include carving words onto wood using a blade, reading printed text on paper, typing words on a keyboard that will appear on an internet blog, and filming the first words

spoken by a baby and recording this onto a DVD. Literacy also consists of less mundane pursuits.

The Oxford English Dictionary (2nd Edition Vol.VIII p.1026) defines literacy as follows

literacy ("lIt@r@sI).
[f. literate: see –acy. (Formed as an antithesis to *illiteracy*.)]
The quality or state of being literate; knowledge of letters; condition in respect to education, *esp.* ability to read and write. Also *transf.*

illiteracy (I"lIt@r@sI).
[f. illiterate: see –acy.]
a. The quality or condition of being illiterate; ignorance of letters; unlearnedness, absence of education; *esp.* inability to read and write. Also used more generally in sense: ignorance, lack of understanding (of any pursuit, activity, etc.). Cf. illiterate *a. (n.)*

For me, as a teacher of English in an Australian high school in the late 1990s, literacy seemed something of a contested term. In the school where I worked, literacy was very much about reading and writing traditional text. There were specific, prescribed, functional skills which students had to achieve and display to be considered literate, and as a teacher of English the development of these skills in my students was very much one of my responsibilities. Many of the students had few ambitions beyond working their father's farm or selling produce at the local market (this was a country school), but there was pressure from the school itself, and from the State and Federal Governments, to push students to achieve what were considered to be acceptable basic literacy skills.

Over time, I came to realise that this pressure had less to do with a deep concern for the students' individual and *personal* futures and wellbeing, and more to do with those national economic and social goals ideologically linked to levels of literacy. These ideological linkages still play a determinant role in education, being responsible for the construction of 'league tables' measuring the 'success' of schools and, by extension, educators, and as indicators of Australia's 'success' as a 'developed nation'. The *Australian Language and Literacy Policy* (Department of Education and Employment 1991, p. 9) explains that schools must work to achieve high levels of literacy in students partly, and it seems cursorily, because of the "personal benefit and

welfare" of students but also because of the need to achieve Australia's "social and economic goals".

This Department of Education and Employment (DEE 1991) document was important at that time because it ostensibly allowed practising teachers to clarify their understanding of what literacy was supposed to mean to their pedagogical practice. It explained literacy as:

> [T]he ability to read and use written information and to write appropriately in a range of contexts. It is used to develop knowledge and understanding, to achieve personal growth and to function effectively in our society. Literacy also includes the recognition of numbers and basic mathematical signs and symbols within text. Literacy involves the integration of speaking, listening and critical thinking with reading and writing. (DEE 1991, p.9)

It became apparent during the 1990s that within governments and universities there was occurring a growing movement to make literacy into something more than reading and writing. Since the place where this is realised was in the classroom, and developing reading and writing skills involved working with the development of a set of very functional skills, educators could infer that this movement primarily related to the embedding of literacy into social practice. Certainly students had to be able to recognise symbols and articulate how they sounded and what they meant, yet there seemed to be very little getting away from the growing interest in literacy's perceived connections to national growth, which meant that standards had to be established, measured and tested, and basic text recognition and word pronunciation had to be demonstrated by all students on a regular basis as a measurement of 'success'.

Colin Lankshear and Michele Knobel (2006) point out the ambiguity in these moves towards a greater emphasis on functional standards of word and text recognition on the one hand, and a more expansive and socially constructed understanding of literacy on the other. As a teacher in the classroom the significance of this ambiguity did not register for me, though I was aware that literacy had come to involve an emphasis on exacting standards and an opening up to the reading of symbols and markers in other social or cultural situations (there were now literacies

around mathematics and music for instance). Indeed the use of computers themselves was sometimes being broadly interpreted as a literacy.

Although the traditional notions of reading functional English texts might have been what were measured in day-to-day teaching, what mattered increasingly were these new ideas that considered literacy more broadly. For a teacher trying to connect to the lives of working class rural students, many of whom had failed with traditional literacy tasks for eight years or more, these new ideas around literacy were refreshing. James Gee, through several texts (1991, 1996, 2007) published over more than a decade, helped to articulate emerging trends and ideas that were to become influential to this study. Because of its relevance to the teacher at the grass roots level, Gee's work was useful and accessible in ways that the original texts from which he worked, such as those of Lev Vygotsky (1962), (1981) and of Shirley Brice Heath (1982) were not. Gee's (1991, p. 3) notion of the term *discourse* as the "identity kit" of language, thinking and action that helps members of a socially meaningful group or social network make distinctions between themselves and others was seminal to my teaching at the time; and also later on, in the research explored in this thesis. Of particular value was the notion that we become part of one discourse or another because of our primary discourse in the family unit; that we are dependent on our birth or upbringing for our initial engagement with language and that only later comes the need to communicate with secondary institutions such as friendship groups, schools or employers, or, indeed, the government. It is then that we employ the necessary secondary discourse(s), so literacy becomes the control of secondary uses of language (i.e., uses of language in secondary discourses).

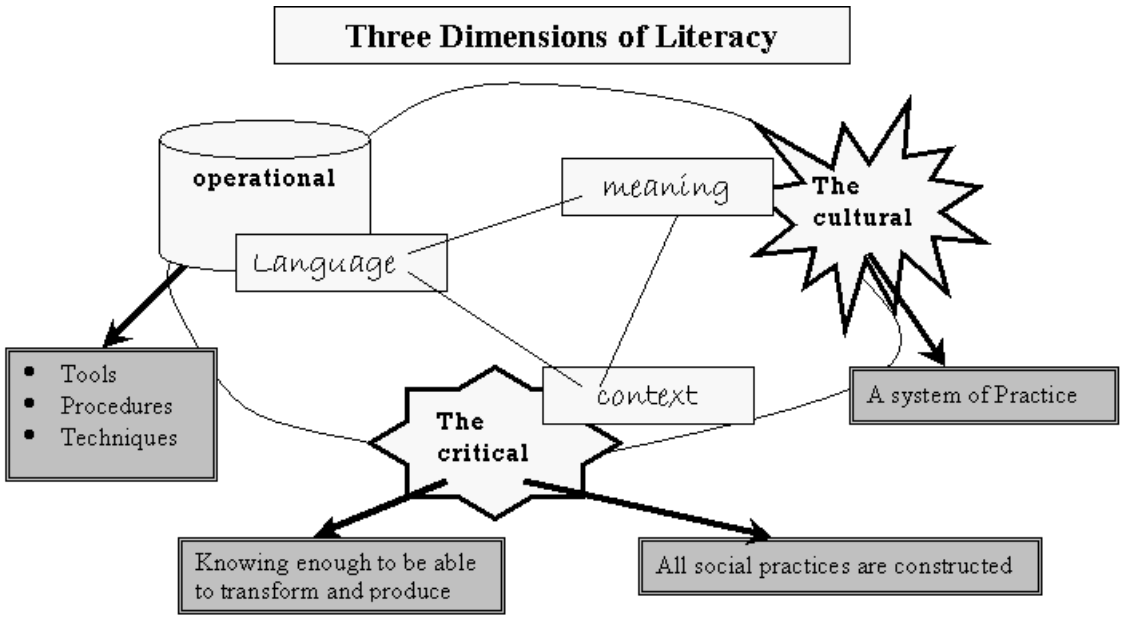
According to Gee (1991, p. 8), control here means "some degree of being able to 'use', to 'function' with [language], so 'control' is a matter of degree" that culminates in *mastery*, which is defined as "full and effortless control". Gee examines the gaining of control and identifies two processes by which it is achieved, one being "acquisition" and the other "learning". 'Acquisition' is that process which occurs subconsciously and almost incidentally in the home or the intimate surrounds of the young and constitutes the way in which a degree of control over first spoken language is achieved: by assembling those linguistic elements we need to function in our immediate environment. Acquisition is not the sole preserve of the young, however, and extends further into our culture and continues, as we mature, into the realms of

(amongst other places) popular media. This is in contrast to 'learning', which Gee considers a more formal process whereby the seeking and gaining of knowledge from a teacher-like figure is consciously undertaken; learning is a deliberate exercise and is more analytical and structured.

Gee suggests that acquisition is better for the mastery of a specific skill such as music, dance, reading or writing, and that learning can give us a language with which to discuss what we have acquired. He says (1991, p. 6) that although "[w]e are better at what we acquire ... we consciously know more about what we have learned". This made sense in terms of my role as a teacher of English and it became one of my teaching priorities to find ways for students to acquire reading and writing skills in situations that were informal and relaxed. Some of the games and the early work with computers were aimed at achieving this.

It was, however, Bill Green's (Green 1988; Green & Bigum 1993) work on literacy that was to become a more lasting guide and influence on the project I was undertaking. Green emphasises three interlocking aspects or dimensions of literacy, which he labels the 'cultural', the 'operational' and the 'critical' (see Figure 2).

Figure 2. Three dimensions of literacy



Each dimension is related to the other in the manner mapped out in Figure 2. What Green terms the operational dimension contains many of the elements that the traditionalist/functionalist considers important in literacy learning – such things as phonics and letter recognition – but their proposal of cultural and critical dimensions implies a more expansive understanding of notions of literacy than those which confine it to the DEE's "read[ing] and use of written material".

Literacy also exists within a culture; it has a use, and this aspect has a bearing on how literacy is taught and who has access to it. Each literary activity exists as part of a complex situation. In reading a comic book teenagers do not bring to the task only the operational aspects of understanding the language as it is presented on the page, in terms of decoding the written words and the arrangement of images. These readers also bring the cultural discourse of engaging comic book reading: the levels of meanings, the stereotypes and conventions, the way characters speak, those contexts in which all the elements appear, and the resultant judgement as to whether or not the whole experience was better than the last comic read. Readers can then also deal in a wider discourse with other comic book readers, all of whom share a common discourse about the meaning, context and language of the comic.

Looking at this concept of literacy further in the critical sense – and perhaps supposing that say these teenagers are also engaged in learning about comics, or at least about narrative and illustration, and may then seek to design and create comics of their own – this engagement could be considered as close to a mastery of the secondary codes of comic books, and indeed, could be considered to indicate a formal literacy, at least with regards to comic books.

These developing ideas of literacy influenced my classroom work. Allied with this was my deep interest in using computers in the classroom. The connections to be drawn between these two notions encouraged me to think differently about the tasks facing my students and me. In an expanded view of literacy that used the technologies of the modern computer and its networks, I could see very clearly the relevance and importance of Green's three-dimensional model.

The operational dimension would be interpreted as the learning and acquisition of control or mastery over the uses of hardware and software: everything from the 'on' switch to the manipulation of text, from the scanning of images to the creation of

linked web pages. Green's notion of the cultural dimension of such literacy would involve the embracing of the burgeoning 'worlds' or disciplines of computers, computing and telecommunications, which although they were at that time, as now, in a state of change, were even so bringing students together in informal ways to engage, communicate, assimilate and learn in the classroom. It became apparent, too, that a critical eye would need to be cast over the work the students created in such a culture, and that; further, it would be incumbent on the teacher to aid the students in the development of their own critical facilities. Certainly such a model was valuable as a guide, but just how it could be employed to actually bring such about such change was not immediately apparent.

Literacy as technology

Controlling the secondary uses of language involves reading and writing of texts, and the reading and writing of texts involves, in turn, the development and use of some form of technology. Why do we do this? To communicate, to express, to record, to worship, to be part of a discourse which helps to define who we are in our culture, even to be human, to be what we are. Without doubt we performed all of these activities before the existence of an extended textual literacy, and the results of our actions are recorded in the very objects we produced. Stonehenge's enigmatic solidity is certainly testament to, if nothing else, a mastery of stonemasonry. Yet its ultimate purpose as a place of religion, of recreation, or of mere decoration is lost to us because of its creation before a time when textual literacy technologies allowed us to keep such things in a permanent form; a form beyond ourselves – transportable, personal as well as communal.

We make literacy what it is as much as it makes us what we are. Literacy is a technology "that converts thoughts into records" (Murray 2000, p. 43) and uses a variety of other technologies to accomplish this task: an alphabet, writing tools, inscribable surfaces, as well as grammatical and syntactical conventions that mimic spoken language. It is a feature of tools – of technology – to shape and be shaped by their users. Technology is not autonomous and always has a context; it exists because people bring it into being and it continues its existence as people shape it, further adjusting it to suit different situations of use. Reading and writing are just such

technologies, brought into being to help perform a particular task. It is possible that the initial impetus towards writing was driven by the need to record the contents of ancient Mesopotamian storehouses (Blainey 2000), and so this early literacy reflects the technology of its day: the marks were made with wooden sticks impressed into clay tablets (Fischer 2001).

Literacy and technology are always related. The Industrial Age of the Victorian Era, for example, saw the establishment of our current mass print culture of typeset books, magazines and newspapers, of typewriters and printing presses. This was also the period when the democratisation of education became so important when compulsory schooling for all levels of society, as distinct from only the wealthy or specialists (like scribes or members of religious orders) came into being. The emerging literate population created a demand for reading material which spurred the output of writers, novelists and journalists; of self-help books and guides to living; of literary magazines, penny dreadful tales of crime and horror, as well as books to help define literacy such as dictionaries and usage guides. This melding of literacy and technology continued into the twenty-first century.

The function of literacy

Literacy performs a distinct function, in that it is the medium by which we engage in the discourses that reflect our culture. Not only is literacy's shape defined by the technology of a particular period in its history, it is also one of the ways in which culture is perpetuated. We know of the cultures of the past to a large degree through our understanding of the literate material they left behind. Scholars like E.V. Carr make the distinction between the study of pre-history, which studies those cultures we have knowledge of only through archaeological traces, and recorded history which relies heavily on the study of written records of the past (Carr 1987). Literacy is the conduit that enables a culture to exist over time through the investigation of what has remained. Through literacy we can understand what has been and can compare it to what is happening now. Literacy is also the way we create the future, which we bring into being by imagining and writing it.

Despite the importance of its recording and transmitting functions, literacy is more than the passing on of knowledge from one generation to another and it is much

more than just the knowledge we have about ourselves. We use literacy as a means of self-expression. We can take words and put them together in our own way and ask others to share this experience. Literacy is especially democratic in this sense. As we master the codes we share this ability with others; by expressing our thoughts and desires through words we use those skills that society has given us. We use literacy to reflect meaning, both as part of the discourses of our culture and in a personal sense; if an idea does not exist unless it is written down, then a culture does not exist either unless it is expressed in words. Walter Ong (in Tuman 1992a) makes a distinction between oral and literate cultures: "There is legend and myth without literacy, but no history; persuasive speech making, but no rhetoric; religious feeling, but no theology; folklore and commonplaces, but no philosophy."

Literacy as a social control tool

Literacy does not exist without literacy practices and literacy events. Literary practices consist of those "general cultural ways of utilizing written language which people draw upon in their lives. In the simplest sense literacy practices are what people do with literacy" (Barton & Hamilton 2000, p. 8). A literacy event, meanwhile, is "any occasion in which a piece of writing is integral to the nature of participants' interactions and their interpretive processes" (Heath 1982, p. 93). The collection together of written pieces into documents and documents into a literature (Nelson, 1992) is an example of the power of literacy practice to shape the discourse that is culture. The Archaic Greeks relied on poets to create their works extemporaneously during a performance according to a variety of readymade phrases, plots, verse forms and metaphors (Ong 1993); the process was interactive, with the poets incorporating local issues and identities into the performance in order to involve the audience. As the Greeks adopted the alphabet and developed writing they transcribed the most popular of their poets and the practice of the creative performance passed away (Ong 1993). The written versions of two major poems survived into history: Homer's *Iliad* and *Odyssey* continued to be recited in front of audiences, and the literacy events they described came to have special significance. The hero of the *Iliad*, Achilles, became the archetypal role model for the Greeks. Alexander the Great carried a copy of Homer with him as he conquered the world. The literacy event – in this case the transcribed poem – became a model for manly actions and virtues, and through

literacy practice defined the appropriate behaviours for generations of Greeks. The poems' contents became solidified in time, unable to change or interact (Ong 1993).

Literacy is a powerful force in society. Adherents of all the major religions – from the Judaeo-Christian-Islamic in the West, to Hindu, Buddhist and Taoist beliefs in the East – are all children of the book. The knowledge of what was in the books, and the limiting of who was allowed to read them and when, were, and still are, powerful definers of power and position. In Europe, the history of the Reformation can be seen as the outcome of changing literacy practices. Gutenberg's first work was a Bible printed in the German vernacular. As printed Bibles became available in greater numbers and at affordable prices, people wanted to read them. Whereas previously the people, the illiterate, would hear the Latin words of the Bible recited aloud by the local priests as part of religious ceremonies, now a movement of individual readers often silently reading and contemplating the text in their own spoken language arose and had a profound impact on Western thought and history. People came to see the possibility of their own autonomy in interpreting the Bible's message, an autonomy that yielded interpretations with as much authority as the teachings of the Church.

The literature reviewed so far shows that literacy not only provides a means of social expression; it is also a means of social control. Control of the literacy codes and, as a consequence, of cultural discourse, has often led to the creation of gatekeepers of knowledge in the form of those who possessed and could read the various types of writing and could thus decide the construction of the literacy codes: the scribes of the ancient world; the monks of the medieval world; the wealthy; and the rulers of many ages. In modern times in a world of nearing universal literacy, the notion of gatekeepers has wider applications. The "cut-glass accent" of Received Standard English (Wells 1997, p. 19), or BBC English as it is sometimes called, was imposed, until recently, as the norm for non-English speakers learning the language and by its ubiquitous use in British broadcasting; other accents and dialects, and by extension, their speakers were considered representative of cultural and social inferiority. Professional bodies, including educators, can cloud their practice and their theories with jargonistic and specialist language that excludes those on the outside. This is an example of Gee's discourses in action. These gatekeepers have exerted a strong influence on the development of literacy but the proliferation of literacy in the

Industrial Age saw the evolution of new forms as a mass audience of consumers was imbued with the ability to become participants and stimulated the development of a mass literacy production industry. Literacy is not static; it is dynamic, and constantly evolving and as with all evolutionary processes there is no correct or right path, only that which emerges over time and affords the best conditions for survival (Misson 2001). Still, those who control or have power over the use of literacy, the gatekeepers, work hard to keep that control. To them it will likely be argued it is the controlling of standards; to others it will seem like a restriction.

The rise of popular education, which began in post-Revolutionary France, had as its aim the creation of conditions conducive to those Enlightenment ideals regarding individual and collective autonomy that advocated raising the consciousness of a society's members so they became aware of their connection to that society as a whole. From the modern Industrial Age there emerged the idea of a mass education system to deliver a workforce sufficiently trained so as to be able to work effectively in society. Our current education system, too, can be seen as the means society has for passing on the values and shared knowledge of itself and its culture, or it can be viewed alternatively as a system for maintaining control over society by reinforcing class and cultural divides. School knowledge and school literacy are still powerful tools for defining success in society; failure to master them is often a barrier to higher-paid occupations and consequently higher social standing. If, as Gee (1991) contends, the way literacy is transmitted is by either acquisition or learning, then it can be seen that many working class children only experience school literacy as learners, while their middle class counterparts often acquire the elements of school literacy – familiarity with books and the importance of textual literacy – from their home environments. These middle class children have the benefit of acquisition reinforced and enriched by learning, whereas working class children can struggle through the often alien environment of schools, trying (or not) to learn about literacy from the start.

Many school children *never* master the traditional version of literacy. Australian Bureau of Statistic figures indicate that more than 40 per cent of the population operate at less than the "minimum required for individuals to meet the complex demands of everyday life and work in the emerging knowledge-based economy" (ABS 2006). Whether the illiteracy rate is part of a failure of modern

education in general, or is evidence of the inadequacy of the specific emphasis on whole language over phonics, or indicative of the inherent problems of the English language or the hidden prevalence of dyslexia and other learning difficulties, (Fawcett 2003) has been part of a debate across modern society (Green et al 1997). What is important, however, is that those without any control over the secondary discourses are at a major disadvantage, and that this is a disadvantage that cannot readily be compensated for by any amount of classroom innovation.

Who are the players in the literacy literary game?

Literacy has an intimate relationship with culture and is also a mechanism that defines power and power relationships in society. Additionally, literacy is part of a complex industry that helps to define and shape what literacy itself is. The technological changes of the late fifteenth century that saw the steady multiplication of printed texts, and the development over time of a literate public able to read them, were part of a longer process of change between the private and the public uses of literacy of literacy events and practices (Eisenstein 1979). When the handwritten or dictated scroll or letter was the commonest form of literacy event there was little separating the public and private spheres of literacy. As books became more common a public role or use emerged, most often for religious purposes. Since the rise of mechanised printing there has evolved a whole industry of public literacy or writing for a public purpose which includes all literature, as well as legal, political, educational, commercial, historical and scientific writing, pamphlets, handbills, advertising and political posters. A private literacy continues to the present day, through letter writing, diaries and journals. Though there are obvious exceptions private literacy has traditionally tended to be handwritten.

Some aspects of public literacy have tended to follow the market place in that they reflect the interests or tastes of the readers. Works on popular topics such as the Bible have been the most common, and economies of scale have allowed even the most obscure of interests to develop a literature (at least in the more commonly spoken languages such as English and French). The growing ability of social movements such as trade unions, Temperance organisations and the Mechanics' Institute movement in Australia to produce their own literature had broadened the

variety of textual products. Governmental and social initiatives such as municipal libraries, which act as repositories of texts, have also shaped the type of reading to which the public is exposed. The producers of public literacy – authors, journalists, editors, illustrators, publishers and printers – share a relationship with the literate public over time. Tastes and interests have evolved; sometimes as part of those technological changes that saw the relative decline in printing costs through cheaper paper or more efficient printing processes that led to widely available newspapers, magazines and books. Yet at the same time, industry has always been quick to produce work that the market seemed to demand. In literature this saw the creation of genres as earlier works set a series of parameters or created stereotypes that resonated with the reading public. Genres have themselves evolved over time, jumping the species barrier to establish new forms of media such as spoken word productions, cinema and hypermedia.

Standing alongside the producers of public literacy and sharing in the relationship – since they too are often producers as well as consumers – are the educational establishments. Academics strive to develop mastery of the codes, and schoolteachers try to guide their students' attempts at learning or acquiring these codes. Teachers are often credited with a seminal role in the transmission of literacy to the public, although, as has been indicated, other societal factors are at play which may be equally if not more important. The role of teachers is often seen in terms of reading and writing, or rather their ability to instruct students to become producers and consumers of literacy. The higher sense of mastery of the discourse, which is our culture, flows from this. If literacy is only seen as applicable to textual production and consumption, then mastery involves skills in writing – handwriting for the very young, typing or word processing as these students mature – as well as mastery over what is written in the form of grammar and spelling, meaning, coherence and engagement; and skills in reading where a similar progression from the decoding of simpler works through to more complex pieces.

There is a major debate (Snyder 2008) on whether the teaching of a simple set of decoding skills for words, even out of context, is more efficacious than an approach that valorises a 'whole language' approach to words (generally in a context). In any case skills and materials are pitched at levels cognisant of the abilities of the students. When literacy is considered to be more than text, then as consumers students need to

be aided in the development of an awareness of more than just the written word, despite its many complexities. There is the need to enable their development of an equal control over digital literacies that have incorporated the fields of orality, music, art and film, along with the previously dominant textual literacy.

The electronic ®evolution and literacy as meme

Literacy is concerned with the use of language, its codification into a form that is at once recordable, transportable and re-presentable; literacy uses technology to do this. Some of this technology is, because of its ubiquity and our familiarity with it, almost invisible: the alphabet, handwriting, and books. All these are technologies; not autonomous elements removed from any social or cultural context, but integrated into, and integral to, the fabric of the very cultures they represent. Their presence has helped change cultures, and different cultural usages of these technologies have impacted upon their evolution.

Text, and the reading and writing of text (also known as literacy), has survived and thrived in a variety of environments, and through many changes in those environments, for many centuries. Literacy has developed as both a cultural tool for the continuation of ideas and has helped to shape those ideas. Richard Dawkins (1989) and others describe the way ideas seem to exist through time in the form of ‘memes’. For Dawkins the ‘meme’ is a metaphor related to the concept of genes and their way of propagating through time, carried by the organisms they help to define. Memes are ideas that are passed on from brain to brain, or mind to mind, and can propagate, self-replicate and spread like a virus through groups of people, evolving (or mutating, as some would see it) so as to ensure their own survival. Literacy itself can be regarded as a meme: an idea that began as an attempt to represent language-as-speech as physical text and which then evolved over time to create and include alphabets, printed Bibles, breakfast cereal boxes and online magazines. The latter have even been described (Rushkoff in Gorman 1995, para. 17) as “viral shells wrapped around memes... a group of coherent, discreet, units of thought that, when absorbed by readers, is capable of changing the way they function”. The description applies equally to all products of literacy.

Literacy and technology can be interpreted as two memes interwoven and sinuously intertwined through history, creating a double helix that contains the code of the wider culture's story. As has been mentioned, changes to technology can and do lead to profound changes in the influence of literacy: the Industrial Revolution's development of mass markets, and concomitantly, the necessary machinery to keep these mass markets fed, clothed and housed, as well as entertained and educated, saw the creation of a variety of genres and modes of reading material. As with many other aspects of life, such as transport and medicine, the changes and developments that grew from the scientific and industrial discoveries of the early nineteenth century still exert a profound influence today. Photography, recorded sound, cinema, radio, television and telecommunications have had immense effects on our society, yet at the same time mastery of these technologies is not considered in the same way or at the same level as print-based textual literacy (Bruce 1997). The advent of computers has made the situation even more problematic as the computer's ability to digitise these physical representations has meant that it can contain any and all of the proceeding technologies for re-presentation in a different, more malleable form.

As the DEE (1991) document cited earlier in this chapter makes clear, our educational institutions, both as producers and consumers, still see the mastery of language as primarily the mastery of text. Seymour Papert (1993, p. 71) proposed the term "Letteracy" for the ability to use this technology, reserving 'literacy' to refer to a wider set of skills and knowledge. For him the concept of literacy must be extended to encompass all of the inputs the world has to offer and our responses to them. It is increasingly apparent that mastery of language necessitates the mastery of more than just text. The way we use language – not just to communicate but as entertainment, as a reflective device, and as a means of self-expression – has been given a wide range of additional outlets by the technologies of the past century. To be literate in the twenty-first century means to be able to control and master these media.

Implications for literacy

When proposing a definition of literacy that shows an awareness of the cultural and societal changes taking place, the multimodal nature of current communication and language use must be considered. Text valorised the modality of sight over all

other senses. Printed text in our modern era was used in silence; the use of pictorial elements in books, though common for young readers, gradually diminished, so that adult mature readers now have crisp white pages filled with letters and mostly unadorned by illustrations (Kress & Leewen1996). Though there may be a haptic element in the touching and holding of a book (as well as an olfactory element in a book's smell), the act of reading is primarily a visual experience, a visual re-presentation of the auditory and the oral. Text, as Ong (1983) points out, has an oral genesis; it is rooted in orality as a representation of the spoken word. Early recorded sounds, radio and telephones introduced an auditory modality very different from the naturally spoken word heard by an audience. Cinema, and television to some extent, brings together sense of position as well as a very different visual dynamic while adding an auditory modality. The computer uses a similar range of modalities, and promises, through the digitisation of information, many more, including touch and visual feedback. The whole field of virtual reality offers a truly multimodal experience (Ong 1993).

The implications for literacy of the development of the computer, a technology permitting a range of modalities, are one of the themes of the current work. To hold the notion of literacy as it pertains to computers as being just 'computer literacy' is to suggest a limit both to the capabilities of computers and to the expansive possibilities of literacy. Certainly much commercial, educational and literary *writing* is now performed using a computer, and writers can now compose text so that it most resembles the printed words found previously only in professionally produced books. Yet this is not the great distinguishing feature of a computer with regard to the ways in which it can be used to deal with text. On a computer, text becomes a far more malleable entity. Words, phrases, paragraphs can be 'cut and pasted' – apparently physically moved – from one end of a document to the other, and from document to document. Writers no longer need to start at the beginning of a written work but may begin at whatever point they choose, going backwards and forwards as ideas develop. With the word processor, the notion of literacy as a mastery of such secondary codes of language as spelling and grammar becomes something different too. Spelling and grammar checkers will automatically change a misspelt word or an ill-constructed sentence according to the codes decreed by traditional literacy, without the need for the writer to have mastered them.

Yet the computer is more than a glorified typewriter. It allows users to manipulate images, sounds, and music as well as text. Such potential for change in the way in which meaning, information, and language itself is manipulated, holds real implications for our definitions of literacy and for the way the educational uses of computers in teaching literacy can and should be approached. If literacy is the control of language, then literacy must be defined in terms of how language is used. When language is combined with another medium such as the visual arts, then our traditional definition become less clear, for literacy then extends to art as language, to an appreciation of the implied literacy of the moving image, and to recorded sound and its place in communication. Just as text becomes plastic and able to be sculpted by the computer, so too, does an image, a moving image and a sound. Each piece of information can be broken apart and reconstituted in different places or transformed as the manipulator wishes.

As text converges with other media into multimedia, the need arises to be able to read it. The literacy practices that grew up around the book and other textual artefacts are still some of the most dominant elements: “screen layout and typography, even terms such as ‘font’ or ‘web page’ derive directly from, and expand the typographic culture that digital multimedia are supposed to replace” (Bruce, 1997, p. 301). As Marshall McLuhan points out, the content of any new medium is the older media (McLuhan, 1974).

The rise of email and the brief messages that can be ‘texted’ using mobile phones via what is known as Short Message Service (SMS) show us that text is itself evolving under the pressures of technology. Email communication shares many elements with oral communication in its informal use of language and often inconsistent grammar (Barron, 2000). Email may also employ abbreviations (BRB for ‘be right back’), acronyms (LOL for ‘laugh out loud’) and idiosyncratic typographic elements called emoticons or smilies (☺ ;-)) which are intended to provide, as their name suggests, intimations of emotional states without the need for elaboration.

Another important textual form that is moving away from printed text, both in the way it can be read and in the way it is converging with other media forms, is hypertext. Hypertext and hypermedia are examined in greater detail in the next section but it is pertinent to draw attention here to its differences from the printed text.

Hypertext involves the breaking down of larger pieces of text and the linking of these pieces; the pieces are then called ‘nodes’ (Engelbart 1962). The links between nodes, the hyperlinks, are also very important in meaning making since they can establish relationships between nodes: hierarchies, cause and effect, generations, direction and instructions, even random, changing relationships. Hypertext can only really exist on a computer because the link or the thread that connects the nodes is its chief defining factor.

The following section focuses on the nature of hypermedia as a specific branch of literacy.

What is Hypermedia?

Multimedia, hypertext and interactivity.

To grasp the nature of multimedia it is necessary first to summarise what is meant by the term ‘media’. Media are forms of presentation of information or entertainment. Text, image, sound and all the variants of these, such as music, calligraphy, moving pictures, animations, are all individual forms of media. Multimedia, then, is the combination of two or more of these forms. In this sense an illuminated manuscript is multimedia, as is television. When either is transported onto a computer by scanning, digitising or otherwise recording, although it remains multimedia, it has changed its form. It appears the same, but it is not. An illustration of a manuscript on the computer’s screen is a representation of a manuscript; it is not a book.

To the sellers of computer equipment multimedia refers to a machine with a sound card and speakers that combine images and sounds (see http://www.apple.com/imac/). The writers of newspapers and computer magazines refer to multimedia as the world of e-commerce, micro-payments and web portals. Educators most often talk of multimedia as the combination, in a computer, of a variety of media which together help express information, and sometimes entertainment, usually for the purpose of learning specific subject content. By placing

the word ‘interactive’ in front of the term the dimension of user control is added (see http://www.boardofstudies.nsw.edu.au/multimedia/).

Hypertext is somewhat different to multimedia: it is the non-linear arrangement of pieces of text in a network (Bolter 1991, p. 18) The closest approximation to such a network in terms of traditional texts would be a Table of Contents, which provides, in essence, a map or representation of the information contained within a book arranged according to the order in which it is presented on the accompanying pages, and in the order in which the author intends the book be read. By viewing a chapter title in the Table of Contents and then flicking through the book’s pages to find and begin reading at that chapter, the reader performs an action analogous to the process of hypertext. It is the flicking of the pages to locate the desired page that carries with it a sense of linkage between the two textual elements – the chapter title in the Table of Contents and the chapter itself – that is the important concept here. So it is too, with hypertext where, as will be explained, the important concept is a link that carries with it a continuity of meaning from one place in a textual presentation to another.

Hypertext, and ultimately hypermedia, is the product of at least two streams of application and theory. The more obvious stream stems from Vannevar Bush’s (1945) memex idea, through Engelbart’s (1962) Augmentation research, to Ted Nelson’s actual coining of the term ‘hypertext’ and the proposal of his Xanadu concept (1992). Myers and Burton (1994) and Collins, Hammond and Wellington (1997) discuss this history in some detail and that history will be explored here shortly. The second stream is historical and aligned with the evolution of the book and printed text and concerns the nature of linearity and the development of ways to present knowledge. Russell (1997b), for example, suggests that such things as an annotated Bible and a footnote are types of hypertext, and many textual examples that resist linearity such as Joyce’s *Ulysses* are also arguably hypertext (Snyder 1996b; Landow 1992). The invention of the personal computer allowed for the merging of these streams and made the promise of much of this earlier thought into something more concrete.

An early development that allowed computers to be used to create texts with the possibility of non-linearity and the addition of multimedia for the mass education market was HyperCard (Atkinson 1987). The program used a card file index as a

visual metaphor to represent information stored in the computer by category. The addition of ‘buttons’ that could ‘take’ the user to any other ‘card’ in the ‘stack’ (as the file or collection of cards was called) completed the analogue. Thus, by referencing information according to multiple topics or categories, the ‘stack author’ could construct a variety of ways for the user to ‘navigate’ through the information provided. HyperCard spawned a large number of imitators, and other programs based on the same idea for example, ToolBook 11, Linkways, Director, Authorware and HyperStudio (Wagner, 1993-1997). HyperCard allowed explicit links between objects but for links between texts and words within texts it was less well designed. It was left for other programs, such as StorySpace from 1990 and later the World Wide Web in 1991, to use text as the basic ‘anchors’ or ‘nodes’ from which to hang links.

Words are always linked. Words link to form sentences, paragraphs, chapters, and theses. The linking of hypertext is not a linking of words with words; it is rather a linking of words with meanings and concepts. In hypertext, words and groups of words form snippets of meanings and it is these that are linked one to another. A word in isolation can be linked to a paragraph of other words that define and contextualise it. By regarding each word as a separate entity, each can be assigned a name, or address, or attributes that enable it to be used again. It should always be remembered that the making of meaning and context is never actually performed by a computer; it is people who assign these links and contexts and meanings to the order of the linked words. A computer performs an assigned task and does not care in any way what order the list is in. It is humans who care about order, about beginnings and middles and ends (as a reflection of the human condition, no doubt), but for the computer order is something to be determined by the user’s circumstances (it is merely a process) and if the user changes the order it does not matter to a computer. Computers have no ethical or aesthetic interest; any and all information can be fluid in its presentation. As long as the address (a way of working out where the object is in a computer) remains intact, any object can have its relationship to all the other objects/entities established and re-established over and over again.

Hypertext then, is text with a link that is able to associate one piece of text (what is termed a ‘string’ of text) with another. Each object or entity is called a node and hypertext is a series of nodes linked to each other. If we were to ask what the nature of the link is, we are engaging with the context of the document as a whole.

Each node will have a reason to be linked (Nielsen 1990). For lexicographers nodes might be words and definitions of words, so lexicographers establish links between words of similar definition. A dictionary can contain etymological information, so these could be linked, too. A manual for the operation or understanding of machines or production processes might contain nodes consisting of information broken down into smaller discrete parts, and links might exist between the chronological order of the process, or between objects in physical proximity, or of similar nature or made of the same material. What is apparent here is that it is the context or meaning applicable to the links that connect the separate nodes.

An author creates all of these links. A conscious mind develops the link idea; the author extends metaphors and meanings in as many ways as the information needs to be presented. Each node can be 'tagged' with attributes including when it was made, how much size it represents as a file and/or who made it. The author may consider any or all these attributes important pieces of information and these too can be made part of the links between nodes or they may not.

Each word can serve as a node, and each node has a series of links associated with it. Ted Nelson's (1992) concept for his Xanadu program takes the notion of hypertext to the extreme by positing a collection of all the published material in the world within its system. Each node would have as many links as a 'reading' of each document might suggest, with an inexhaustible stream of links as each node immediately leaps to the next document, and on again to another suggested node. Vannevar Bush (1945) understood the human brain as behaving in this way, and had previously envisaged a hypertextual, or as he called it, a memex machine which would allow a user to access information in a more 'natural' way, by being able to follow links or trails through the information. The metaphor of a trail was important as it allowed for the idea of a 'map' of the information to be created; a map that was particular to individual users, reflecting their particular idiosyncratic sets of ideas and those thought processes that led them to the sets and types of information or objects that they found.

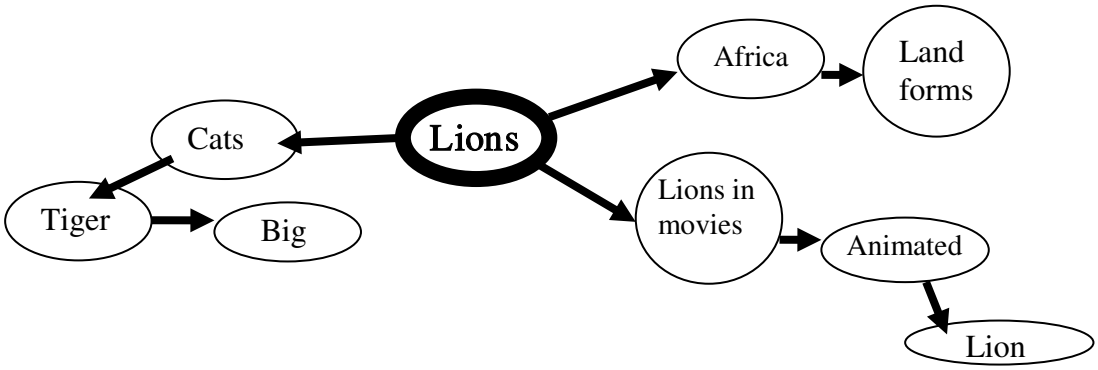
To Bush, and to the scientists and engineers who came after him, the concept of linking nodes was about the mind associating ideas – associating nodes – into patterns that flow from the nature of the ideas that are being discussed. If we imagine

the thought processes of a student investigating lions as a first point of interest, his or her thoughts might encompass cats in general then on to other mammalian categories; or the lion can be pursued by looking at Africa and its geography; or to take another direction of thought entirely she may be interested in fictional references to lions from Androcles to *The Lion King*. Bush's original example was the bow and arrow (Bush 1945).

To imagine this set of information and the structure of a hypertextual relationship between them we might present it as an unordered list:

- Lions
  - Cats
    - Domestic Cats
    - Large Cats
      - Tigers
      - Leopards
  - Africa
    - Vegetation
    - Land Forms
  - Movies
    - Fiction
      - Animated
      - Live Action
    - Non-fiction
      - Documentary

Figure 3. One possible structure of information on lions



Or we could order the information on Lions like this (Figure 3).

Taking a form similar to a concept map (Novak, J.D. & Canas 2008) and even closer to a mind map (Buzan 1991), the origins of such charts owe more to a graphical format than a printed text background. The surfaces upon which they were originally designed – blackboards, white boards and paper – are like the page of an illustrated book; they are static surfaces. This graphical presentation from a computer screen also appears to be static and immovable, yet it does not have to be. The memex that Bush imagined was a machine, a physical machine of microfiche readers and projectors that would allow him to view information and images.

Such a device was never built but later engineers such as Engelbart enabled the development of the familiar configuration of screen, key boards, mice, key pads, even pens, printers, and networking. Engelbart conceived his work in *Augmenting the Human Intellect* (1962, para 19) as providing "capabilities for manipulating and displaying information that can be of significant benefit to the human in nonmathematical processes of planning, organizing, studying, etc". The way information can be displayed is reliant on the computer and its accompanying technologies, in the form of input devices that allow for the expression of that information in a logical way.

The presentation of text is only one way to use the computer (though it is the dominant one). Computers can now display images and play sounds, as well as enabling the creation and combination of these media. The relationship between the old media of a physical analogue world and the new media of a digitised, computerised world is central to this research. It is not suggested that these ideas and the issues are to be raised or considered for the first time; far from it. The work of McLuhan and his studies of media in the 1960s have again started to inform the field in the last decade. His suggestion is that the content of each newly developed medium is formed from the content of the previous technology or forms. "The content of a movie is a novel or a play or an opera" (McLuhan 1974. P. 26). So recording technologies, such as phonographs, recorded the music played in concert halls, early cinema used textual and oral forms of media, in the form of stage drama, as their basis. Early in the history of these emerging media, new forms that became defining

points started to be created as the users and innovators came to map the affordances that the media offered and created new forms.

My suggestion here is that this analogy of one medium becoming the content of another holds true for multimedia as well. So, what do the affordances, the inherent qualities; of multimedia allow us to do? Or, in the context of this research what does multimedia allow school students to do in relationship to writing stories?

Multimedia from a computer user's point of view involves the use, be it in the process of creation or of comprehension, of more than one medium *emerging* from the interface with the computer. This involves images seen on the screen, sounds heard from the speakers, even playback from "smart" input devices that give a response through movement or vibration to the users like the joystick used by aero-gamers (King 2002).

But this is a limited operational way of looking at it, for multimedia sits upon the whole of the creative output of humanity. The content seen on a multimedia computer, what the user actually sees and hears, is related to the technologies that preceded it. This is important because it is the content we can experience and the activities that we can do with a computer that most engage us, whilst it is the affordances of the technology that drive the next set of content. The content of computer multimedia, that blend of image and sound we most associate with it, is a product of the very users of computers. Once again the history of cinema, as a combination of images and sound, indicates how the content of early multimedia reflected the interests of those innovators who designed it as a way to present other previously known forms of media content (Monaco 2000).

The history of the creation of digital image, which started with SketchPad (Jordan & Packer 2001) and Engelbart's famous demonstration (Englebart 1968) shows that reproducing images and sounds was among the early goals of computer research. Initially the only input devices were not text but such rudimentary devices as punch cards that also provided the output. These forms and devices were intermediary and display the reliance of the computer on the extant technology of the page to convey information. In 1968, before any of the popular computing manifestations of Apple, IBM and Microsoft had come into being; Alan Kay's DynaBook was conceived as a multimedia device. A range of concepts we now associate with

computing were contained within this early prototype of the personal computer, although it was never actually built (Jordan & Packer 2001). Kay pioneered the idea of a graphical user interface (GUI) as a way of presenting information on a screen through icons, menus and windows.

Interestingly, and importantly in terms of this research, Kay aimed his device at children as users, and saw the GUI as reflecting the way they might think. Kay's ideas, and further research (Kay & Goldberg 1977) at the famous Xerox Palo Alto Research Center led to the implementation of GUIs by Apple in the Macintosh and later by IBM and Microsoft with Windows. The ubiquity of the GUI sometimes hides the deep ideas and concepts that make it possible. We take for granted that an image stands for a process that the computer will undertake – such as the movement of money around in a bank account or the printing of a document. Our ability to interact with these images forms the basis of hypermedia.

C. P. Snow (1969) introduced the Two Cultures debate 50 years ago with reference to the divide between ways of 'knowing' in the Humanities and in the Sciences. But there are another two cultures at work in the development of the electronic revolution, on the one hand engineers, on the other people like William Gibson's artboys (Gibson 2001). The engineers are intent on finding better ways for us to work; for example, Bush wanted to be able to better handle all the information available to a scientist in 1945 – he thought it was growing too fast to keep up using the available recording technology. Similarly, Engelbart was keen to augment human intellect and saw computers as a valuable tool. Such powerful motives influenced other engineers and designers until multimedia computers became widespread. The artboys and artgirls were also interested in these devices, but their motives were not so much to mirror the way we *think* as to mirror the way we *feel*. To the engineers, being lost in the information was a problem to be overcome; to the artists, being lost in the datasphere could be reflected as part of modern existence and the alienation of the individual. Snow saw this optimistic/pessimistic division between the literary figures of his time and the scientists.

Hypermedia

The following online (indeed hypertextual) encyclopaedia definition (Wikipedia, 2009) provides a succinct encapsulation of the phenomenon from which to begin:

> Hypermedia is used as a logical extension of the term hypertext in which graphics, audio, video, plain text and hyperlinks intertwine to create a generally non-linear medium of information. This contrasts with the broader term *multimedia*, which may be used to describe non-interactive linear presentations as well as hypermedia. It is also related to the field of Electronic literature.

Previous mention has been made of the notion of 'literacy' as a contested term. The same can be argued for hypermedia, although the nature of the contestation is somewhat different. Where the challenges with literacy are often concerned with political correctness, the maintaining of standards, and attending to rules, the challenges around hypermedia are more to do with keeping across new links and inclusion and possibilities. Hypermedia holds the promise of literacy without having to learn to read and write in the traditional textual sense of the term (Tuman 1992c). It offers the acquisition of another use of language, a secondary use, which can sit alongside and augment, the learning of more formal secondary uses of language.

In Magritte's painting below (Figure 4), as Scott McCloud (1994, p. 28) points out, we see not a pipe, but the picture of a pipe. The combining of text with this image presents the reader with an example of multimedia.

Figure 4. Magritte's The Treachery of Images (1928-29)

Yet this changes again when we digitise the image and insert it into this document (or the screen), so that it becomes instead, data forming the image of a pipe;

what also changes is how that data can and will be subsequently be ‘read’ and manipulated.

Figure 5. Manipulated versions of Magritte’s The Treachery of Images (1928-29)

That’s not a wet pipe. This is a wet pipe.

The very act of digitising an image – what Manovich (2001, p. 117) calls “transcoding” – is, however, more than just the creation of another version, or a representation. It becomes a re-presentation. Even so great an undertaking as the act of moving from the handmade books of the Scriptoriums to the printing presses of Gutenberg does not provide an analogy capable of conveying the extent and nature of the changes involved when media are digitised. Certainly Gutenberg was able to make many more copies of a work than was previously possible and at a far cheaper unit cost, but the form of the object remained fundamentally the same. If one were to transcode those texts into digital images, the material would be completely reconceptualised. It could be manipulated further, the manuscripts indexed by adding information so that all the images of pipes from the margins could be found. It could be animated and made interactive, allowing users to make a series of choices about how they want to proceed through this new medium. Other parts could be added, such as the annotations and glosses of other versions of the manuscript. The words themselves could be digitised and turned into computer text, ready for further manipulation.

In line with Green’s notions of the dimensions of literacy, it is suggested here that hypermedia may be considered in both an ‘operational’ sense and a ‘cultural’ sense. The operative sense entails much that has already been discussed. The story of hypermedia informs much of its present use. The creation of the Internet, and the later adaptation of a hypertext system to use it called the World Wide Web allowed hypermedia to develop as an open system. An open system relies for its existence on the input of material from its environment; this material is then transformed by

processes within the system and output back into the environment. Feedback from the environment provides the system with information that enables the system to function continuously in response to any environmental changes.

In the hypermedia open system information is input, transformed and output in the form of text, music, images, movies or documents that incorporate all of these media. The way in which it is viewed via a GUI means that the Internet itself is now a form of hypermedia, with interactive sound and images that move or make noise to guide the viewer as to their use or potentiality.

The cultural dimension of hypermedia lies in the user's ability to explore and manipulate the technology that results from the operative dimension. The computer is not merely a utilitarian device for the accomplishment of activities. It has always been a source of play; it was no accident that the first program Bill Gates wrote was a game (Wallace & Erickson 1992). An early use of computer networks involved the creation of a multi-dimensional dungeon object oriented (MUD/MOO) for interactive game play: the provision of a place that only existed in the computer, where individuals could log on and through a textual interface, read and write commands synchronously, and so explore and interact with a created environment. The MUD/MOOs were collaboratively written and developed by teams, and in this sense were created by the users themselves as they explored and talked about the technology through their keyboards with each other.

The development of computer processors saw the speed of calculation and consequently of presentation increase, and the spread of monitors and sound devices saw the emergence of hypermedia games. As the media of one technology becomes the content of the next development, the hypermedia games that emerged became the moving noisy versions of the previous text-based systems. Instead of a written description with a set of text commands – move right, type N to move north – the user was given a GUI, often consisting of a view into a virtual world ahead – the eternal first person – with a series of buttons or menus to use, or even just the cursor on the screen representing the position of the mouse.

These hypermedia games were and still are designed to be immersive, to take the user into the world of the game and accomplish tasks, solve puzzles, explore and interact. In one sense they are like the immersive world a reader enters whilst reading

a book or watching a film. There is a relationship between these three media – the book, the film and the game – that is of much interest to this research. What are the similarities between them? What is the same about the experience and what is different?

It is the contention of this research that the answers to these questions can form the basis for a re-engagement of students in their learning. If students can find these games immersive and able to hold their attention, if these games can inculcate, as it were, a first level language in the cultural lives of these students, can the same principles, employing the same technologies, be applied to classroom teaching? Could this application be used to extend their literacy potentials? The now famous metaphor of Prensky (2001) that more contemporary generations are natives to a world where digital technologies are commonplace is useful in this context as well.

The theory and argument concerning hypermedia, its nature and place and role in the development of literacy is vital and ongoing. It seems almost inevitable that our young people will pick up on this digital literacy as a way of communicating and working, and that learning within a school environment might be advanced and benefit from the adoption of these ways of working, but what do we know of this from existing literature?

When it comes to explorations of the use of hypermedia within the school classroom, or at least as it was ten years ago when this study got under way, there was very little work going on in classrooms. The following section, highlights what was known at that time

Research into hypermedia in schools

When the National Literacy and Numeracy Plan for Schools was introduced in 1998, the focus in the majority of classrooms in both primary schools and high schools moved towards the more formal and functional testing of skills and school-based knowledge. At one level, as a teacher of English, I was left in no doubt as to what was expected, but at another level came an awareness of what was now possible; and there was a mismatch between the two.

A proportion of my twelve, thirteen and fourteen year-old rural students had 'failed' to develop the traditional 'essential' literacy skills; despite eight and sometimes more years of schooling, they could read and write at only very basic levels. As noted earlier in this chapter, The Australian Bureau of Statistics suggests that more than 40 per cent of the population operate at less than the 'minimum required for individuals to meet the complex demands of everyday life and work (ABS 2006). The intensified application of yet more functional skills-based lessons with more and more testing seemed unlikely to improve their success, though it did seem likely that it would increase their disenchantment and boredom with school in general, and with my English lessons in particular. A tentative introduction of computers and computer-based learning games into lessons, however, had resulted in an increase in the students' interest right across ability levels. A closer examination of my own use of computers and computer-based learning games in my own schools is included in the Case Study chapter. Here, in the present chapter, I explore studies that suggest computers and hypermedia might be used in a sound educational way in middle years classrooms.

Hypermedia in Australian schools in the late 1990s (and indeed subsequently) was seen largely as a device for supporting students in *finding* information. It was, and still is, regarded as a sort of contemporary super-encyclopaedia that exists on a disk and is read off a screen. Although broadband has somewhat changed this, in the past hypermedia typically came in the form of a commercially-packaged, software program that would present facts, figures, pictures, images, and even music and sound, that teachers might use to support students in their project work in subjects right across the curriculum (Ayersman 1996; Vrasidas 2002).

The use of these packages could also support the production of professional looking textual folios that could be delivered in an increasingly polished way on computers, again with the use of other readymade writing, drawing, and desktop publishing packages (Ayersman 1996). For students to produce 'polished' portfolios was almost always a winner with parents. The use of such packages and the high quality of the documents which they enabled sometimes hid the fact that some children had minimal skills and little understanding of how, what or why they were putting things together; that the end product looked polished and professional was enough (Najjar 1996).

My interest at this time was rather different. I wanted to use hypermedia to support the capacity of students to tell stories, to create narratives, to play with their imagination and let their ideas fly. I was particularly keen to use hypermedia to help students who were hampered because they couldn't read or write very well with traditional texts, even though, as I knew very well, they could still tell stories. With the aid of hypermedia, could they create artefacts that presented and preserved their own stories? I was interested in using hypermedia to stimulate what might be seen as the traditional province of the English composition class.

This division between hypermedia as a means of consumption of ready-made products and as an aid in producing something new has been noted by both Ayersman (1996) and by Najjar (1996). Becker (1994) and subsequently Beavis (2002) discussed the trend with which I saw my work becoming associated, that of using hypermedia and multimedia as stimuli for creative work, particularly work that might be seen as more closely related to film and cinematography.

As was implied earlier in this thesis there are two ways in which to approach educational research into hypermedia and hypertext: to view it as a consumer product in and of itself, or to see it as a means to produce a software product (Ayersman 1996). The consumer approach sees hypermedia as commercially-produced material that is used by students to gain information – facts, pictures, images, music and sound. Teachers can also discover material in this way, and tailor it for particular local needs. The research into this area is generally favourable, though with qualifications: "multimedia information helps people learn – sometimes" (Najjar, 1996). It was found that multimedia worked best when it encourages the dual coding of information, that is when the media elements support one another and when the multimedia is used by learners with low prior knowledge. The use of the Web has seen a marked increase in multimedia entering classrooms. WebQuests and Hot-Lists are a positive attempt at creating a systemic method of using materials in effective and educationally meaningful ways.

Alongside the interest in multimedia as a source of knowledge and a teaching aid is the use of video or computer games as stimuli for English writing classes and also as 'text' worthy of critical examination (Beavis 2002; Becker 1994). This trend has grown as a natural offshoot from the convergence or remediation of material that

sees novels become films that then spawn comic books; these can then evolve into computer-based games played on consoles and television screens, or as part of existing computer systems and even into small handheld computer devices. This process can start with any form of media. So Batman Comics become films then novels then games; Final Fantasy games become films, then comics then printed novels.

The second approach sees users as producers; the individual student constructs or designs software to share with other learners or as an end in itself. Ayersman (1996, p. 515) describes this approach as using hypermedia as tutee and holds that "active learning theory, constructivism, constructionism, and many other theories of learning that have at their core the axiom that learning is doing are particularly suited to using hypermedia in the role of tutee". Proponents of constructing hypermedia have been very enthusiastic in their support for it as part of education. Papert (1993, p. 72) opines that such activity is "intellectually exciting and joyful in its own right". Other authors make similar points, so that, for example Marcus (1993) speculates as to whether it "is worthwhile asking ourselves if the personal excitement and satisfaction that come from working with HyperCard are not best shared by giving students themselves the tools rather than a finished product". McMahon and O'Neill express similar sentiments:

> The magic comes because children are operating with digitised sound, digitised graphics and digitised text; in this form, the sound, graphics and text all become fully manipulable, they can be cut and pasted, twisted, turned, repeated, and linked in any number of ways. (1993,p.67)

The discussion of hypermedia and hypertext is only decades old. The replacement of CD-ROM and local networks with the Internet (and in particular the World Wide Web) for the delivery of multimedia content has happened on a large scale in only the last decade. Hypermedia's impact on education is still very much being investigated, though the consensus, as noted above, seems to be positive. At the time that the current research began, hypermedia's impact on the English curriculum was almost unknown (Snyder 1996) and there are indications that since then it has been generally avoided, ignored or resisted (Durrant 2001). Russell (1997b) suggests

that the concentration of hypermedia in the Science and Social Science areas of the curriculum, with their emphasis on information gathering and retrieval, and their evaluation on utilitarian aspects of cognition, has hampered its adoption by the English Language educators, who might be more interested in the expression of ideas and the nature of the communication itself. The increasing interest in new media (Kerin 2008) is perhaps an example of a change in this trend. Still, hypermedia and hypertext use in society and education is still in its infancy though a small body of research into its use in the classroom has started to emerge. Much of the research is anecdotal and observatory, though some studies have more elaborate designs.

Turner and Dipinto (1992), in their study of Grade 7 students, employed HyperCard to create multimedia research projects on mammals as part of the science curriculum. The researchers' purpose was to answer several process-oriented questions, especially concerning the benefits of investing the necessary time in learning the software. They were also interested in some social and affective questions regarding student and teacher interactions as well as content-specific questions as to whether this form of learning might offer new insights to the students either in the science curriculum they were working with, or in the process of writing about it. Turner and Dipinto (1992) outlined four sources of data: participant observations, teacher interviews, student reflections and an analysis of student's 'stacks' (name given to HyperCard documents – also used with HyperStudio). The conclusions were generally very favourable in that all the students mastered the program sufficiently to produce a stack, and the benefits in terms of an increase in synthesis skills was noted by one of the teacher researchers. Student interactions were positive and co-operative. The researchers did not notice any appreciable enhancement in the *content* learning but they did unexpectedly find that the students developed greater appreciation of writing skills, especially regarding such notions as breaking long streams of information into manageable chunks. The students were also very aware of revision and editing, probably because of the shared nature of the activity and the acute proximity of their audience – the other students. One student commented, "going through HyperCard is like going through someone's mind".

A second study, conducted by Lehrer (1994) investigated the effectiveness of students designing knowledge collaboratively using hypermedia in encouraging "students to think about how to represent an idea, to think about how to link different

representations of an idea, and to think about relationships among ideas". The researchers instructed a class of Grade 9 American History students in a hypermedia program called HyperAuthor (Kaindl 1991) with the goal of the students developing a hypermedia presentation as an educational tool for their peers. The researchers described their instruction method as scaffolding, a term I was to use myself later. The study was evaluated by examining student discourse (through videotaping), surveying the students' perceptions of design, of their mental activities, and by assessing their competence with HyperAuthor. The results showed that students increasingly became less engaged in off-task behaviour as the project went on. The researchers also claim "students participating in design activities seem to explore topics more deeply, converse substantively about the topics, develop personal interests and involvement, and begin to develop critical standards for knowledge".

Toomey (1995) examined multimedia as a cognitive tool and described three case studies – two Australian and one American – in which primary school teachers and their students used multimedia technology in the classroom. The case studies revealed that the very function of multimedia on the computer and the purpose of the activity (which was to present information) can lead to a situation of mediated activity, where the students' peers and the teacher are drawn together into a collaborative working environment.

All these studies focused on subject areas other than the study of English and involved students working in groups. Some researchers in English curricula have focused on a Literature approach to hypermedia in which the students were involved in creating multimedia presentation of existing texts such as *Hamlet* (Reed & Wells 1997) and *The Masque of The Red Death* (Harris & Cady1988). Again, these projects were group-based.

Work was also conducted by Chen & McGrath (2003) with high school students using hypermedia. The students used the program StorySpace (Bolter & Joyce 1987) to construct hypermedia, and the researchers were concerned with the process of knowledge construction. Haviland and McCall (1999) outline how they adapted their curriculum with the program HyperStudio (Wagner 1993) (the software used in this research). Eighth grade students in an English classroom used hypermedia instead of paper as part of a bibliographic word definition research assignment.

According to Haviland and McCall (1999, p.65): “In doing so, students move from being passive consumers and users to very active designers and producers of that information.”

Others have approached hypermedia as a tool for the creation of the student’s own work, which is the area of the current research. A study from the United States by Wilhelm (1995) followed the experience of three students as they improved their writing skills and learned to enjoy research. The author used HyperCard with the students to construct Personality Profiles, a ‘stack’ on Psychology and another as a Cultural Journalist. Aside from technical problems of availability and number of computers, software learning on the run and the inevitable disk crashes, the outcomes were generally favourable. The students were able to master hypertext sufficiently to produce their own stacks. The researchers noted the increased enthusiasm of the students for their work compared with traditional methods, and remarked on the development of critical literary and research skills and collaboration with each other, even though this was not a group activity.

Two other studies introduced HyperCard to all-girls groups in the UK. In the first study (Buckingham & Sefton-Green 1995) students were given some background on story writing and some instruction in the use of the program and asked to complete hypermedia stories. The researchers found an initial problem in this approach: “Which comes first: the ability to write in non-linear narratives or the experience of reading them? Could the students invent non-linear narratives without being competent users of the technology” (p. 54) The students had no obvious cultural forms to imitate, even so they were able to collaboratively create a range of interactive stories, though some were more interactive than others. It was noted that some groups did not grasp the non-linear potential of the program. The authors noticed that the program forced the students to be explicit about a how a reader might view their work. They also suggested that the students’ “engagement with the work clearly took it beyond a mechanical exercise in narrative construction”.

In a study similar to Buckingham and Sefton-Green’s research, Russell (1998a; 1998b) used the program StorySpace to create interactive stories with Australian classes at Year 8 level. Russell, like almost all the authors previously mentioned, stressed the collaborative nature of the exercise. He was also concerned with the

impact that hypermedia pedagogy has on teaching and learning, as well as such "school" issues as assessment, homework and authorship. A further aspect of this study, one that is echoed in Jordan (1997), is the explicit use of multimedia elements such as colour, images and pictures to convey meanings in a similar way to text. This is a movement that reflects the influence of the Internet and modern youth 'cyberculture'.

All of these studies gave support to my belief that to use hypermedia with students of year 7 and year 8 would have beneficial outcomes. Perhaps the main difference between the studies above, and my own proposed work that was these studies were undertaken by experienced researchers, largely working as researchers with selected groups of students, all be it within real classrooms. My challenge was that I was primarily a teacher of English and – only a beginning, developing researcher, and I had to work as a teacher with full classes as part of the normal curriculum.

The final section of this literature review turns its focus to the location for this study. It highlights the development with in and nature of the middle or junior high school in which this work was positioned, and asks what is known and documented concerning why this level and stage of education might be appropriate for the introduction of hypermedia as a means of creatively telling stories and developing literacy.

Middle Years Schooling

This section suggests that the Middle School movement developed out of a deep sense that the existing organisation of schools was not engaging with young people; that there was a disconnect between what was going on in the classroom and the interests and concerns of the students themselves and the larger needs of society. To support this argument I give an outline of the history of the Middle School movement and the ideas and concerns behind it. I then look at how government policy has reacted to these concerns.

Middle Years or Middle Schooling is the shorthand term given to a collection of educational ideas and movements (Chadbourne 2001) which focus on students in

the later years of primary school and the junior years of secondary schools, roughly 10 to 14 years of age. Middle Years Schooling incorporates a philosophy of education that goes beyond the ways in which surrounding secondary schools operate and teach (*Teaching and Learning in the Middle Years in the ACT* 2005). The Middle Years movement looks deeply at the transitions facing students as they move from one way of teaching and schooling to another. The early or primary years are typically concerned with the learning of literacy and numeracy, with learning how to learn and with the development of social skills. The senior years, on the other hand, are concerned with the ways knowledge and information are organised into discreet subjects and disciplines; with completing what is considered in our society a 'basic education'; and with the transition to higher education or the workforce. What happens in the years in between, what should be the concern of these middle years, and how a curriculum should be arranged is a long debated and continuing issue.

For many years there has been disappointment at the achievements and behaviours of young people in schools as manifested in low achievement levels, behavioural problems and truancy (Hill & Russell 1999). This has been particularly the case in secondary schools, where it has almost seemed as though such problems emerge immediately that the students reach this level where a more rigid style of traditional schooling is the norm. Increasing expressions of disenchantment amongst educators at senior school levels and from tertiary educators as to the efficacy of the schools in supplying literacy and numeracy skills supports this popular image of problems in the educational system (Donnelly 2004; Leigh 2005). The wider media and political debate has also expressed concern at the seeming lack of skills amongst young people, and this is coupled with a generational concern with behaviour problems, especially amongst boys at this age.

Such reactions to change are not surprising. In the primary school those students were the senior members of the school community and were often looked upon as responsible leaders by the teachers, looked up to by their juniors; they were young people to be admired and emulated. Then, at the height of their growth and achievement they are moved back down to the bottom of the hierarchy at secondary school. Here they become the juniors once again, and this time in a far larger environment, and with the prospect of at least six more years before they can reach the same level of prestige and respect. Where primary classes tend to spend the majority

of their time in the one setting and with the same teacher, the far more impersonal nature of large secondary schools sees students having to experience a now crowded curriculum – too many teachers and too many different subjects. Secondary schools can see a student having to cope with up to fourteen different subjects and teachers in anyone week (Groundwater-Smith 2001). Very importantly, this is also a time of major transition within the students' own physical and emotional lives; of puberty; of the defining of personality; and of the need for reestablishment of important personal relationships.

Teachers actively involved with the middle years have expressed their concerns with the efficacy of current schooling for these students. There is concern that for some able students the middle years are wasted years because they have already learned basic skills, so they might better spend these years embarking on the discipline-specific learning necessary for undergoing higher education and taking up a professional role in society. In addition there are concerns with the other end of the ability spectrum, where it is felt that middle school years are far too focused on moving students into more formal discipline-based study with a consequence that some students get left behind, become disenchanted and, long before they reach the senior years, lose all interest in formal education (Tyack & Cuban 1995).

In my own work as an educator, the middle years are of particular interest because of the opportunities they offer. Middle years students are familiar with the school system, they typically have basic literacy skills, and they are often open to and eager to take on new learning. It is, I have found, a time of promise and possibility, and my own interest in computers and in the worlds that working with computers opens up has fitted well here. Although on the whole students have spent little time using computers at school to explore the world, they are often more computer literate than many of their teachers and keen to improve their skills. Yet despite the opportunities that such a willingness to seek new knowledge seems to present for teachers much that has been written about these middle years seems chiefly concerned with the apparent difficulties they present.

The identification of adolescence as a stage of development in particular need of attention began to gain currency after 1945. In the United States junior high schools came to constitute the majority of secondary schools shortly after World War II. These

schools introduced a broader range of exploratory, *tryout* courses and activities in order to assist young adolescents to discover and develop their interests and abilities. Junior high schools were also the source of other educational innovations, including extra-curricular activities, and core curriculum approaches emphasising the correlation of subject areas and the integration of learning across subject and disciplinary boundaries (Tyack & Cuban 1995).

Despite the innovations and successes of junior high schools in the United States they eventually became the target of increasing criticism for adopting rigid curricula, grading systems, large size classes, tight schedules, regimentation and essentially a very impersonal climate, so typical of so many senior high schools.

In the 1960s, when Britain and Australia were looking to reorganise aspects of their educational system, the idea of 'middle school', with similarities to the early American Junior High was dominant. In Britain Middle Schools appeared in the 1960s and were strongly motivated by a need to improve the transition from primary to secondary schools as well as meet the particular needs of children in these middle years. (Hargreaves 1986). Accompanying this drive was recognition that some of the rigidities of the later American junior high schools must be avoided. The emphasis then was to be on a period of schooling that moved students gradually from the personal and intra-disciplinary approaches of the primary school, to the more impersonal and discipline-based approaches in the secondary system. In particular this transitional period was seen to be a time when students should be encouraged to engage with learning and be interested in a range of topics and areas that they could develop in a more formal way in subsequent educational levels (Tyack & Cuban 1995).

Both in Britain and the US the institution of Middle School, though lauded by many, never really lived up to its earlier promise. In Britain a lack of administrative and financial support was in part responsible for this (Hargreaves 1986). Hargreaves also points an accusatory finger at the two cultures of teachers who were employed in the Middle Schools, the generalists with a Primary background, and the Secondary experienced subject specialists. According to Hargreaves the latter group tended to dominate in pedagogical and curriculum matters resulting in a replication of the Secondary Schools.

In Australia, and particularly in Victoria, real interest in the middle years was generally not manifested in the creation of separate institutions. In the past two decades there has been renewed interest in the middle years as an area of schooling in need of reform. Research in Australia since the 1980s – anecdotal, empirical and observational – has mapped the growing disengagement of students with schooling. This lack of connection with school is manifested in increased truancy levels, behavioural problems and under achievement of all students but especially of boys in the middle school years.

Many of the responses to students' disengagement with schooling are based on theoretical or ideological grounds. Cormack and Cumming (1996a) identify critical theorists' responses that concentrate on perceived inherent problems with school and the power structures of society, psychological responses that focus on the lack of identification some students have with schools and feminist responses that focus on the gendering nature of schools One theoretical viewpoint of particular note is a technological perspective outlined by Bigum, Fitzclarence and Green (1994), which sees schooling as increasingly irrelevant in students' lives. They point particularly to the increasing distance between the more technologically sophisticated wider community and the traditional (that is non-digitally-based) world of the classroom.

Although this present study concedes that there are indeed issues of concern regarding the traditional ways in which primary and secondary schools are organised, the approach taken here is more pragmatic in tone. In seeking an understanding of why the middle years cause such problems with student disengagement, consideration of inherent problems with the system or society as a whole are largely laid aside in favour of a more practical application of pedagogical change in the classroom itself.

This leads into those issues that the Middle Years movement sought to address with regard to what schools taught and how they did it. These are areas that have received criticisms from across the spectrum of educational stakeholders and observers. Traditionalists who emphasise a "back to basics" approach, especially in literacy teaching point to failures to equip young people with everything from good spelling to "Australian" values (Donnelly 2004). Other influential groups in society, such as the Australian Chamber of Commerce and Industry (2007) and both State and Federal Australian governments have been pressing for more vocational approaches,

as well as putting pressure on incorporating societal issues such as drug, sex and sexuality education in to curricula; even sport has its proponents, who see it as a panacea for a range of society's' health problems such as obesity, heart disease and diabetes.

Concerning pedagogical issues, Middle Years advocates opt for child-centred learning (Rogers & Freiberg 1994), for cross-curricula projects and for inquiry learning. The latter has its roots in the work of Vygotsky (1962) and sees the teacher as a mentor or facilitator of learning along empirical, constructivist lines; allowing students, usually in groups, to follow up issues which are of interest to them by posing their own questions and discovering possible solutions. Such methods see student engagement lifted and are particularly effective since the rise of information technologies and the Internet (National Research Council 2000).

Indeed there has been a significant amount of research into the benefits of students working in groups. This is emphasised here because most of the existing literature that explores the introduction of hypermedia into the classroom has been done as group work. The advocates for group work and the researchers and studies that support this way of working are considerable and mostly highlight similar benefits from working in this way. In brief, these studies agree that working in groups result in students being more engaged with their school work, in actually learning more content and in understanding and retaining what is learned longer than when more traditional teaching is used. This has been argued to be the case with respect to students right through the schooling years and it has been argued consistently for three decades. (Sources: Baines, Blatchford & Kutnick, 2008; Collier, 1980; Slavin, 1983; Dalton 1996)

Researchers who have demonstrated support for group work, have, however been well aware that their work will likely be ignored and that those places where it is introduced will be attacked and will need to be equipped to support what they do. Researchers from the 1970s (Collier, 1980) to more recent times, (Baines, Blatchford, Kutnick, 2008) have emphasised the need for teachers, particularly at secondary school level to prepare their lessons thoroughly and be able to defend what they do.

Indeed the need to be ready for critics is well founded for whatever the research into pedagogical issues has shown, actual schooling practice has most often

resulted in highly competitive, didactic, guided learning where all students work according to the stipulated and timeworn "structures and other institutional arrangements through which most schools function" (Levine 2001, p. 1) that form the "grammar of schools" (Tyack & Cuban 1995) and remain deeply entrenched and stifle any attempt at pedagogical reform (Tyack & Cuban 1995).

To address these concerns of transition, curriculum, pedagogy and leadership, Middle Years proponents often argue again for the creation of separate Middle Schools and their proposals entail using whole school approaches to address major concerns of student engagement. In these proposed Middle Schools, issues of transition from one sector to the other would receive serious attention through a smaller more student-centred environment with a stronger emphasis on the facilitation of learning rather than didacticism. The pedagogy and curriculum are all to be reconsidered with a focus on negotiation, co-operation, and a concentration on developing thinking skills. The organisation of the day and the week and the breakdown of classes on an age basis are not to be rigidly set down but should be capable of restructuring to suit the individual needs of students and projects. Teachers and teacher leadership in particular are considered vital and require a substantial devotion of resources to professional development. Many of the concepts of collaboration and co-operation that the middle years encourage amongst student are also for teachers to use as well.

Of relevance to the arguments made here and to this study are these points made in the executive summary of the Victorian Department of Education and Training's Middle Years Research and Development (MYRAD 2002) Project, which says of teaching and learning practices in the classroom that:

This is the most critical area and has been very slow to change. There is a need to move right inside the classroom, to illustrate the actual teaching-learning approaches and practices that are successfully directed to the learning outcomes for the knowledge society, particularly those that:

- strengthen both teacher-student relationships and the challenge of learning;
- ensure learning is based on a constructivist method of learning
- involve students in decision-making about content, process and assessment;

- present authentic tasks that require complex thought and allow time for exploration;
- include processes involving co-operation, communication, negotiation and social competencies generally;
- provide for individual differences in interest, achievement and learning styles. (MYRAD 2002)

(See also Hill & Russell 1999; Chadbourne 2001; Australian Dept. of Employment Education Training and Youth Affairs 1998; and *Literacy and Learning in the Middle Years. Major Report on the Middle Years Literacy Research Project* 2001).

Two major themes immediately resonate between the MYRAD report and my own experience in reading and thinking about middle years reform. One is the need to ensure engagement of students at this middle years level in the classes and through the material they are being taught. If schools are not engaging students, what is? This present study takes the view that the increasing penetration of information and communication technologies into young people's lives may very often be what is engaging students. For teachers to start to use these technologies as integral parts of the school curriculum would be a sensible way to proceed. Secondly, the notion of *collaboration* between students in their learning, which is emphasised by the middle years literature, is a key aspect of this study. The work cited above on the advantages of working in a group is common throughout much of the middle years literature, and resonates with my own experience of teaching middle years students, especially when working with computerised technology and with programs where no student was an expert.

Conclusion

This review of the literature began with attention to definitions of literacy and to how conventional literacies are both protected and contested. In particular, it has attended to how contemporary digital technologies challenge the traditional text-

based ways of communicating and developing knowledge and how our school students, seem to be well in tune with these new ways of communicating.

The chapter explored the basic ideas behind ‘hypertext’ and ‘hypermedia’, which are ideas at the heart of the thesis. It looked at how hypermedia technologies developed and what this might mean for working and thinking differently when teaching literacy in the classroom.

The literature on The Middle Years Movement, and on schooling in the middle years, years 7 and 8 of the secondary school, was presented and the criticisms of much of this schooling, particularly in terms of the rigidity of school structures, the didactic nature of teaching practice and the inappropriateness of subject matter were all highlighted. Some of this literature also emphasised the benefits of students at Year 7 and 8 levels, being in more open systems, enabling them to learn with and from each other and to develop practices of cooperation.

All of this work on how best to work with middle year students supports the introduction of hypermedia into the classroom. Indeed a several studies have been found that specifically show advantages in doing this. They suggest that to use hypermedia with middle school students would have benefits, particularly relating to students’ engagement with tasks and (though less conclusively) to their learning of subject matter.

My review of the literature suggests that my inclination to use hypermedia to help middle year students to tell stories was a sound idea. According to the literature explored above this idea is sound educationally, it is desirable socially and it would likely be technically possible. My task in reviewing the literature, however, is in part to find existing research and scholarship within which to ground the study, but also to seek out what it is that my work might do and add to knowledge in a way not done by previous researchers.

It was clear to me that none of the existing studies had been undertaken by teachers in the classroom, teachers who were also necessarily dealing with the challenges of day-to-day schooling. Researchers, rather than teacher/researchers had undertaken these studies. Also, none of these existing studies were developed with the specific intent to develop a program to introduce hypermedia into the classroom which

could be readily picked up by colleagues and that might become an established part of the curriculum. This desire to develop something essentially very practical was the drive behind the development of an assessment and evaluation tool as part of the study. The literature relevant to this can be found within the chapter on the development of the evaluation and assessment instrument.

Chapter 3: Methodology

Introduction

This chapter describes the search for a way of structuring and theorising the thesis. It documents the eventual decision to choose a 'case-study' approach to explore the teaching and learning of hypermedia in a middle-school classroom, and outlines how particular authors and theory influenced what was done. The chapter also explains the decision to find a way of assessing and evaluating the students' work (the hypermedia stories) and it explains how phenomenography was adopted and adapted as a way forward with this evaluation/assessment exercise.

The first of the major sections of this chapter explores the search for an appropriate methodological framework and the influence of teacher research theory. The second section highlights the 'case study' as a suitable method and its applicability to this thesis. The third section describes the adoption and adaption of phenomenography as a theoretical base for evaluating the students' completed hypermedia stories.

The influence of teacher research theory

The literature around teacher research has been characterised as sitting in two camps (Fishman & McCarthy 2000). Whilst this is probably an oversimplification (Lankshear & Knobel 2004), it is a division that has been useful in helping me to understand my own beginnings as a teacher researcher. In the first camp is the literature, which, it might be argued, stems from the Lawrence Stenhouse school (Stenhouse 1985), and emphasises the very thorough collection of data around a problem and its systematic and serious analysis. It may also entail some triangulation of evidence to aid with verification and justification. This is an essentially deductive approach, where the outcome is seen to follow logically from the evidence. The other

camp, that of Berthoff (1987), instead emphasises coming to knowledge through the practice of teaching and writing about it, and through the searching and re-searching of the teacher researcher's own professional work, understanding and knowledge. This is a more inductive approach, where reflexive insight into a problem plays as big a role as attention to the data. Berthoff argues that this dialogue with ourselves, or with colleagues, and with the larger literature helps us to 'shape' our understanding of what is happening and of what is meaningful and worthwhile. Order and sense in a professional situation are uncovered through writing about the practice, through reflecting on the writing and the practice, and by searching and researching other relevant practice and literature.

At the beginning, it was the Stenhouse school that exerted the most influence on the research work. For me, and for the academic staff who initially supported me, research – bona fide scholarly research – was associated with systematic data collection and the equally systematic measurement of outcomes. Any attempt to understand the effect of hypermedia on middle year students' story telling would have to involve comparing storytelling resulting from teaching via a traditional method with learning outcomes via the hypermedia program. Examples of pupils' stories prior to the hypermedia intervention and examples of subsequent hypermedia work might be compared and considered by the researcher for a number of features, perhaps with other assessment input from other teachers. Information about the students themselves might also need to be collected so as to enable the categorisation of the students. Comment could then be made on which students, or rather, which category of students, most or least benefited. A research plan along these lines initially made sense and appeared to be satisfactory both to the university in which I enrolled as a research student and to the secondary school in which I wished to do the research.

After some months, however, this type of a systematic approach seemed inappropriate. I realised I was not been interested in a close comparison between ways of working with stories in the English class. I was much more interested in tuning in to the way the students, particularly the less traditionally literate students, worked with this different type of literacy and what if anything, they produced and how they reacted. The retirement of my initial supervisor and the introduction of a new supervisor to the project supported and activated this change. As a result, the project crystallised into an action research project, the focus now being on the cycle of action,

review, planning and action again. The project had ethical clearance from the University. The main issues were informed consent of the students and their parents and guardians and the need to not disadvantage any of the students who decided not to take part in the hypermedia classes.

The literature concerning action research (Kemmis & McTaggert 1988; Macintyre 2000) emphasises the need for at least three cycles of action, review and replan before the drawing of conclusions as to what does and does not work. Life in (and indeed outside of) classrooms is unpredictable, and events intervened that made it apparent that the completion of three cycles would not be possible. Two cycles of teaching were completed, one with Year Seven students and one with students from Year Eight, but personal circumstances and developments at the school meant that no more could be accomplished. To complicate matters further, the outcomes and consequences of these cycles were challenging. Although I felt I had learned a good deal through the process and had better taught the second cycle more effectively, the outcomes of the first intervention were at least equal and in some cases superior to those from older students in the second intervention. It was difficult to see how this cycle of action, review, intervention and action was actually operating to improve learning. It seemed that the focus should be more on the students and their learning and less on my teaching and me.

Following the completion of the research, and after I had left the school, I was faced with a second change of supervisor and a further new direction. Exercises of inquiry into my more recent concerns and misgivings and my original hopes and intentions for the project marked this stage of the study: why was I doing this in the first place, and what was it that I had originally hoped to achieve? A period ensued in which I revisited teaching notes and journals written at the time of the early research work, and during which time I reflected on what had been done and achieved and how I now saw and thought about it. This was followed by an exploration of the development of my own professional understanding, and what now seemed important in the work; what it was that, in retrospect, was significant in the project, and which aspects should be more deeply delved into. Working in this way led inexorably to an acceptance of the influences of the writings of Berthoff (1987), discussed above.

It was becoming clear that my interest did indeed lie in the outcomes that students achieved with hypermedia and with the quality of their learning experience. Yet, I was also keenly interested in the *way* the students worked with the task and I was certainly more keenly interested in these aspects of the work than in my own teaching of it. It seemed as though it was the students' avid interest that drove the process rather than my own teaching, and this excited me because this was in sharp contrast to the process of the traditional English story writing class.

Emergence of methodological direction

Two related foci for continued research emerged. The first was an exploration of how the students worked with the assignment: what they did and what they learned and achieved, and the beneficial and detrimental outcomes they experienced. The conviction grew that working with hypermedia held great potential with middle years students – that is, students in Years 7 and 8 of secondary school – as an effective tool to support their storytelling, much more so than the traditional English creative writing class. Yet since there was little or no existing research to support such a conviction, a strong case had to be made for introducing hypermedia, and some indication of how best to approach such an innovation needed to be offered. It began to seem that this work I had undertaken might be the beginning of a significant body of work that could make such an argument.

Of course, the related issue of how to make an assessment of the resulting hypermedia work did not escape my attention. If hypermedia were to come into use in contemporary classrooms and be taken seriously as a subject within the formal curriculum, a way of thinking about its assessment would be necessary. In the growing climate of literacy assessment and testing, any lack of demonstrable efficacy could seriously hamper its adoption. So the question arose, how might hypermedia work be usefully and reliably evaluated and assessed in the classroom? This question is picked up and explored later in the chapter, under the heading 'Assessment of student hypermedia work: Phenomenography'.

Case Study theory

Two pieces of work have been particularly influential in the selection and application of a 'case study' approach to this research project. The first was a case study written by Asmussen and Creswell, entitled *Campus Response to a Student Gunman* (Creswell 1998) and the second was the work of Yin (2003). Yin writes in detail about the application of the case study method, and his work guides the structuring of this section of the research in ways that will be discussed shortly. Without doubt, however, it was Asmussen and Creswell's work (1995, p. 1) and their proposal that an "in-depth qualitative case study exploring the context of an incident can illuminate ... conceptual and pragmatic understandings" that initially influenced my selection of the case study as the primary methodological approach to this research. Their account demonstrates how an event abounding with unpredictable elements and with unforeseen challenges can be used to undertake research. Important too is the act of attending to the small things; paying close attention to seemingly unimportant details, and then reflecting on these things. It is an approach to research that resonates with the work of Berthoff, who argues that sometimes it is the close examination of information we already have which is necessary, rather than the further gathering of information:

> Research means looking – and looking again, we do not need new information; we need to think about the information we have. We need to interpret what goes on when students respond to one kind of assignment and not to another, or when some respond to an assignment and others do not. We need to interpret things like that – and then to interpret our interpretations. (Berthoff 1987)

Bent Flyvbjerg (2001) also makes a series of compelling arguments in favour of case study research, which appear particularly pertinent to the current work. Firstly, he emphasises the argument for the close attention to detail (the sort of context-dependent detail which is to be found in the case study). Accompanying this is the constant grounding of the researcher in the details and context of the research, which

helps avoid the potentially mechanistic and stultifying processes sometimes associated with both conducting research and undertaking classroom learning. It avoids the situation where the researcher or the learner is influenced by some distant method or theory and embarks mechanically on a track which all too readily moves along a blind alley, and at the end of the process the researcher is not at all clear of the effectiveness or usefulness of the activity. Such an image resonated particularly after my false start.

A further major thrust of Flyvbjerg's argument is that predictive theory is actually very hard to find in the social sciences, although on the other hand, learning is very possible and common. People learn very effectively, and observing this learning through the detailed analysis of case studies can be a most informative process in itself. Indeed, there is the potential for double learning: the learning of the skills of the researcher in performing the observation, and the learning of the student working on the set task within the case study. So, whilst theoretical understanding and general rules and principles may sometimes guide the search for insight and learning from case studies (which is Berthoff's argument), it is also important to explore case studies to consider where expected theories and rules just do not apply. Flyvbjerg cites his own work on governance in Aalberg, Denmark. As a neo-classical economist, he began this work expecting to uncover the detailed processes of a Western city governed by the principles of democracy and the free market. Instead, he found a local business community of power-mongers, engaged in illicit deals and in blocking competition. The only place that the underlying ideals he expected to uncover existed was in the rhetoric. It took his case study, however, to show this, and to suggest that many of the ideals of contemporary Western governance actually constitute no more than mere lip service to a predetermined pragmatism.

The case study then, appeared to hold the promise of enabling a nuanced view of my intervention with hypermedia. Such an intervention need not be driven by a theory, even theory in the 'softer' sense of general explanation, and this was attractive. Whilst, as Berthoff suggests, some 'theory' or series of principles could be used to guide the interrogation of the case study, there was no impetus to understand the case study as a rule-driven event. Yet, although the work discussed above provided important and convincing reasoning that the 'case study' approach was a useful one to adopt in the research, it was the sound advice of Yin (2003) regarding method that

offered close guidance for thinking about and working through this aspect of the study.

Yin offers three conditions for the selection of a case study approach: the first is the discernment of a bounded case, where questions of how and why can be asked; the second entails the researcher having some limited amount of control over events; and the third is that the event explored happens contemporarily to the exploration in a real life situation. All of these conditions appeared to exist with respect to my research. The proposal to employ hypermedia in the classroom was certainly a bounded case. As a teacher I certainly had some 'limited' control over the events and the events and the research were certainly contemporary in nature and a real life event.

Yin also suggests six steps for establishing a firm structure for working through the study, emphasising that although case studies will often explore events and situations where things do not go to plan or as generally anticipated, this does not mean that planning should not be done. It is only with defined expectations and planned data collection that researchers achieve clarity when situations do not go as expected.

It should not be inferred from the following discussion that Yin's steps guided the initial planning and undertaking of the intervention. As has been explained, the hypermedia intervention was originally planned as an action learning project. Yin's steps were, however, crucial in retrospectively positioning the project following the false start, and in subsequently framing and interpreting the collected data. In the following chapter where the case study is reported, it will be argued that much of the preparatory material and the evidence gathered for the original action research analysis fit within these six-step guidelines.

Yin's first step is the establishment of a clear focus, through the formulation of a series of questions to ask of the situation or case. Each question is likely to lead not to a single simple answer, but to a more complex interlinked series of social, political or historical issues, or to further questions within which the overall study can be positioned. Case studies usually begin with simple "how" or "why" questions, and whilst these questions are internally focused and limited to the issues at the heart of

the ‘case’ under investigation, they will be questions that are informed by previous research, by reading of relevant literature and by consideration of existing practice.

The second step involves the selection of the case or cases, and the making of decisions concerning the ways in which information will be gathered. While a single ‘case’ or a series of ‘cases’ can be examined, each ‘case’ should be considered individually. The place of each ‘case’ in the overall study should also be clear, or as clear as possible: for example, the ‘cases’ are being selected because they are typical, or because of their atypicality. The nature of the data to be gathered will also be determined by the overall aim of the exercise, but just what is to be collected should be thoroughly planned and thought through before the study begins. A key strength of the case study method involves using multiple sources and techniques in the data gathering process. The researcher determines in advance what evidence to gather and what analysis techniques to use with the data to answer the research questions.

Yin emphasises the importance of ensuring construct validity, internal and external validity, and reliability at this stage. Construct validity involves the positioning of the research within a conceptual domain, and requires the application of correct measures for those concepts being explored. Possible problems of perceived subjectivity are countered by 68isualiza multiple data sources and by eliciting comment and review from qualified respondents outside the study. Internal validity involves the discernment of patterns across multiple pieces of evidence, from a range of sources being brought together consistently through 68isualizat causal links. External validity points to the extent the case will likely be 68isualization across other cases in the established conceptual domain. Reliability refers to the stability and accuracy of the overall measurement and is perceived through the repeatability of the outcomes of a research event over time. Case studies can be used in quantitative and qualitative approaches to research.

Some researchers adopting a qualitative approach would question the relevance of terms such as validity and reliability, and assume them to be rooted in a positivist perspective on quantitative research. There has been, however, a good deal of discussion concerning the place and validity of qualitative research and the seminal work of Nahid Golafshani (2003) is relevant here. His article ‘Understanding reliability and validity in qualitative research’ highlights some of the more compelling

arguments around this issue. He 69isualizat that the overall aim of researchers is to establish their trustworthiness, and to do this; they must consider how they are working and how they can convince others of the rigor of their research. He argues for qualitative researchers to show how they have addressed issues of bias and thoroughness, and highlights work that is exemplary in this respect. One method of so doing is to employ the practice of triangulation, "a validity procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study" (Creswell & Miller, cited in Golafshani 2003, p. 604). As stated above, eliciting aid from others in interpreting data from different perspectives at different times and locations can also be helpful in this regard. Whether a researcher talks of and sees themselves as engaging in issues around validity or reliability, or around truthfulness and rigor, this is the time in the planning of a case study when the researcher should consider how he will convince the reader of the trustworthiness of his work.

The third step relates to preparing for the collection of data. The case study has the potential to generate a huge amount of material and this can simultaneously be a strength and a weakness. The latter is especially the case if adequate steps have not been taken to support the handling and storing of the data in a systematic and readily retrievable way. Yin draws the distinction between field notes and 'on the spot' evidence on the one hand, and associated documentation on the other. Associated documentation can be collected, explored and then stored in advance, but systems must be in place for the material generated at the time – the field notes and 'on the spot' evidence – to be kept in such a way that subsequent retrieval and analysis does not become problematic. Yin 69isualizat the need to collect data from a range of sources so as to enable a triangulation of evidence and analysis. It is also important at this stage to think through likely problems and issues that might arise and design responses to such issues. The preparation for data collection also entails the development and discussion of rules of confidentiality, and of actively seeking opportunities to discuss all aspects of the study with those involved. This includes the seeking of formal permissions and the sharing and possible honing of a set of research questions. Throughout this planning time, Yin 69isualizat the need to keep returning to the research questions, since with all the possibilities that the case study affords for the collection of data it is easy to overload the study with documentation in the false

belief that the quantity of information in itself provides validity. It becomes a risk, too, that the researcher may 'drown' in too much data and lose sight of the original purpose of the study.

Step four is the collection of data itself which, as already stated, Yin suggests should be collected from multiple sources of evidence and comprehensively and systematically stored in formats that can be referenced and sorted so that converging lines of inquiry and patterns can be uncovered. In this way, internal validity can be established. The focus here is the evidence collected as the case unfolds. As indicated in the third step, certain documentation will be collected beforehand but as the case unfolds, the researcher will keep field notes that express both what is unfolding and the way he or she is thinking about the events. Documentation will often include the collection of comments or interviews from participants, possibly the shooting of videos or the taking of photographs. All information that may be associated with the construction of the events and what they might evidence of an eventual interpretation of these events should be captured and considered. Yin speaks of daily summary reports in which the researcher notes the outstanding issues, questions or concerns that evolved through the day. It is here also that the possibility of new issues or questions are raised and considered, and documentation made of deliberate decisions to proceed with or defer new lines of enquiry. Maintaining the relationship between the issue and the evidence is mandatory. The researcher may enter some data into a database and physically store other data, but it is also incumbent on them to document, classify and cross-reference all evidence so that it can be efficiently recalled for sorting and examination over the course of the study.

The fifth step is identified by Yin as the formal analysis stage. Whilst it is likely that the researcher will have been forming and reforming ideas, expectations and possibilities throughout the overall process, it is at this time that interpretations are seriously tested and explored. Connections between and across ideas, theories, arguments and events are tested and re-tested. Emphasis is placed on the researcher always remaining open to the eventual outcome, and certainly remaining accepting of other possibilities of interpretation that triangulation may yield. A major strength of the case study method, with its use of multiple data collection methods and analysis

techniques, is the opportunities it provides to triangulate data in order to strengthen the validity of the research findings and conclusions.

As is implicit from the earlier discussion, the local case study is always established and analysed within the context of larger issues in the literature and the research, and to a significant extent the local case study is interpreted within the larger theoretical or political contexts. Yin suggests that sometimes at this stage, one or more focused, short, repeat interviews may be necessary to gather additional data to verify key observations or check a fact. Yin warns of the danger of premature closure and he argues that where things fall into place readily, the researcher should be sure to feel suspicious, to seek further triangulation, and to think creatively for other possible hypotheses. He suggests that even if the obvious hypotheses or arguments are appropriate, the situation will, with further thought, invariably become more nuanced and complex. The sign of a good case study is that it has picked up on this more complex nuancing.

The sixth and final step is that of writing the report. According to Yin, the goal of the written report is to portray a complex problem in a way that conveys a vicarious experience to the reader. Case studies present data in very publicly accessible ways and may lead the reader to apply the experience in his or her own real-life situation and understand how the researcher came to the conclusions that they draw. The aim is to convince the reader that a thorough investigation of appropriate areas has been undertaken, and that any conflicting or contradictory evidence has been explored.

Case Study applicability

Close alignment with Yin's conditions and steps is provided in the 'Case-Study Chapter'. Indeed Yin's steps provide a major structuring device for this later chapter. In the following section, however, I offer an initial argument for the appropriateness of a 'case-study' method to be adopted with this particular piece of work.

The initial research questions centred on the impact of the use of hypermedia technology on middle school students' attitudes, learning and achievement. This broad

brush of an enquiry with its emphasis on the "what" type question was later broken down into a variety of parts and definitions. These included previous learning success and achievements of the students; what they were learning and how this learning was manifested; the nature of the pedagogy and curriculum; and how the latter were implemented and received by the students. These "what, how and why" types of questions were in keeping with Yin's conditions regarding case studies.

In terms of researcher control over the events under examination, the process could hardly resemble a physical experiment in which the elimination of all variables was attained; a classroom is far too messy a place to ever be compared to a laboratory. In keeping with Yin's second condition, there was, however, a degree of isolation and manipulation into a bounded case that is bounded in the sense that this was a classroom where lessons were to be undertaken. There was some control over the resources used and in the pedagogy and curriculum pursued, including the form that the final finished piece of students' work should take.

Concerning Yin's third condition, the research was ongoing with the teaching and learning under continuous investigation. The research concerned itself with questions of import for that moment (about technology and teaching and learning storytelling and literacy) and it had implications for future classrooms, teachers and students. Indeed, the research as conducted appears an exemplar of Yin's underlying definition of a case study as an empirical inquiry that investigates a contemporary phenomenon "within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin 2003, p.13). When Yin describes the case study as coping with "the technically distinctive situation in which there will be many more variables of interest than data points" (2003 p.13), it seems as though he may have had in mind the very classroom in which this study took place. Equally, in any classroom the interactions between teacher and student are rife with many interesting variables or aspects for the researcher to note and consider; each student is an individual and reacts in different ways, and at different times, to the content and style of lessons, and the unpredictability of the teenager requires little comment.

Multiple sources of evidence (the data) came in the form of: the completed hypermedia stories that formed the students' school work; the researcher's field notes; the transcripts of students' discussions; and their post-intervention interviews. All of these were used in "a triangulating fashion", and since analysis involved the classroom as a whole, these data offered distinct and deeper opportunities for reflection than a mere collection of students' activities. I created, too, a series of narratives around the events of the research that allow the context of the school, the classroom and some of the individuals to emerge.

Type of Data	Collector	who	when
Text based creative writing	Assisting teacher	Whole group	Pre
School reports	Assisting teacher & Action Researcher	Whole group	Pre
Interview with Assisting teacher	Action Researcher	Whole group (attention to selected individuals)	Pre/post
Still photos	Assisting teacher & Action Researcher	Whole group (attention to selected individuals	Fieldwork
Audio taped conversations	Action researcher	Selected Individuals	Fieldwork
Video taped conversations	Action researcher	Selected individuals	Fieldwork
Conversations	Action researcher	Selected individuals	Fieldwork
Video taped Presentations	Assisting teacher & Action Researcher	Whole group	Fieldwork
Research diary	Action Researcher	Whole Group	Continuous
Students' Interactive stories	Action Researcher	Whole Group	Fieldwork

Yin speaks too of the "development of theoretical propositions". This was, of course, a matter to which I had given long and serious thought and I consequently

formulated a set of general statements that I considered as underlying the introduction of hypermedia narrative composition to the classroom:

- Using computers for a task in an English classroom can lead to outcomes which are distinctly different from those obtained using more traditional methods
- Students already have a range of technical skills not generally allowed to be shown in schools
- Computers are engaging for students
- Computer technologies, such as multimedia, can benefit students' learning
- Collaboration is important in learning, and
- Different ways of working with students can involve existing expectations of self-value and awareness of others.

In effect, this constitutes a form of case writing that accords as an intermediate stage between the original action-research directed study, and the case study that it became.

Yin is also clear on the distinction between single and multiple case studies. In this research there were two case studies (one conducted in June with a Year 7 class and the other in November with a Year 8 class). Yin (2003, pp. 46-49) makes an analogy between case studies and experiments when he discusses replication. He describes how scientists conduct an experiment more than once so they can replicate their results, testing their procedure and method and perfecting the original experiments. In the same way, case studies can be preceded by a trial of their protocol the actions, activities and interventions to be undertaken in the case.

In my research, the two cases were an attempt at replication in the sense that the first case acted as a trial of the protocols of teaching with and about hypermedia and multimedia and the software and classroom setting all the resources necessary to conduct a technologically-rich and stimulating environment. The second case differed in special ways. The protocols remained similar, though there was some development across the first and second interventions. Extra evidence was collected, such as taped discussions between students as they planned their hypermedia stories. The

presentations the students made at the end of the process were videotaped too. The actual undertaking of the cases followed similar lines, with lessons on software interspersed with lessons on planning, storyboarding and hypertext.

Each of the case studies produced similar sets of hypermedia stories (designed combinations of sound, image and interactivity) but the two cases acted as progressions with the application of the protocol being defined over time through experience and practice. Each case study also provided opportunities to observe and record examples of engagement and collaboration, as the students mastered the art of hypermedia creation.

Case study analysis

In analysing the case studies, I again turned to the work of Asmussen and Creswell in their 'Campus Response to a Student Gunman' (Creswell 1998). In this case, the evidence of the incident was presented as a narrative with an account of all that the researchers undertook in looking at the response of the campus to the incident. The researchers then identified several themes that they later divided into categories. I did this with my research: from the evidence I collected, I identified three themes in the students' responses to the lessons, in the work that they produced and in my research diaries and interviews. These themes comprised the *engagement* of the students, their *collaborations* as groups, and their *identities* as students in the classroom, as creative multimedia authors and as reader/interactors of other students' hypermedia stories.

Two further units of analysis were embedded with the classroom: one was the students' reactions to the research as members of a class, and the other was the students' own creations that exist as artefacts in and of themselves. As students in a classroom, their 'school work' is one form of evidence to be collected, as is the research diary, the transcripts, and the account of the classroom as a place where the students were able to be engaged in activities, to work collaboratively and to trial different identities as students, multimedia developers and game players. The multimedia stories the students created can be analysed and interpreted (appraised) as distinct objects, as well as evidence of the students' activities. As distinct objects, they

can be removed from their context and examined in their constituent parts, as well as compared to all the examples of students' multimedia stories, and with multimedia stories and games in other contexts.

Assessment and evaluation of student hypermedia work: Phenomenography

The second part of the research question relates to the assessment and evaluation of student hypermedia work. The challenges were how to make judgements about the quality of the students' hypermedia work overall and how to break up the task into component parts. The concept was that the assessment of the students' hypermedia work would support their ability to comprehend and develop those skills involved in working on each of the different dimensions of hypermedia, such as working with text sound and image as well as the ultimate skill of bringing the parts together into the final work.

The composition of a written textual story is itself a complex technical and technological task. It involves skill in manipulating a pen or a keyboard in understanding the grammatical construction of the text; in selecting and using words and stringing them together in a coherent and even persuasive or evocative manner; in developing plot and weaving themes together, and so on. The task of developing a piece of hypermedia, however, has another layer of technique and technology with which to contend, which involves skills in working with visual material as well as text, and with skills in video or sound clips, in constructing an overall image and mood as well as tone and voice. The Curriculum documents in use in Victoria (VACC 2002) at the end of the 1990s had little to guide such work, especially with either formative or summative assessment. It seemed to me that without tools to assess this hypermedia way of working to create stories, this form of literacy would be seen to have little relevance in secondary school classrooms. To be taken seriously the proposal of a new mode of storytelling must lend itself to assessment, as well as be capable of being understood by the teacher and students in terms of its constituent parts and required skills, and of its potential for skill development.

The creator of a hypermedia production is necessarily a designer, programmer, illustrator, producer and director as well as a writer. At the very least, five distinct

elements and areas of skills development are involved in hypermedia production: the written text, the audio input, the visual input, the overall design and the bringing together of these elements, and, uniquely to a hypermedia presentation, the development of the interactivity of the work. The reading and writing of a hypermedia piece involves inviting and accepting the invitation to move around, into and across a story space. This story space is not two-dimensional as with a traditional text or 77isualization, but rather extends through various optional and contingent narrative spaces linked and motivated by the writer's and the readers' interaction with the various multimedia elements. There are, in effect, five writings involved, not just one, as is the case with traditional storytelling. So, how might these five writings be assessed?

One way to assess hypermedia storytelling is to develop a series of categories or grading related to each of the constituent writings and to develop a matrix on which to map the score of a student within each category. Whilst this might satisfy the education system's need for numbers and scores it does little to help give students feedback and guidance about how they are progressing and what more needs to be done with each of the skill sets.

John Biggs and Keith Collis's (1982) development of a Structure of Learning Outcomes (SOLO) 'taxonomy', which has been used for over twenty years to map student learning outcomes, presents a further option. Although its use has most usually been confined to higher education, it has been employed in a few studies at school level and across all major disciplines (Kimber, Pillay & Richards 2007). SOLO became the prototype for the tool in which an assessment matrix for hypermedia production was developed.

The SOLO taxonomy highlights five qualitatively different levels at which a student might respond to any given task:

- *Pre-structural* – where the response is unrelated to the task.

- *Uni-Structural* – where an appropriate but minimalist response is given.
- *Multi-Structural* – where several responses (or answers) are given and the responses are appropriate, but there is no attempt to explore or develop a relationship between the responses.
- *Relational* – responses become elaborate, with several examples brought together into something cohesive.
- *Extended Abstract* – These responses are more complex and abstract. They often go beyond the required response and seek out fundamental principles that can be further developed.

In my research, the set of hypermedia stories produced by the students were worked through in order to discern what each of these levels might look like for each of the five dimensions of composition noted earlier written text, audio input, visual input, overall design, and interactivity. In fact, during this analysis of the five dimensions the process was simplified by reducing them to four, with 'language' being used as a category that combined both audio voice clips and text. This process, of using the pre-defined, context-neutral levels of SOLO to inform context-specific understanding of individual areas took this work logically into the realm of phenomenography.

If each hypermedia story is considered in terms of these multiple qualitatively different levels of response, a SOLO taxonomy is produced that gives a clear indication of the range and variation in quality within each story and also across the overall group of student stories. In brief, working in this way enables a grasp of the strengths and weaknesses in each hypermedia story and an assessment of the overall strengths and weaknesses of the collective stories to be achieved. It enables feedback to be given to students on how and where they are achieving and helps teachers themselves to gain a better understanding of what students are struggling with, and consequently to direct intervention where it might be most useful. This way of working is informed by phenomenography, a research method and educational tool developed in Sweden in the 1970s, and more recently used extensively in exploring learning in higher education in the UK.

Phenomenography was developed largely as an educational tool to explore the different ways in which students understand and misunderstand important concepts in the subject matter they are learning (Marton & Booth 1997). One of phenomenography's strengths is that it simplifies and assists students and teachers to get to the heart of what and how a phenomenon or topic is understood. It homes in on misconceptions and helps teachers to see where and how a student's understanding is incomplete. It does this by empirically exploring the 'structure' of the understanding that underpins student responses to assessment tasks, or answers to questions. Phenomenography does not require or identify a correct or incorrect manner of perceiving a particular phenomenon (Marton 1981; 1994), and indeed such notions are largely irrelevant. Phenomenography's aim is to indicate and illustrate the different possible conceptions that people have of a given task, undertaking or experience.

In phenomenography, the structure of an understanding is described in terms of what is focused on and how is it acted upon. So, in this study, when students worked with the visual dimension of a hypermedia production, I asked: 'What is their focus when working to create a visual dimension in their story?' Do the students see the visual aspect as being critical for carrying the overall narrative and mood of the work, or does it merely illustrate particular aspects of an event or a character? By asking 'How is the work undertaken?' questions that arise include: Do the students work with a range of methods, by, for example, matching mood and purpose of illustration to the intent of the illustration, or is the practice limited to adopting one or maybe two methods that have been minimally mastered, such as the use of 'clip art'? When these two aspects of the visual dimension – 'what' is focused on and 'how' it is practiced – are considered together, then an understanding of how students understand the visual dimension and their ability and insight in using and developing this dimension follows. In phenomenographic language, we have gained insight into the 'structure' of their understanding. By examining all four dimensions explored here, we can get a clear idea of how students work with each dimension, how they integrate them in order to achieve the total task of hypermedia production, where the strengths in their understanding lie, and where their understandings are limited.

According to Orgill (2002) "phenomenographic information about the different conceptions that students hold for a particular phenomenon may be useful to teachers who are developing ways of helping their students experience or understand a

phenomenon from a given perspective". Given that the initial aim of the study was to address what Gee (1991) terms the control of second-level language skills for students (that is notions of literacy), phenomenography provides a valuable tool for enabling the teacher's understanding of hypermedia and for enhancing the hypermedia literacy of students.

One of the things that has been found in exploring students' understanding of a wide range of different subjects and concepts is that there is almost always a close relationship between the 'what' aspect and the 'how' aspect of understanding. So, to continue the example of the visual aspect of hypermedia production, where students have developed a reasonably complex understanding of the role of the visual – for instance, they believe it is carrying a story line – then they will almost always be able to develop the practice to do justice to that understanding (Prosser & Trigwell 1999).

This close relationship between the 'what' and the 'how' of knowing in phenomenography is one of the reasons for it being termed a relational method of exploration. Yet phenomenography is also characterised as relational in that part of the analysis involves the development of what is termed an 'outcome space': this is essentially a mapping of the range and relationships of the understanding of a concept or phenomenon as expressed by the participants of a study, usually, and in this case, a class of students (Marton & Booth, 1997). Such mapping allows the researcher or teacher to gain a quick picture of how the group is performing as a whole where there are overall limits in understanding and where there are strengths. Subsequent teaching can then address the areas of least understanding.

Combining SOLO and phenomenography

A methodological approach that combines SOLO and phenomenography is not without precedent. Several previous phenomenographic researchers, particularly those studying real teaching situations, used Bigg's SOLO taxonomy as an aid to achieving insight into the range and levels of understanding in a group of students (Prosser & Trigwell, 1999). The present study followed the example of these studies and initially explored each of the dimensions of composition (visual, language, interactive, design) in terms of four levels of SOLO: *uni-structural*, *multi-structural*, *relational* and

extended abstract. Because each and all of the students undertook and completed the hypermedia production task, the pre-structural level was extraneous to this study's explorations and therefore left unremarked. Exploration and analysis of the student hypermedia stories for the 'what' and the 'how' of each dimension at each of the four levels of Solo was conducted. A brief description of this is presented below.

Uni-structural response

In the *language* dimension, the uni-structural response is characterised by the inclusion of a single word or noise that appears to add little or nothing to the understanding of the overall scene or story, and involves the use of one single skill, for instance, typing in a word.

Within the *visual* dimension, a uni-structural response is characterised by a single, simple image, which illustrates a seemingly ad-hoc aspect or event and is executed by the use of one or two very simple tools (a clip art image).

The *interactivity* dimension of hypermedia production was assessed here by examining the way the group focused on engaging the viewer with their hypermedia story, moving the viewer around and between each screen and through the story as a whole. At the uni-structural level it is characterised by very simple navigation from one screen to another, always in one direction, with only minimal attempt to engage the viewer in any particular scene. An example of this minimal engagement is the insertion of a single button that plays a sound (e.g. a car horn, or a child's cry).

The *design* dimension relates to the overall structure and complexity of the hypermedia product, the way each of the dimensions complements the other and the way the viewer is encouraged to move through the story and is reinforced with certain messages as they do so. A uni-structural level for the *design* dimension is characterised by little cohesion across the dimensions and a minimal attempt to create relationships between the screens and across the hypermedia story as a whole. Usually there is some cohesion between the visual and language dimensions (for example, a sound is linked to an illustration) and there is an awareness that there must be a simple mechanism for the viewer to move through the story, but there is little focused attention on how the dimensions of the story work together as a whole, either within each screen or across the story.

Multi-structural

The multi-structural level for the *language* dimension includes using single sentences for instruction or direction. With the *visual* dimension, the multi-structural level can be seen in busier scenes with many more images, including the use of 'homemade' material. For the *interactivity* dimension the multi-structural level exists where the hypermedia storyteller positions buttons on a hypermedia page, each acting in isolation. At this level the focus is very much on the single instance – visual, aural or interactive. There is very little attempt to relate one aspect of the work to another. This level of work was very common within these stories although, students' work often developed to include use of relational levels of response.

Relational

At this level the dimensions are not isolated from each other as they were in the previous level. In the *Language* dimension the sentences are related to the images and the sounds. In the *Visual* dimension more sophisticated images are related to the text that appears on the hypermedia pages; this is also seen when various elements of *Interactivity* are related together and they aid our meaning making as we progress through the hypermedia. More sophisticated images and relationships to text are also important in the *Design* dimension, where the different parts, such as *Visual* and *Language,* come together to create a mood.

These levels of response, informed by SOLO ranging from uni-structural to relational, were mapped against each of the five elements of the hypermedia story written text, audio input, visual input, overall design and interactivity to form the basis of the matrix against which to map and measure the students' stories. The resulting application and results are explored in Chapter 6.

Concluding comments

The aim of this chapter has been to describe the theory and the methods that were adopted to address the research questions the study raised. I have explained that even though the project did not develop smoothly, it did in the end, advance as a case study, with an appreciation of and alignment with the philosophical position of Berthoff (1987) and in particular with close guidance from Yin (2003).

The second focus of the study, the development of an evaluation and assessment tool was less problematic. It became clear to me that such a tool was necessary if hypermedia work was to be seriously considered for introduction into the classroom. Some familiarity with the ongoing phenomenographic work of colleagues made the option of adaption and adoption of this way of working an obvious choice.

In this chapter the guiding theory and methods were outlined and in the following chapter the inevitable messiness and complexity of the case study will be apparent, but the steps of the case study, as described by Yin (2003) are used to maintain structure.

Chapter 4: The Case Study

Introduction

This chapter reports on the hypermedia intervention as a case study. The six-steps of Yin's (2003) case study approach (described in the previous Methods Chapter) guided the collection and development of data into this case study and these steps structure the presentation of events and data. The overall aim of the chapter is to describe how the intervention was negotiated and how the study proceeded; a major challenge has been what to present and how to present it.

In terms of what to present, Yin (2003) draws the distinction between two types of data, 'field notes' and other 'on the spot' evidence that document what appear to be consequences of intervention on the one hand, and on the other hand documentation relating to the reasonably stable factors surrounding the case-study such as factual information about the school and its catchment and data relating to curriculum and previous student progress and success.

In terms of 'how' to present the data whilst Yin's (2003) six steps are a guide for a structured presentation of the overall study, there is still considerable challenge in presenting appropriate and adequate data that provide evidence of events, as they unfold, particularly in a classroom intervention, and particularly when the researcher is reliant on text. Often only summaries of documents are presented. In this thesis, however, I have tried to provide, amidst the inevitable summaries, a range of extracts from contemporary field notes and journal entries. Whilst there is plenty of contemporary data to work with, most of the field notes and journal entries were written on an early personal computer and stored as electronic data that are no longer readable. Nevertheless, copies from early printouts, which were stored and labelled according to Yin's advice, were re-typed for presentation here.

Returning to the challenge of presenting data, the idea of presenting evidence as a series of snapshots has been adopted. This idea builds on methods developed in

Action Research where key events and actions are presented as small contained packages and used to help stimulate subsequent reflection (Elliott and Adelman, 1990). Throughout this chapter, evidence of those events, is introduced as a snapshot. Sometimes the snapshots include samples from my own notes and journals, sometimes they involve conversations with others, the English class teachers, for instance, sometimes they involve examples of students' work and sometimes they include students' comments.

In stages 1 and 2 of Yin's steps, presented in the following pages, snapshots typically involve data that demonstrate the setting up of the case study within the context of the school. In steps 4 and 5, the snapshots are typically used to demonstrate the unfolding of the intervention. To attend to the advice of Golafshani (2003), the intention throughout this chapter is to demonstrate the trustworthiness of the evidence and therefore the legitimacy of subsequent analysis.

In terms of the larger structuring of the case study, this present chapter constitutes a recounting of the first four of Yin's (2003) steps, from the establishing of focus through the selection of cases and onto the collection of data. The fifth step, of analysing and evaluating this case study is flagged at the chapter's end, but major discussion of this analysis is conducted in the chapter that follows. The sixth of Yin's steps, that of preparing the report, is realised in the writing and presenting of this thesis as a whole.

Yin's Step 1: Establishing focus

Case studies "emphasize detailed contextual analysis of a limited number of events and their relationships" (Soy 2006, p.1). The clear focus required for the undertaking of a case study is established by the framing of research questions informed by examination of not only the literature, but of those intricate ways in which the research object is connected to larger "political, social, historical and personal issues" (Soy 2006, para. 6). The evidence presented here is intended to frame the issues and research questions: it indicates my own thoughts and ideas from those early days and also highlights discussion with the school Principal and my early approaches to Victoria University about beginning a postgraduate research project.

Snapshot 1.1: Teaching journal mid-year 1997/8

It is a Tuesday. I stand in front of a chaotic cohort of thirteen-year-olds. It is the session before lunch and we are going to read a novel. It is a strong novel, especially written for young people of this age. I want them to hear this, to understand the excitement, the expression, and the humanity to be found in literature.

The room is set up in a grid of desks. It is always set this way. This is the way the school sets up its 'formal' classes and English is a formal class. I distribute copies of the novels – but there are not enough to go around. I face the dilemma of what to do and know before I have even asked myself the question that I will do what I always do, but hate doing: I'll ask the quieter compliant students, often the girls, to share, and try to ensure that the louder, more easily diverted students, very often boys, have one each and so maximise the chances of keeping them on task.

The reading proceeds. I begin by asking one of the girls to read out loud and although I respect her determination to keep going with her faltering delivery, I realise that to go on in this way will likely cause distractions. She gets through a paragraph and I take over, offering a brief summary of events and actions and consequences so far. I read for ten minutes. I put in as much passion as I can but after ten minutes attention is wavering. I tell them to read on by themselves for a few more pages and walk around the class. Two girls are reading their own novels. I guess this is OK; they are strong readers and had read this class novel within the first week. They are now bored with it. I note that the distraction from some of the pupils unable to read very well by themselves grows too noticeable. I call for their attention, give and get from the class a quick recap of what was read and move on with more of my reading.

In response to the novel the students are assigned the task of writing an account of a time when they have been lost or misplaced. Some of the students have written several pages, enough to meet the set requirements of the task; they sit quietly gossiping amongst themselves. One boy has written twelve pages and I allow him to go to the library on the other side of the school, where computers are set up for word-processing, so that he can produce his work in a more professional format. Other students, seeing how he has been 'favoured' also want to go.

Meanwhile two boys dictate to an integration aid their own accounts of being lost. The boys are not able to write their own stories. The aid jots down the boys' stories and leaves lines so they can copy out her words. I work with another group designing a simple flowchart to help them work out a plot for their own story. They welcome the attention but my concentration on their work leaves others to be distracted and soon the noise gets too loud and I must deal with objects being thrown around the room.

The boys I have just helped with the use of a flow chart make some effort, which is pleasing, but one is stuck when it comes to the writing and stops after three words, even though he was articulate in telling me of the incident and I know he has written a little by himself in previous lessons. Another writes four lines all in capital letters and comes to a stop. He has done it he says. I look, yes, he's covered all the events, but he's left out the detail he gave me of, which made his story live and there is no punctuation.

The class finishes. As they leave some of the boys talk of the latest video game; one has stayed up until 4 am playing it. He is flushed with excitement and the exhaustion. Watching him in class it is hard to imagine he could be passionate about anything.

Snapshot 1. 2: Comment made in the same journal entry a day or two later

This class has preyed on my mind. I really feel defeated by this class. It's no better or worse than a thousand others I have taught across my teaching career but it has got to me. The novel was exciting. It was by a top Australian author of teenage fiction. Certainly some of the class liked it. Nevertheless it was inaccessible for the majority of that class, unless I read it for them and worked hard at making a performance of it. Even then most were indifferent. One student had asked if there was a film version so she could really get to know it.

When I think about the writing exercise I feel even more disheartened. I had made it about what I thought would have to be a poignant part of their own lives: a time when they were or felt lost and alone. I knew some of them were avid readers, pupils full of energy and life who would talk enthusiastically and intricately about this or that event in their own lives to one another, who would even go to the library and read for their own enjoyment, and yet it seemed that even they were unwilling or unable to express themselves beyond a few simple words with this formal task.

So many students do not value their English classes. I do not take it personally. I know it's a problem for other teachers of English. It is the subject most concerned with helping them be literate and able in their day-to-day life and forthcoming career as well as in the classroom.

There has to be another way to evoke the power and delight that reading and writing can bring.

Snapshot 1.3: Subsequent note in teaching journal, following a discussion with the Principal

The hint is there in the Head's enthusiasm for technology and I feel this enthusiasm for technology, too, and so do the students.

What if I used computers as a way to make English, and school itself into a different, compelling, engaging form, almost by-passing formal reading and writing? What would it look like? How could I do it? What would the students' reactions be? What would be the reactions of the Principal and other staff?

Snapshot 1.4: description of the school and its students, from early research proposal

The school is situated in a town in country Victoria with a population of around 5000 people, 100 kilometres from Melbourne, the state's capital. The town services a large, mixed farming area and contains rural processing industries, transport and associated support services. The catchment area of the school extends approximately twenty-five kilometres in every direction and includes several small towns and settlements. Nearly half the students travel to the school by bus.

The families that use the school come from a range of social classes and occupations: abattoir workers, shop assistants and shop keepers, tradesmen and women, farmers, truck drivers, as well as the services; from semi-professional areas such as the police force, health workers, bank workers and public servants to teachers, lawyers and engineers. Recent improvements in transport infrastructure means more commuters now live in the town or environs and travel the hour to the capital city.

Ethnically the community is largely white Anglo-Celtic, with smaller numbers of well-established and integrated migrant groups such as Italians and Maltese. Few if any are more recent immigrants.

The students' prospects in life are often to continue the paths set by their parents, though even this is changing. Eighty percent of the students will complete Year 12 and of this approximately two-thirds will go on to further studies, including university, though mainly they will follow trades and undertake TAFE courses

The town is not noted for its ambition and this is reflected in its high-school population. It has been fearful about the future as the rural world shrank in terms of its importance to the economy and its need for labour, but some confidence has returned due to the attractiveness of country living; what has been termed the search for a 'tree change'. Tourism is increasing in importance.

Snapshot 1.5: Journal entry, September 1998

The aim, I think, is to establish some sort of formal project or piece of research that brings together my own interest in computers and concern with students learning English. I want to do this in a way that I can document what I do, how the students react, and what the outcomes are …

I am convinced I can engage at least some members of the class more than I do now with some sort of a hypertext program that can be used as an aid to telling stories. This is the aim: to use the program to help them create and tell a story. I believe that many of these boys are going to connect with this. I think the others will too. Video games, this way of thinking it's much more their sort of world.

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Snapshot 1.6: Summary of problem and proposed intervention, from early research proposal

I would like to undertake a project that involves a class of junior secondary students authoring their own hypermedia stories using computers and hypermedia software provided by the school and myself. The aim is to create an alternate way for these students to be literate, to develop and communicate a story. This intervention is to be part of formal English classes for a period of four weeks.

The students will need to work in groups; this will not be an individual assignment. The reason for this is, in part, is that to author a complete story would be too time consuming for individual students but also group work will encourage students to support each other with skill development and to collaborate. One of my concerns with students at this level is that they rarely get the opportunity to support each other and work as a team and yet teamwork is important in the world beyond school.

Yin's Step 2: Selection of Cases

In this section the evidence presented relates to the ways in which discussion with the school and the university proceeded in the early stages and in particular how the specific classes and students were selected for inclusion in the research.

Gaining access to students over extended periods, disrupting existing timetables and generally messing up the smooth running of a class or several classes is not easily achieved or done lightly. On reflection, I am surprised at how readily things fell into place. Three factors were critical here, the first being that the students I was keen to work with were at the lower year levels and so there were no examination curricula to attend to. Second, the school year itself was working to a close: teaching staff were tired and open to ideas that might help free them from some teaching. Third, the Principal, himself was entirely sympathetic to the idea that English classes should be thought of in terms of a broader approach to literacy and that storytelling via hypermedia should be included in the formal English curriculum.

The Principal and I discussed the idea of trialling hypermedia-based storytelling in English classes several times over the months preceding the study. He was keenly aware that some of the school's teachers were legendary for their 'technophobia' and he expressed the hope that this work might help to show how technology could be introduced into all subjects and lessons and that such incorporation was very achievable. One of the conditions of the intervention was that whilst I would be responsible for and do all the necessary preparation and lead the intervention within the classroom, the regular English teachers of the classes I worked with should be present during the class times (not necessarily active, but present) and as the Principal made clear, learning about the possibilities of this way of working would hopefully have a positive impact on the teachers involved and even the school more broadly.

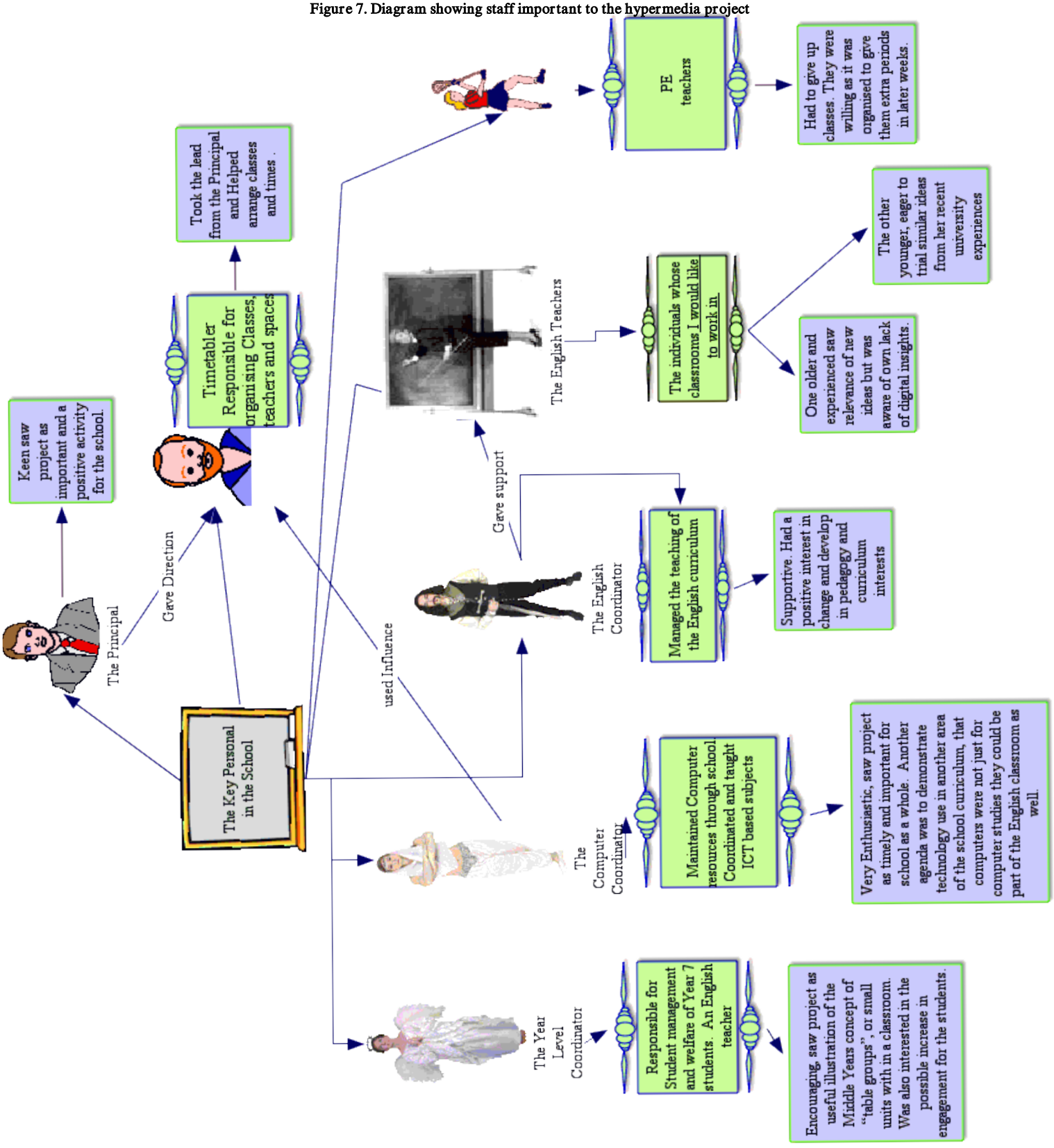
I was well aware that whilst the support of the Principal was a necessary condition for a successful project it was not sufficient in and of itself. Getting the English teachers on board, for instance, would be critical and probably challenging. Much of the data presented in the following section involves notes and discussion relating to approaches and discussions with existing staff and the circumstances surrounding the selection of the particular classes and the class-times. I had indicated

what was required for the intervention in terms of numbers of students, how they might work in groups, and time with the students and time in the computer laboratory, and these things were negotiated with the relevant members of staff. Key aspects of this development are highlighted through the snapshots below.

The following snapshot, Snapshot, 2.1 is in the form of a diagram, which is reproduced on the following page as Figure 7. The icons were deliberately chosen to be representative of the staff members, as they seemed to the researcher at the time; they do not reflect the physical or personal aspects of the any of the people involved. A genie is used as the icon for the Computer Co-ordinator, for he was in many respects something of a magic worker. He was able to supply all of the technological assistance required and his insightful suggestions were always welcome. He was a problem solver, with access to resources and expertise, and without his invaluable support the project would not have gone ahead. The other icons are also cryptic representations, or visual metaphors for other key staff involved; the Year Level Co-ordinator had the very best interests of the students in mind and all questions and queries related to this. The English Co-ordinator was at first somewhat aloof and appeared unconvinced by the project, but in the end proved to be open to experimentation and to the possibility for change. Her backing was absolutely essential. She came to a positive decision in discussion with the two English teachers and myself involved. She is represented as a Knight for her ability to wield a decisive sword over situations. In the diagram I show the English teachers at the blackboard because I saw them, at that stage, as essentially very traditional teachers. The fact that they were to open to this intervention and new outcomes and possibilities is to their considerable credit.

Snapshot 2.1

Figure 7. Diagram showing staff important to the hypermedia project



***Snapshot 2.2: Comment on negotiation and ultimate success** (From field notes)*

So in the end what have I managed to negotiate for this study? I originally requested to work in a sustained way with one class of Year Seven Students (26 students). Strangely there has been pressure for me to take it on with more students than I can manage. The whole of the Year Sevens and all of the Year Eights is what has been suggested. I don't think I can manage this. Maybe I am more convincing than I realise. I think the real motivation, however, lies in the pressures that digital technologies are creating amongst teachers. The school and more senior staff are aware of government interest in new technology and of the fact that the public in general is more involved and accepting of them. I think in the school as a whole there is the awareness of an interest in a more technological approach to schooling and at the same time staff feel greatly under-educated and under- resourced both in terms of goods and ideas. So when I appeared with an idea and a plan the initial reaction has been to say 'yes' and try to get as many students involved as possible.

I have requested a class of Year Seven students; maybe later I could take on other classes including Year Eights. More classes mean more data but also more disruption in the school. The intervention will be disruptive to the timetable and to other teacher's arrangements. The regular English teachers are to be with me in the classes so that will help with managing the numbers and be useful to sound ideas off them. I have begun to discuss the process with them and also the idea of group work and how the groups might be drawn up. Both are keen for the groups to be mixed girls and boys and maybe even of mixed ability

Snapshot 2.3: Further comments from field-notes

The main challenge has been in getting sustained periods of time, preferably on consecutive days. A 50-minute period or even a 100-minute double period is not enough to set up equipment and work on complex tasks. It is essential that students see themselves making adequate progress if I am to hold their interest and enthusiasm. Some lessons are jealously guarded by staff, the higher up the secondary school you go the harder it is to get this sustained time. It's a great relief that the English Coordinator has been supportive. I thought she'd be the biggest challenge.

To secure longer periods of time in the day and more days in the week, it has been necessary to negotiate with the teachers of other subject areas such as physical education (PE) and languages other than English (LOTE). I already have all of the English classes and the small amount of IT allotments. I also, successfully, asked for time from the Art subject, arguing that art could be seen as integral to the hypermedia innovation. So the lessons I took for the Hypermedia storytelling project came from English, Information Technology and from Art and also PE.

In designing the lessons I was most aware of gaining long, sustained periods of time for the students to engage with the tasks. Much of secondary school teaching is conducted in 50-minute sessions. This time is often inadequate for lessons involving equipment, which has to be set up and put away, but also for complex tasks that require a number of discrete steps to complete, for example creating a stack in the HyperStudio program. I was able to negotiate eight sessions per week over two consecutive days for the Year 7 class. The Year 8 class was more difficult to organise but I was able to gain seven sessions, five on a Tuesday and two on a Friday afternoon

Approaches to the University

Whilst these negotiations with the school were developing, I had approached the local University. University staff from the School of Education had worked within the school and I had an informal relationship with one staff member in particular. I was advised that this project would likely be favoured as the School of Education was keen to develop its research base and classroom research, of the type suggested here, was of interest. I consequently made a tentative expression of interest and was quickly encouraged to develop a more formal proposal, which, after some months, was accepted

Issues around what constitutes the case for analysis

None of the above data answers Yin's essential question, "What constitutes the case?" The way in which the idea of 'case' was conceptualised in this study is that this was a single case, with two parts. The first intervention informed the second intervention but the students involved and the processes and the outcomes were sufficiently similar for both interventions to be seen as part of the same case – a case of teaching story telling through a hypermedia program and computers with middle school students in an Australian country town.

One intensive month was spent with each class, with a brief hiatus in the middle. As is discussed in more detail below, I was able to reflect on my practice during and following the first cycle of the intervention and consequently approached the second cycle differently, although aspects of the teaching changed the qualitative outcome of the students' work and the level of student engagement appeared to change little. It seemed both at the time and subsequently, on closer analysis of the outcomes, that the two classes produced work of very similar quality and had similar levels of engagement and satisfaction with the tasks. The slight difference in the ages of the Year 7 and Year 8 students and the difference in my teaching seemed to have little or no effect on these key aspects of the students' learning.

Yin's Steps 3 and 4: Preparation for, and the collection of data

As explained in the introduction to this chapter, Yin (2003) draws the distinction between two types of data; 'field notes' and similar evidence around the unfolding of the intervention on the one hand, and documentation relating to the reasonably stable factors around the school and students on the other hand. The details of the school, its location and cohort forms part of the stable information and this has already been presented under Yin's Step 1. The other major type of stable information involved an informal profile built for each student in the intervention. This profile included details about their family background and their behaviour in the classroom, including engagement and interest in classroom lessons and activities and their previous achievement in English.

In Yin's six steps there is but a single phase for the collection. His emphasis is on multiple sources of evidence and on evidence collected as the case unfolds. In this study, however, because of the two parts to the case – the Year Seven and the Year Eight intervention – the intervention is described in two parts.

The snapshots include examples of the lesson plans and the materials that supported each of the lessons, together with examples of student work and some of their comments. They also include field notes and journal entries made at the time. Notes were made during the lesson and shortly afterwards in an attempt to capture, for instance, the comments and questions of the students. I have recalled these as field notes. These notes could be varied and wide-ranging and I tried to give myself a period of reflection within an hour or so of each session, and certainly by the end of the day, to ensure the accuracy of the critical information accumulated during the session. This was done not only as a way of reflexively preparing for the next lesson, but also to accurately record my reactions at the time. Augmenting this data collection were more reflective comments made later and entered into a teaching journal. There are also included here recordings of comments or conversations with the English class teachers concerning how they perceived the intervention proceeding; these were audiotaped with accompanying note taking and then summarised and contextualised with the aid of my own notes as soon as possible. The English class teachers were usually present for each of the taught sessions, and subsequent conversations about

what they had seen and how they assessed the classes' performance were most valuable.

Teachers are familiar with developing lesson plans, drawing up learning objectives and anticipating outcomes and I made preparation for the intervention by working in this way. Relatively less attention was paid to the expected results since I wanted to remain open to the possibility of a whole range of outcomes.

Drawing on the work of Jonah Peretti (1997) I began the intervention with activities familiar to the students. Peretti utilises what is, in effect, a scaffolding of activities; of moving from what students know towards what it is that they are expected to know or to experience by mediating their learning through familiar activities towards more challenging accomplishments. Supporting or scaffolding their work in the earliest stages of the process increases the students' knowledge base, allowing the strategic withdrawal of guidance over time to enable them to work in an autonomous fashion.

I began with activities such as the reading of books with similarities to hypertext such as the 'Choose Your Own Adventure' series (Packard 1986). After completing a worksheet that allowed the students to create the outline of a branching story the students could progress into the novel concepts presented by creating actual hypertext: branching stories on a computer. My interests lay, of course, in what the students would do on the computer, but the project began in the familiar territory of paper, print and books.

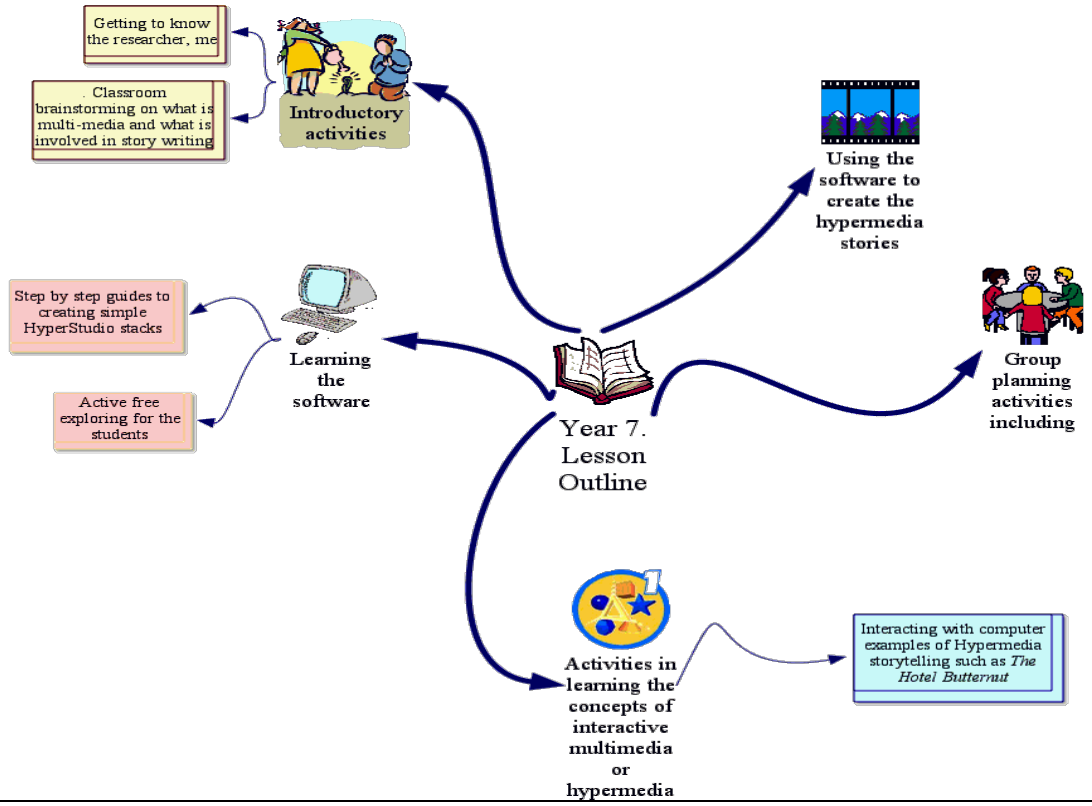
Before the project began I made an outline for the intervention as a whole in diagrammatic form, but lesson plans were developed for just the first three lessons. It is counterproductive to develop lesson plans too far ahead (Robinson, McKenna & Wedman 2000, p. 330) since plans invariably have to be modified and changed as student learning and interest shapes the progress of the activities under instruction.

The First Week

Below is an illustrated account of the lessons taught as part of this research project. It encapsulates all of the activities covered by the students.

Snapshot 3.1: Diagrammatic outline of initial intervention – year 7 students

Figure 8. Diagram of the Year 7 Intervention



I also prepared a step-by-step guide to make it clear to the English teachers involved and to reinforce for myself, just how the intervention would unfold

Snapshot 3.2: Figure 8- Outline of initial intervention with Year 7 students

1. Introductory activities
    a. Getting to know the researcher, me.
    b. Classroom brainstorming on terms such as *multimedia* and *story writing*
2. Learning the software
    a. Step-by-step written instructions
    b. Step-by-step instructions displayed on a projector linked to a computer
    c. Students were allowed free time to explore the program.
3. Activities in learning the concepts of interactive multimedia or hypermedia
    a. Reading copies of the Choose Your Own Adventure series to see a printed version of a simple hypertext.
    b. Completing paper based branching flow charts
    c. Interacting with computer examples of Hypermedia storytelling such as *The Hotel Butternut*
4. Group planning activities including
    a. Storyboarding
    b. Flow diagrams
5. Using the software to create the hypermedia stories
6. Presenting the hypermedia stories to the whole class
7. Writing narratives based on the hypermedia stories

Snapshot 3.3: Extracts from journal entries following the first week of sessions

There are twenty-five in the class, thirteen to fourteen-year-olds. They jostle one another, shoving or weaving around to grab their preferred chairs from the set of tables in the centre of the large room. I watch as they enter, looking at them closely, wondering how they will react to my lessons in hypermedia, animation and storytelling. I see girls neatly dressed in their school uniform: tartan skirts their hair carefully drawn back with hair ties, boys some towering over me, their winter jackets still on, less careful of their appearance save for the ubiquitous baseball caps. These are country kids, many from families that have been in the district for generations, some from farming families, others from the rural industries such as transport, abattoirs, and the businesses in the towns. All listed English as their first language in the school enrolment forms.

The English teacher is an experienced teacher with a major responsibility for VCE English students. He takes time in my class to catch up on marking and positions himself as at the back, visibly removed from what is going on. Despite his aloofness he has interest in what unfolds and I feel him to be supportive.

The room is large enough to contain twenty-six computers around its edge with an area of tables and seats in the centre. Filing cabinets, a scanner, printers, projectors and screens fill the room with the potentiality of technology. Floor to ceiling windows on one side also make it light and open.

When the teacher introduced me some boys became agitated when they realised they would have to sacrifice their Physical Education classes for a few weeks. I launch into my well-rehearsed ethically sound script explaining the intentions of the project and I use the whiteboard as a prop for a question and answer session on multimedia and move on to discuss storytelling. Multimedia as a word seems vague to them though I do receive a range of answers on storytelling – ‘imagination’ and ‘creative’ are two prominent comments. The class is attentive but I sense it won’t stay this way if this talking at them continues for long.

The pattern of the project is set. The students divide up into groups of four, two boys and two girls of mixed abilities. They have been divided so that there is ability as well as gender mix. The intention is to maximise the opportunities for learning from one another and the challenges of working together as a group. It is exceedingly unlikely that these students will have ever worked together or even come together as a group before. Each group is to work together to plan and create an interactive story.

I include in the early lessons activities around how to work together, to create and write a story. I also plan the lessons to help them come to understand the idea of

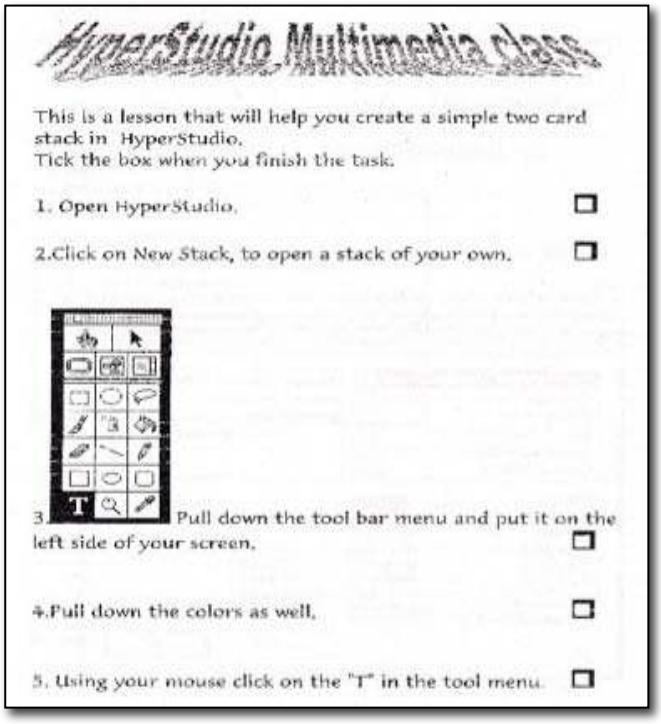
multimedia as non-linear storytelling and I work to help them see the software program as the way in which they can knit the two elements of multimedia and storytelling together. These are complex ideas and I have planned the lessons and stages of the lessons carefully.

Snapshot 3.4: Extracts from journal entries during the first week of sessions

These early lessons work reasonably well. They respond to the groups positively and their ideas for stories show a range of inventive and interesting approaches. At one level the ways in which the students react is on the whole positive but it is like so many classes I have seen very often in the past: not in any way resistant and some even a little enthusiastic, but, on the whole, resigned rather than engaged.

It is in the next step that I notice a change; I have prepared a simple step-by-step plan[Figure 9 below] for using HyperStudio, the software program. I introduce this to the class. An inert projector distracts me but I soon notice a buzz of excitement in the room. Students work through the twenty steps on their work sheets very quickly, they literally race through them excitedly, with energy – totally absorbed. The quicker ones draw the slower ones along, the non-readers watching over the shoulders of the frontrunners, duplicating the moves and producing material on the screen. I just surf this wave of enthusiasm.

Figure 9. A Step-by-step guide to using to using the program HyperStudio

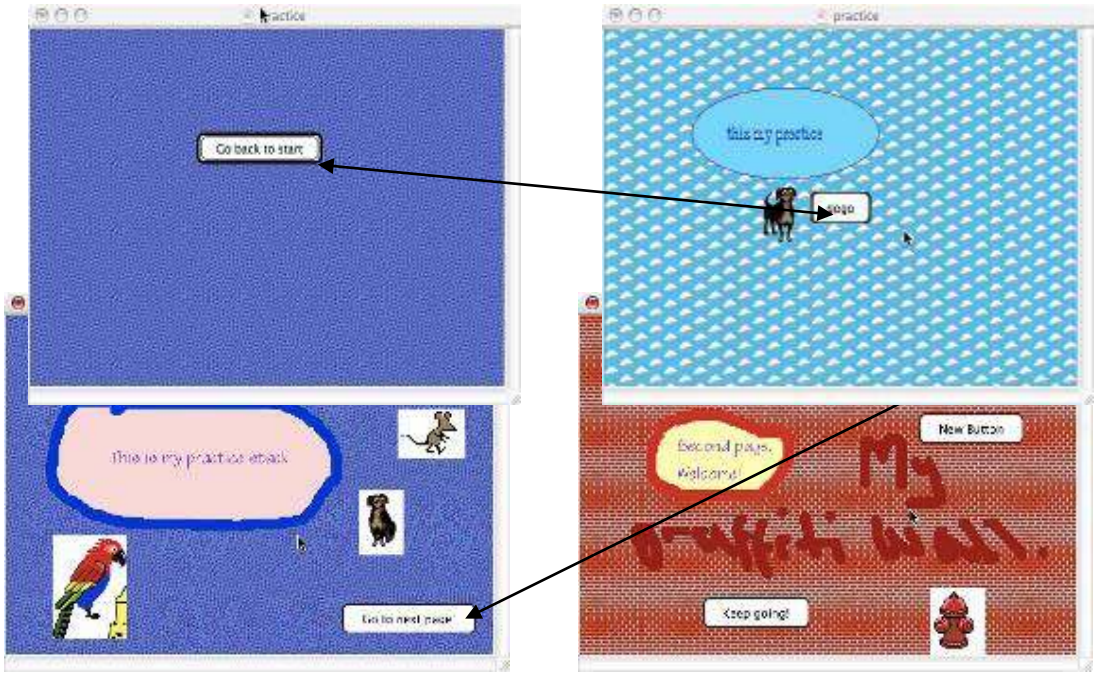


Snapshot 3.5: Class-notes, from sessions, highlighted above

On this first day the students bring their chairs around the whiteboard. Their responses indicate a lack of familiarity with terms like multimedia, but they are familiar with examples such as the World Wide Web and Video Games. Many of them finish this part of the program with the idea they would be creating some type of movie.

The intention is to have each student work individually at a computer. I am at the front of the class with a digital projector, illustrating and expanding on these step-by-step instructions. This is too slow for some groups. They read the instructions quickly and proceed at their own pace. The majority of the class, however, works at my speed, creating a practice stack and becoming familiar with saving and file name conventions.

Figure 10. Initial two card stacks showing simple hyperlink



Students create a stack consisting of two cards, containing 'buttons' that when pressed take the viewer from one card to the other. They add text and graphics to the cards as well. You can see [Figure 10] that some students have already moved beyond the exercise, adding extra features such as more buttons and personalised details such as the mouse-drawn graffiti-styled comment.

Snapshot 3.6: Field notes- discussion with class teacher

So much better than I had hoped. I'm taken aback at how quickly they worked (most of them) and how interested they were (all of them). They didn't want to stop at the end of the session and I wished I'd planned the first session to go on for longer. I'd not wanted to overwhelm them at first but clearly there was no sense of this. The great thing is they are keen to move on during the next lesson. I've really misjudged how quickly some of these kids can work at this. Need to make sure I don't make it too constrained for the quicker ones.

Class teacher offers praise for the class and the exercise. He seems as surprised as me. We both agree that maybe there is a novelty factor, but this hardly matters, the fact is they are engaged and learning.

I also wanted to introduce the idea that the students could create a "space", in this case as a series of rooms to be exited and entered by doors – by creating a series of cards and linking them together. Figure 11 presents the example of three 'adjacent' rooms created to illustrate the idea to the students (top row) and an interpretation/adaptation of that template created by one group of students (bottom row).

Snapshot 3.7

Figure 11. HyperStudio rooms

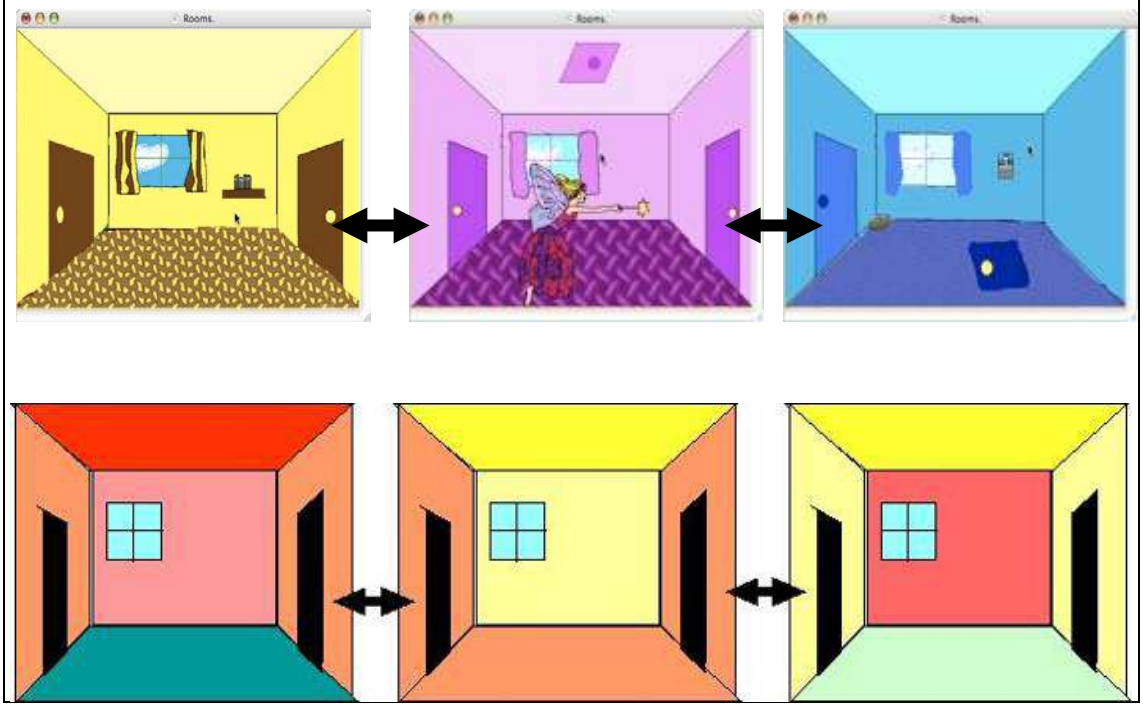


Figure 11 highlights how the students were able to readily grasp the idea, and that they acted on and interpreted them in their own individual ways. They introduced individual touches by decorating the rooms with different curtains and colour schemes, as well as adding characters such as the Fairy. That they were exploring the possibilities of this new environment is shown intriguingly by the innovation of putting an additional doorway in the ceiling of one room and another in the floor of the next room.

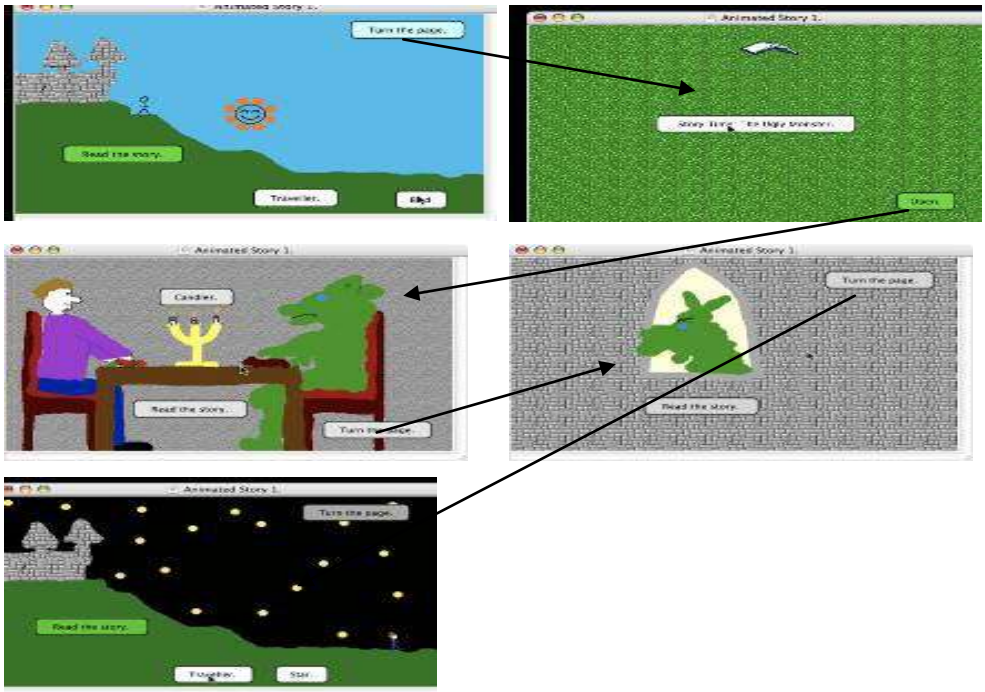
Snapshot 3.8: Initial reflective notes on second session.

I am still very surprised at the ease and speed with which these students are picking up these ideas and working with them. The class teacher is surprised at how the usually disruptive boys are also working on the task. The groups are working. In general there is a willingness to share each other's ideas and strengths and to support those who aren't too quick at 'getting it'.

The Second Week

By the beginning of this second week the students are creating stacks of their own design and imagination, incorporating their own drawings and including recorded sounds and voices. The screen shots below [Figure 12] shows one girl's stack with monsters and castles. Some of the buttons, when clicked take the viewer to the next stack; others display small animations such as a man walking or a bird flying. The arrows show the destination of the buttons when pressed. This example also displays the students' understanding of setting (a castle) and genre (fairy tale) as well as a designer's use of similar images under changed circumstances to advance the story: the first and last cards depict the same scene except for the backgrounds of a day and a night.

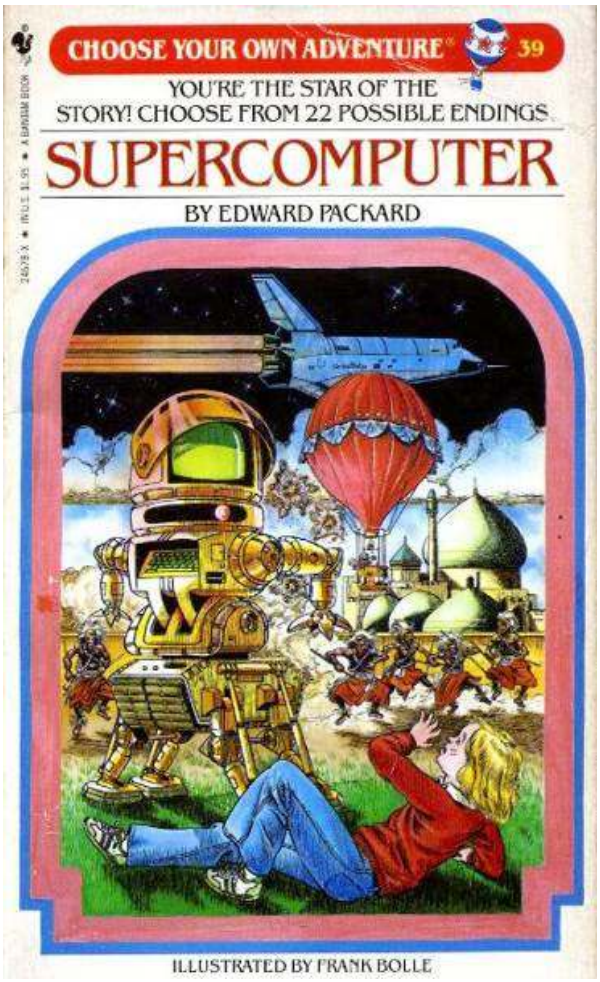
Figure 12. Animated Story- Monsters and Castles



The printed version of a simple hypertext.

Two non-computer based sessions took place during this second week of the program. The classes are still taking place in the computer room. Fortunately the room is big enough for the students to work away from the computers; the aim is to help the students to understand the idea of hypermedia in print form.

Figure 13. Front cover of a Choose Your Own Adventure Novel



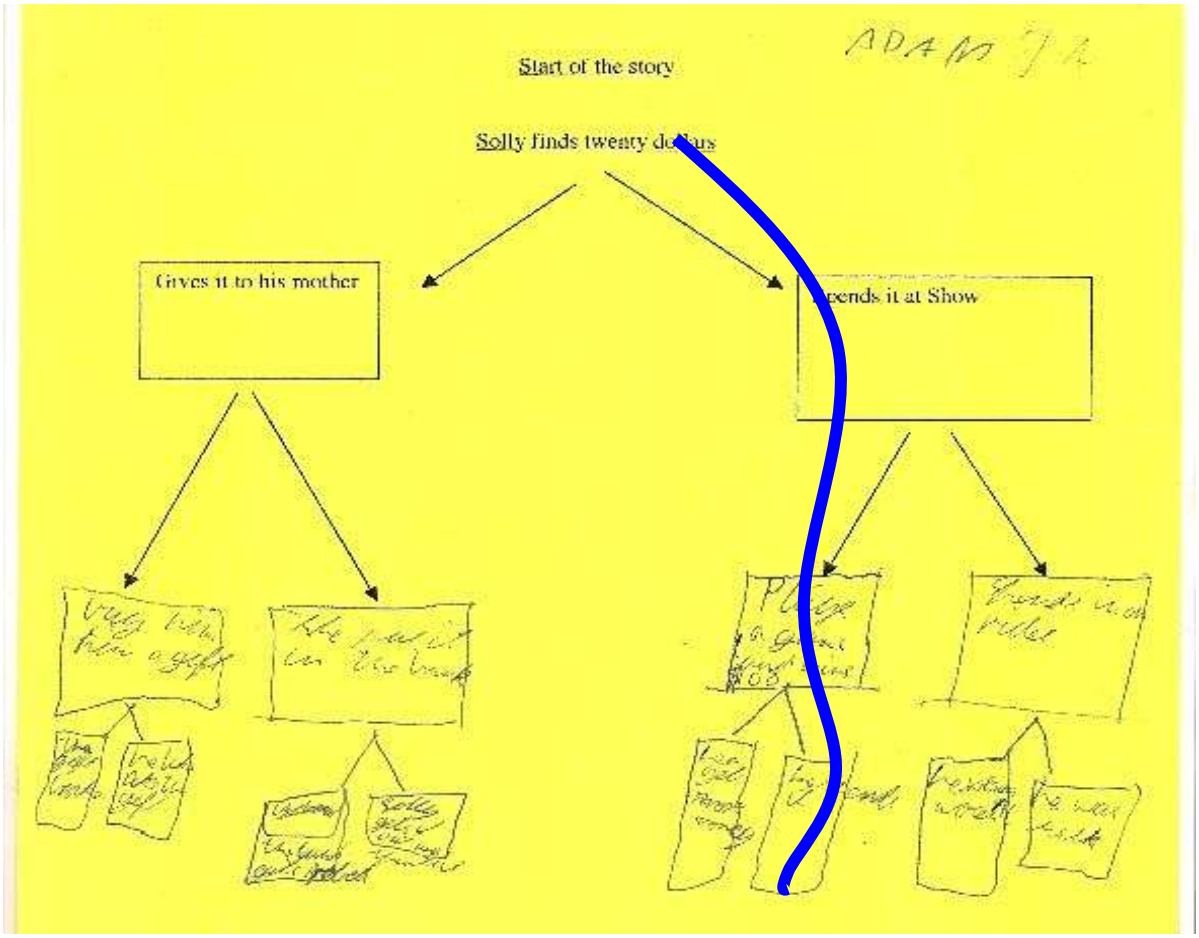
The school has a large collection of Choose Your Own Adventure novels available and the students are familiar with them. I borrowed 25 different books and brought them with me to the class. We (myself included) sat and read a novel each. The novels' plots are marked by a series of choices presented to the reader, usually at the bottom of the page. If readers wish to follow one possible plot line they turn to page 10, if they want another they turn to page 27.

The content of all the novels is similar to that of the one shown in Figure 13.

They invite the reader's involvement by proclaiming, "You're the star of the story!" Other titles include *The Curse of the Haunted Mansion*, *Prisoner of the Ant People* and *Outlaws of Sherwood Forest*.

After reading and discussing the novels and creating a list of possible plots a lesson was introduced in which students were asked to create their own branching story. This served several purposes: one was to introduce the idea of multiple choice stories into the students' imaginations, another was to explore the way each set of choices could create still more choices yet by following any path way through these choices was only to experience a limited number. In the example below the blue line follows one set of choices (or a plot) through the story. This path uses four of the squares or nodes of the story, yet there are fifteen nodes available. A variation on this would see the creation of pathway stories that reuse the nodes; another is the creation of a bounded space where a story can take place and so allow the viewer to navigate this space

Figure 14. Completed worksheet on creating a branching path story



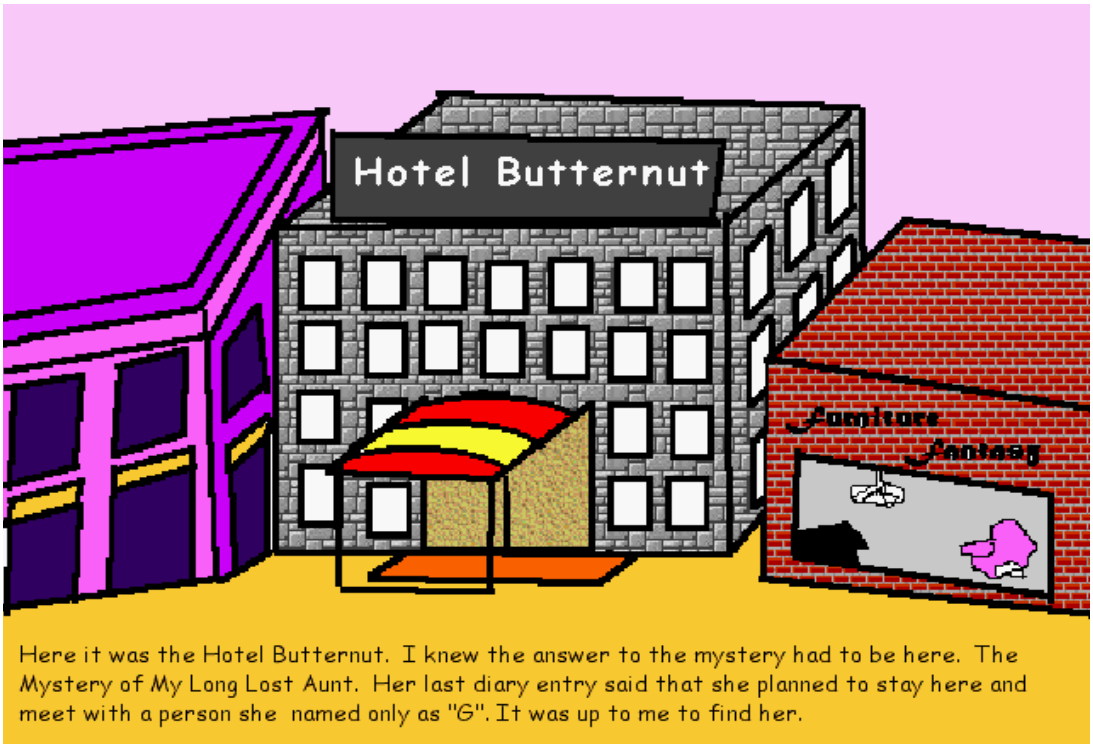
Snapshot 3.9: Comments in research journal end of second week.

These sessions away from the computers when I was leading the work were less successful, in terms of the students' attention and learning, than computer-based classes (my judgement). The usual 'culprits' are boisterous and certainly during the reading of the novels they are not engaged; not surprisingly, reading one of these books by themselves is beyond them. I give help with the reading, suggesting that the main activity is marking up the plots. We have visuals to represent aspects of the plots for the challenged readers and they are able to proceed and 'read' the plots and the components of the plots without needing text, which is a great development. This is an interesting development for me. I'm not disappointed in any way. Indeed, very much convinced of the power of working with the computers and hypermedia as an alternative for some of these students. We are actively considering the components of a story and the pros and cons of these, something we'd never normally do in a composition class.

Preparation for Hypertext story telling

During the second week I presented students with a hypermedia story I constructed myself as an example of how to work with the hypermedia program and with the idea of non-linear storytelling, Figure 15, shows one of the frames.

Figure 15. An example of Hypermedia storytelling –The Hotel Butternut



Snapshot 3.10: Extract from teaching notes on my construction of a hypermedia story (Butternut Pumpkin)

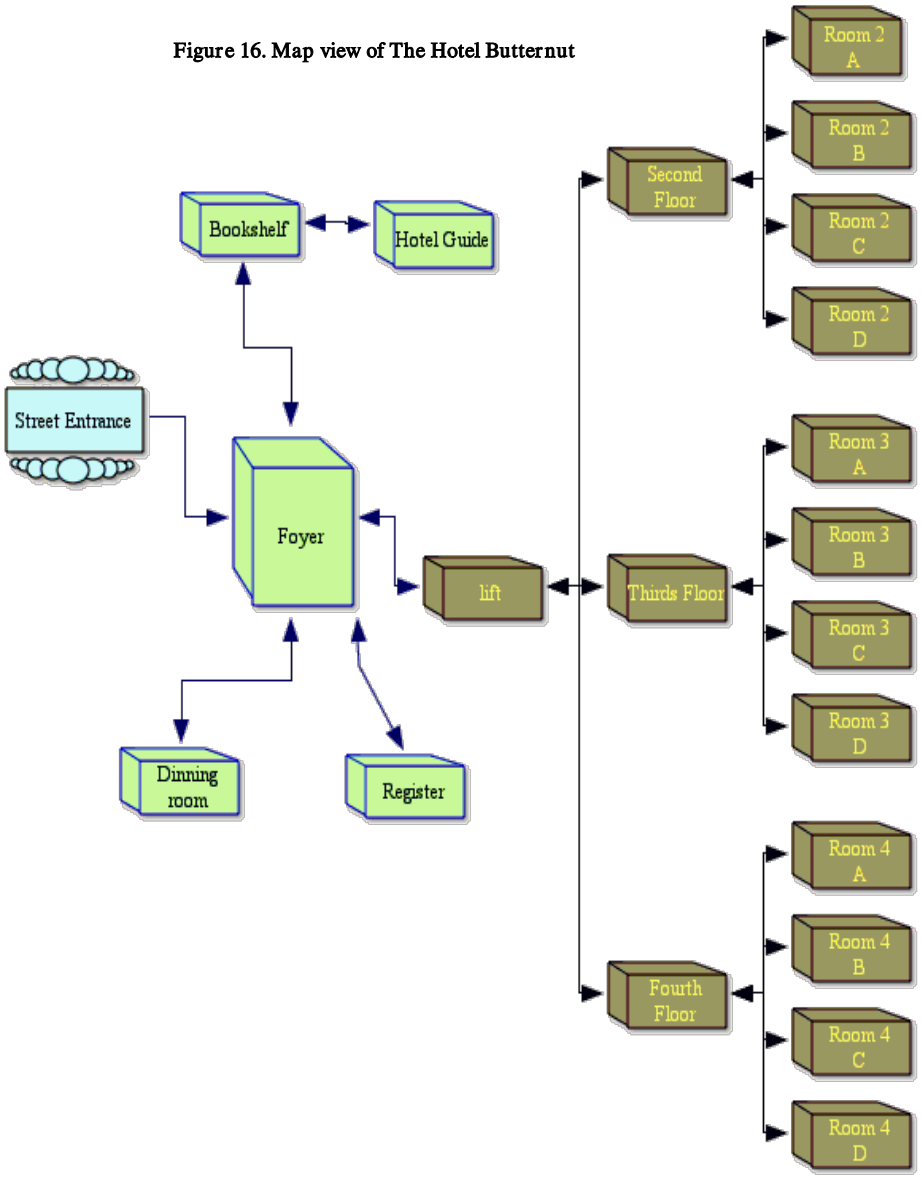
In creating the Hotel Butternut I deliberately drew all the features using the drawing tools of the HyperStudio program in a fast and rough fashion. I recorded my own voice as a sound file and kept clipart to a minimum. The plot was hinted at by captioned text on some of the cards, as well as clues in pieces of text such as books on shelves, or the hotel registry. The viewer was free to take the lift and look in the rooms and the dining room. It was also left unfinished. At the time I was considering allowing the students to finish the interactive story themselves, taking a room or even a floor and creating their own content, as Coover did with his university hypertext class (Coover, 1992) but I decided this would reduce the time available for the students to create their own interactive stories.

In designing the Hotel Butternut I used the model of a hotel that the viewer-

interactor could explore. The foyer became a central hub or node from which other pathways would extend. After the first iteration of the project with the Year Seven class I created a second example of a hypermedia story, in which the viewer-interactor explored a mountain setting. Suitable example material was not readily available, necessitating its creation from scratch. The example stacks created with HyperStudio and provided as supplementary material by the program's creators tended to be didactic rather than creative. I wanted the students to create fiction, so I created my own examples.

Figure 16 is a plan view of the Hotel Butternut. The arrows show the direction of navigation. These plans were completed after the hypermedia stories. This can be compared to the branching tree diagrams discussed below which are created before

Figure 16. Map view of The Hotel Butternut



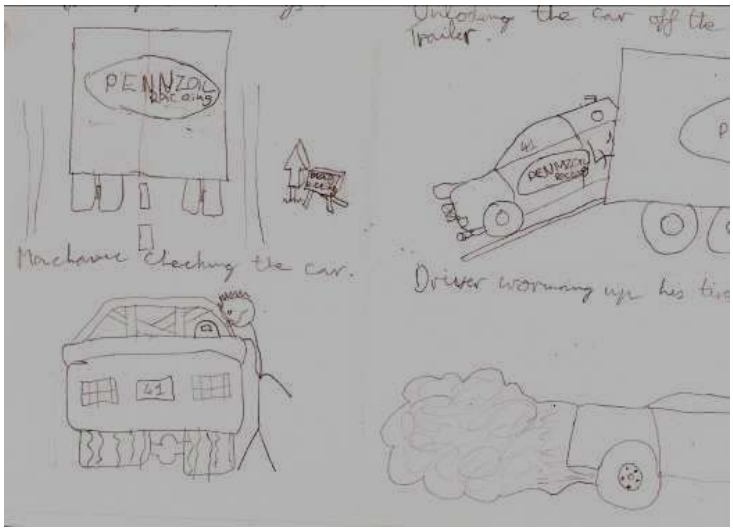
the hypermedia story and are part of the planning and design process.

Snapshot 3.11: Part of a report prepared for the Research Supervisor.

After the students became familiar with the Hotel Butternut there was a definite increase of interest in the project, even though there was no significant lack of interest previously. All the students seemed to have picked up the idea and appeared keen to create their own interactive stories.

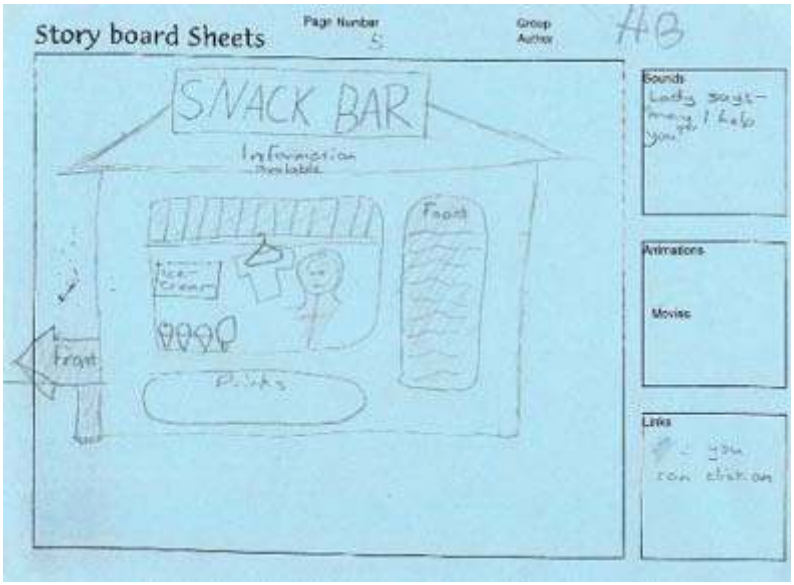
In this part of the project the students worked in pre-defined groups. The groups were set by the class teacher and included two boys and two girls of mixed ability.

Figure 17. Initial sketches of a hypermedia story



The picture in Figure 17 above shows the initial sketches of a hypermedia story about car racing (these students did not continue their plan and later joined another group with a Zoo theme). At this stage, I was allowing some morphing of groups. The concern was that all students should be productive and engaged and that they learned to work as a team. The idea behind the pre-defined groups of mixed gender and mixed ability levels (which I tried to maintain) was to get the students and the groups working and thinking in a slightly different way to that they would have done if working in friendship or ability groups. Sometimes, however, the groups morphed together or split apart and reformed later. It was interesting to watch the way

Figure 18. A storyboard template



this happened. At first, it was just a sharing between groups but then it seemed that couples, usually, would connect with another group and work on the storytelling together. At first I was nervous but I managed to stand back sufficiently to learn that on the whole the moving between groups was productive. I emphasised that they had to learn how to work together to a productive end. The class as a whole, each student in it, as well as the software and myself were supports to be used. Part of their challenge was to make the most of each other, but they had to be aware the overall exercise had to be completed and they had to be seen at the end as part of a group that had produced a finished story.

Story-boards

The illustrations of Figure 18 show the similarity of the early storyboards to

comics, with a mixture of illustration, text and the suggestion of action. The content reflected the boys' interests and is based on real events in their lives.

As ideas became plans and sketches started to become more complex, designed storyboard templates were introduced. These were based on templates used in the multimedia and film industry (Monaco, 2000). I impressed on students the need to plan out their ideas and to think about the content of each card before they started

Figure 19 Completed card for *The Missing Monkey*

working at the computer. I was very conscious of the timing of this step; I felt that planning at this level was only possible after the students had had some time to become familiar with the tools and the affordances of the software. I really felt that they needed to play, to immerse themselves in the "world" of the software program before they knew enough about what they *could* do, to know what they *wanted* to do. This process of exploring, then planning and incorporating, continued through the life of the project as some students discovered features not covered in my initial step-by-step lessons and passed them on to others creating a cascade effect of collaborative learning around the computer lab.

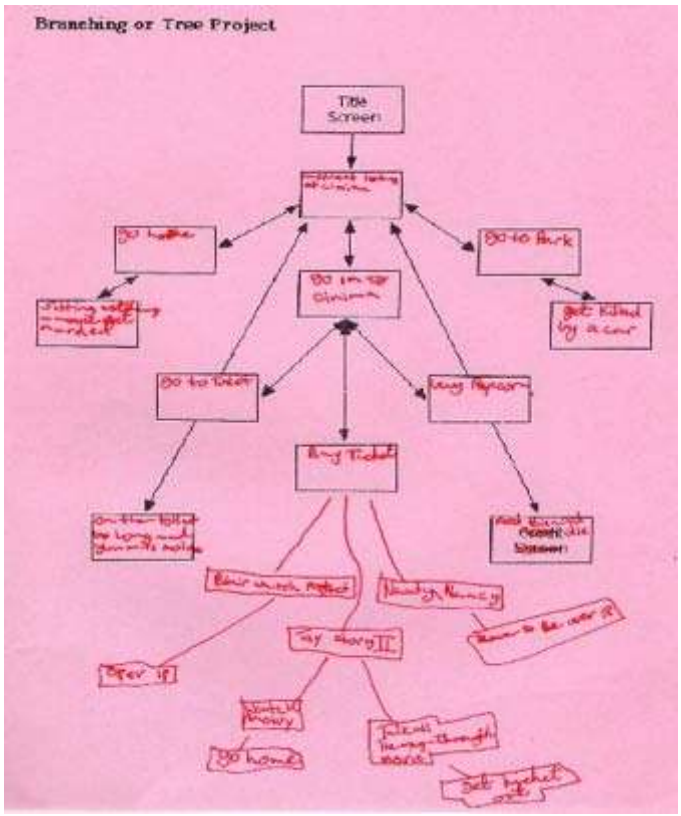
Illustrations completed in this stage included the storyboard (Figure 18) and the completed card for The Missing Monkey (Figure 19). In the storyboard you can see the sketch and on the right hand side a space for information about sounds, animation and interactivity. In the card you can see use of colour and (interestingly) less detail around the window of the Snack Bar than in the storyboard. Features not shown in the storyboard, but added when the card was created, were all the sound

effects; not only does the woman speak when clicked on, but the flowers and signs do as well. The food board hyperlink on the right of the stack, when clicked, takes the viewer-interactor to another card that shows an enlarged and more detailed list of foods plus a message about the Missing Monkey (this talks as well). In fact the detail that was in the storyboard seems to have been transferred in creating the interactive story into the sounds, animations and interactivity of the stack. This development reflects the nature of this pre-planning phase of the project. Students were required to do a lot of their creative thinking at this time, yet there was enough flexibility in the lessons that they could change, adapting new ideas and techniques as they came to grips with transferring their paper drawn plans into the hypermedia environment.

Flow diagrams

Another element common to multimedia design and filmmaking is the tree (or branching) diagrams. Similar to flow charts tree diagrams show the possible progress of the viewer-interactor as he or she navigates the hypermedia story. These were introduced to the students at the same time as the storyboard templates. In a sense each square represents a page of the storyboard; the series of arrows or branches show which cards (or scenes of the hypermedia) are linked together interactively. In the

Figure 20 Tree Diagram of *Woop Woop*



example shown in Figure 20, from *Woop Woop,* the square immediately below the title screen is labelled 'In Street looking at cinema', it has several arrows pointing to and from it and it is a central node in the hypermedia story.

One of the major drawbacks of using a readymade template like Figure 20 is the tendency to reach termination points, literally, in constructing the story. As you can see on the right hand side of Figure 20, 'In street looking at cinema' leads to 'Go to park' which leads to 'get killed by a car'. In the finished hypermedia this point then leads back to the title screen, a 'start again technique' common to video games.

Into the third week

Snapshot 3.10: Feedback from students collected in journal

"Sir, this isn't like real work."

"Can we please stay in and do this sir? It's better than doing our own thing."

"Oh, sir, can't we come in early and work on this?"

"Is there any way I can do this at home?"

"Y'know I know all of the kids in this class now."

"Sir, can we do this subject next year please?"

"Yes, I like books and reading but it's just real fun to do this."

"It's something different, and you're learning skills as well."

"Writing stories, it's not really like writing stories, it's more fun."

"I like writing stories Sir, but I like this as well, it's not really the same."

Snapshot 3:11: Comments on skills development and collaboration amongst students

The most consistent positives have been on the ways in which the students have collaborated and consequently developed skills. This has not been about my teaching, but about affording students the opportunity to work and assist each other. There is an eagerness to discover new things and an equal desire to show this to others. At times we have the situation that would have seemed impossible at the beginning where boys who are usually difficult or reluctant are actually leading or at least working with another who is leading the way in developing this or that. This enthusiasm is infectious and the English teacher, like me is very pleased with the way in which some of the troublemakers have just so changed their approach in these lessons. They really do see themselves as a part of the class activity in these sessions which is so good for them and for us…

The final sessions

Snapshot 3.12: Extract from journal entry

The conclusion of this intervention was perhaps its major failing. I misjudged how the students would become engaged and not focus on finishing. For me there was a task to be completed, like in any class. I had to let go of this and the whole thing sadly just finished, when the appointed time came. I flagged it and one or two teams stayed behind whenever they could, at lunch breaks etc., but some just didn't bring their stories to a conclusion, or if they did they didn't get the opportunity to show-case what they had done with the rest of the class. The groups had some idea of what was going on elsewhere in other groups but so much more could have been made of this.

Snapshot 3.13: Extract from subsequent reflections

An all too common lesson learned by teachers when undertaking a project is that there is not enough time allowed. At one level, this was my initial reaction in this case, but on the other hand I knew that it was more a matter of planning differently rather than taking more time. The intention had been to trial an intervention where students would learn new skills and develop the ability to collaborate in a storytelling exercise. At one level I realised that in the first weeks of the project I probably spent too long on the early, non-computer exercises, eager that they established a clear understanding of what they were doing. In the event they all understood clearly what they were doing. Their collaboration and working together ensured that as much as my lessons and teaching. The thing they lacked was time to work through the complexities of the stories they developed and the complex ways in which they worked to ensure a collaborative outcome. I had emphasised the importance of collaboration and a collaborative end product. They certainly took this on board. No group said they couldn't or wouldn't work together. They sometimes devised plans, which meant that one pair would work on one aspect and another on another, but always they worked towards a single completed story.

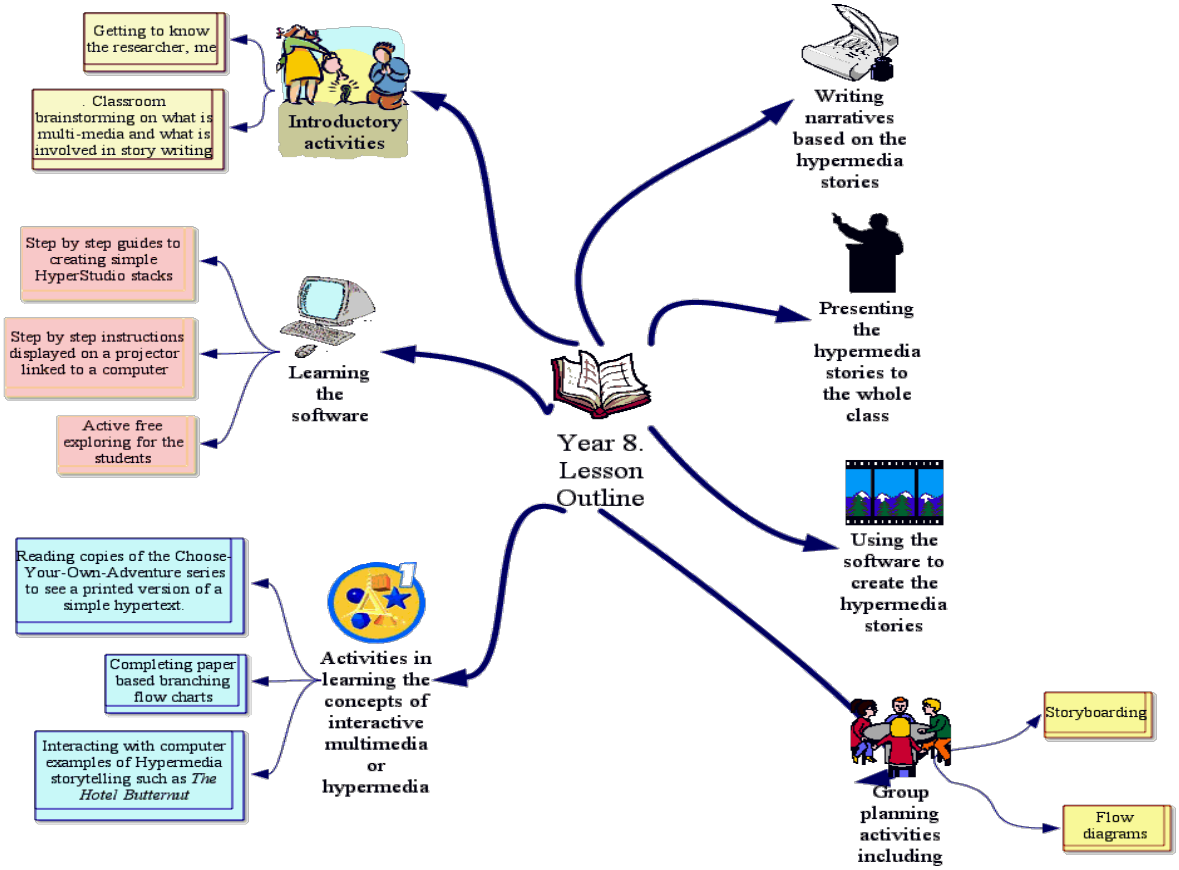
The Second Cycle: Lessons learned

There were three major issues with the way the intervention had gone with the Year Seven students and when the Year Eight intervention was planned I made revisions accordingly. My first concern was that I had spent too much time at the beginning of the intervention, taking the students step-by-step through the non-computer aspects of the processes. Also when they did begin to use the Hypertext

program, I had expected they would need close guidance, but they had seemed, or many of them had seemed well able to work without that level of help and I expected Year Eight students would be even more able, so in the early stages I decided to do much less hand-holding.

The second major revision was that I planned and timetabled presentation sessions at the end of the intervention when students could show off their work and learn from other students. A diagrammatic outline of the second intervention is shown below (Figure 21). The third revision related to comments made by staff at the school about whether the exercise had actually affected the students' ability to write stories in the more traditional way. I consequently also made time for the students to spend some time writing a version of the story they had created. Working at this individual level had not been a focus of my work, but given the interest by other English teachers in the school, I decided to include this exercise as part of the project wrap up.

Figure 21: Diagrammatic outline of Cycle Two with Year 8 students



Major similarities and differences between Cycle one and Cycle two

I do not present a step-by-step account of progress in this second intervention, largely because there were significant similarities both in approach and in student response. I do, however, focus on comment and evidence relating to the differences.

The English class teacher

The English class-teacher of the Year 8 students was more engaged than the Year 7 class teacher. Whereas the Year 7 teacher, an experienced male teacher, had been positive but somewhat at arm's length, this Year 8 English class teacher was keen and wanting to be part of things. She was committed to learning about doing this type of activity herself and enthusiastic about students of this age and incorporating the work as part of their main curriculum. The Year 7 teacher, on the other hand, had been supportive but there was always an assumption (if not an assertion) that this was *my* intervention and that something like this would be unlikely to be part of anything he did. Despite these differences and despite the fact that the students clearly appreciated having the interest and input of their regular teacher, overall the response and progress and outcome for students was very similar to that of the previous class.

Beginnings

Even more planning and preparation preceded this second round. Because I was keen to have fewer closely led activities in the second round and to encourage the groups to work at their own pace, I needed to prepare a wider range of materials to support students along the way. On the whole I knew where the most difficulties might be and the range of possible exercises that might help.

Snapshot 4.1: Extract from research journal

I am more relaxed and more open to allowing students to move at their own pace. Having said this I'm probably better at structuring and scaffolding the activities. I probably expected these students would be even quicker than the Year Sevens and they don't seem to be. There is the same range of student, some usually disruptive and bored with traditional schoolwork and those keen and eager to please and those who are very able but overall it's starting to look similar to the earlier class.

Endings

The conclusion of the second intervention was much more satisfactory than the first. A long and full day was set aside for the presentation of each hypermedia story. There was a main presenter who introduced the story but all members of the group took part in the presentation. Following the presentation there was a questions and discussion time, and whilst I led with comments and questions the class as a whole were eager not to just watch what other groups had done, they were keen to know how they had done things, and why they had done this rather than that.

Although it was a full day of presentations from first thing in the morning until the end of the last session, the attention of the students was keen throughout and at the end there was a reluctance to go, to leave the work, the story and the performance. This delighted me.

The writing up of the stories at an individual level.

Writing stories in text at the individual level had not been a focus of this project but this was what many of the teachers seemed to think this was the goal. I was not disinterested in this, but I had decided early in the planning of the project that it was strategic not to include such a comparison. I did not want my project to be seen, or to sell it, as a way of developing the more important skills of text written stories. For me the exercise was about thinking out and communicating stories differently. In the end, however, it seemed politic, given the considerable support the school and English department had given to me to add on a small exercise to see if there had been any obvious change in the storytelling skills of the students involved. The exercise consisted of each student writing down the story they had developed in hypertext.

Yin's Step Five

A preliminary evaluation and analysis

How to make sense of the mountain of data resulting from a case study is perhaps the major challenge of this style of research. Initially I focused on the outcomes of the intervention that is, the hypermedia stories themselves. Such a focus is clearly important (and is at the heart of the phenomenographic analysis) but this 'product' focused analysis does not address the significant learning experiences of the students during the intervention.

The more I revisited and reflected on this hypermedia intervention the more the actual learning experiences became paramount. The passage of time served to inadvertently force upon myself: that quality prescribed by Yin (Soy 1997, paras. 18-20) of remaining "open to new opportunities and insights", required of the researcher who conducts case study research, in order to "move beyond initial impressions to improve the likelihood of accurate and reliable findings".

Over time and after discussion with teaching colleagues and other researchers and several revisiting of the field-notes and journal entries, three aspects of the intervention resonated as especially significant. Perhaps, above all else, I was surprised at the extent to which the students had *engaged* with the task. In no other work I had done, or seen done, had there been such commitment and engagement by all of the students in the group; not just a few, or even the majority, but *all* of the students.

Following further discussion and reflection I was convinced that for me, another factor of major significance was the extent to which students *collaborated* on the task, not just in terms of working in the set groups, but how they worked across and between groups as well.

The final aspect that I decided would be a focus for me in the analysis of the case study was the extent to which there appeared to be significant growth in the confidence of students as they worked through the innovation. This was particularly the case with the more challenging and challenged students. These students appeared to develop a different sense of 'self' – of their own *identity* – in terms of their

relationship with the rest of the class and their confidence in the classroom when undertaking this innovation.

These three aspects – engagement, collaboration and identity – became the focal points around which analysis of the intervention proceeded. These issues were significant in the literature on The Middle Years of schooling and this literature was influential in my pursuit of alternative ways of working with literacy in the English classroom. Engagement, collaboration and identity consequently became the three lenses through which I explored and analysed the students' learning experiences during the case study intervention. The way in which this analysis unfolded is the focus of the following chapter.

Chapter 5: Analysis and discussion of case study

Introduction

In this chapter the case study is analysed and subsequently discussed under the headings of: engagement, collaboration and identity. As explained in the previous chapter these three facets became the focal points around which student response to the intervention was analysed and explored.

As work on and around the analysis of the case study took place there was ongoing discussion with colleagues, including teachers from the school and researchers from the university. The aim was to canvass views about the validity of these three foci for analysis. The conversations were usually undertaken on a one on one basis and informal, though they were sometimes taped and closely noted. Extracts from these conversations are presented in this chapter to assist readers in understanding circumstances and aspects of the case study that may require further illumination. It was always acknowledged that there is more than one way to work with any data-set and the colleagues who supported my analysis (by contributing expert advice) were not required to comment as to whether the three selected foci were the strongest or best categories for analysis. They were, however, asked to confirm that these three facets of engagement, collaboration and identity were useful lenses through which to look at the case study and that there were data to support their selection.

Much interest has been shown by educational researchers and government on the middle school years regarding the lack of engagement of students, in particular boys, with many aspects of contemporary schooling (Hill & Russell 1999). When using hypermedia I was interested in the level of engagement, in the extent to which the students could become focused on the task of the telling of stories with the aid of hypermedia. Like other researchers (Garthwait 2004), I did not separate out the use of computers and software from the tasks and activities that they performed with these tools. I considered the project as a whole, as an example of how a classroom teacher would set about teaching story writing with hypermedia, in the same way as another

teacher might use butcher's paper to teach students about poetry writing. The tools and the tasks are linked together as a complex set in a way similar to all well-resourced and planned classroom lessons.

In terms of 'collaboration', the students had been set to work in pre-selected small groups, each group to produce its own hypermedia artefact. It was important to incorporate a collaborative element in the project so they could support each other in working with a technology that was unfamiliar to them. Some theorists (Tuman 1992; Postman 2001) have called attention to the depersonalised, alienating nature of computers and see their use in classrooms in negative terms. The expectation in this study, however was that computers and a computer package might be used to actively develop and explore some positive co-operative aspects of using groups of students, firstly as planners of their own stories, where it was hoped the individuals would interact in new and exciting ways, then as authors or creators, where the collective knowledge and skills of the group could aid the individual to achieve as much as possible.

Examination of the students' engagement and collaboration revealed that they were taking on the tasks of hypermedia designers and authors in positive, purposeful ways. This appeared similar to Gee's (2003) observations of the sense of the identity he ascribed to video game players, who took on the identity firstly of being a person playing a game, and then as a character in the game as well. The students I taught were taking on an identity as hypermedia designers, then as authors as they constructed their stories (which they often called games), and then, when they interacted with the stories of their peers, they became characters with another identity immersed in the worlds they were creating. But the idea of developing 'identity' went much further than this. Playing around with roles and stepping into and out of character while creating the story appeared to help re-negotiate aspects of their identity in the classroom. It was also, I believe, one of the most rewarding experiences of the intervention for the students themselves: it was possible to see students grow in confidence and show their respect for others during the intervention.

The analysis that follows is consequently presented in terms of a series of descriptions that highlight the themes of *engagement*, *collaboration* and *identity*. A series of 'snapshots' similar to those used in the previous case study chapter is

presented as evidence. These ‘snapshots’ are developed into a series of ‘vignettes’; each vignette constitutes a series of ‘snapshots’ that together constitute evidence for each of the key themes of analysis: engagement, collaboration and identity.

The notion of using ‘vignette’ was devised by the researcher as a way of collecting together and presenting evidence to colleagues during early discussion around the analysis. The questions posed and answers offered during these sessions drew out useful and supportive information, and extracts from these discussions are also presented within the vignettes to provide additional information to assist interpretation and analysis. Often all themes are working together in any given snapshot. The narrative that is presented alongside, however, helps the reader to focus on a single aspect.

Engagement

Vignette 1: A focus on student Engagement with the task

Engagement Snapshot 1: Day 4. Computer Lab. Year 7 Class. Period 4 (12.45 am) from field notes

Three students are working side-by-side on computers. One notices that her companion has a box on her computer screen full of text.

"How did you do that?"

"It's in the Objects Menu, add a text object then you put that on the screen and click and then you can write"

"How do you put sound in?"

"Nadia knows, she was using it before."

The two girls gather around Nadia's workstation.

"Nadia? When you were adding those people you had them clap, how did you do that?"

The bell rings.

"Get us some hot chips will ya. I'm going to finish these buttons – Oh Sir? Will you leave the room open at lunchtime?"

The teacher pauses at the door, she realises the students are prepared to give up their own time during lunch to continue; that the students had now made the project their own.

Engagement Snapshot 2: Abstracts from discussions with colleagues on Engagement

Colleagues: So how common was this? Was this a one-off and this is why it was memorable?

Researcher: No, very common. I spent a lot of time with them in the classroom during breaks, particularly towards the later stages when they were trying to finish. They put in every bit of time they could.

Colleagues: Was this all the students who did this or just the 'keen' ones?

Researcher: No they all did…. Not every student stayed back all the time and some stayed more than others, but every student put in extra time and did so several times. Some of them, and this was actually the usually less keen, would have spent time after class as well. I had to say no on a good few occasions.

Colleagues: So why else do you believe they were engaged in a way not typical with normal work?

Researcher: The students were focused on this task, really focused. Any teacher knows that kids of this age just aren't really that good at keeping their mind on the task and I'm not going to say they were focused a hundred per cent of the time, because these were long sessions, but it was so noticeable. They didn't go off and talk about other things or do other things or want to leave the room or gaze out the window. Back then they didn't have mobile phones or at least not use them to the same extent they do now, so I'm not sure now… But no, on the whole this was the thing. I mean it wasn't just in class time either. They'd tell me about how they'd been meeting outside of the group to discuss it.

Engagement Snapshot 3: Extract from student comments collected during class

"Sir, we worked on it last night, some of us…. We talked about it and thought about the clipboard thing and we're going to do that now sir?"

"Sir can we swear in this if we want… and can we have like heavy stuff in it? …"

Engagement Snapshot 4: Abstracts from discussions with colleagues on Engagement

Colleagues: So what was it they were really focused on? Was it the computers, was it the novelty of the software, or was it the multimedia stuff? What do you think it was?

Researcher: I'm not completely certain. At one level, the students were introduced to an unfamiliar mode of teaching and learning, to a completely unfamiliar software program, and to a new teacher. So the fact that all of this was novel might have helped but on the other hand it could just as easily turn them off. They did have the more familiar task of creating a story, but it was a very different story, and of course they were also working in groups. Any of these things might have been a turn-on or a turn-off, I thought.

The software program itself proved to be a very attractive feature to the students. Initially I planned to use a precise stepped approach to introducing the program HyperStudio, using material from the accompanying manual and features from past lessons in multimedia document making. Each student received a photocopied sheet with the twenty steps. Each step in the instructional lesson was to be illustrated via the data projector and a large screen at the front of the room. The two classes in the research had different experiences of this lesson. In brief, the Year Seven class followed the first few steps closely but then it became noticeable that individuals were pressing ahead with the steps at their own pace. The Year Eights had handouts and guidance but all proceeded at their own pace. This had been part of the change to the re-run of the intervention. Overall I was able to see the same accelerated uptake of the program I had observed with the younger class but from the word go.

I could see the cheekier students' behaviour change once the computers were in use. So I guess this is significant if we're talking about engaging the students. I noticed this especially with William and Josh S. William was cheeky to me initially at times, but when in the computer room he was totally engaged, a dedicated follower of advice or instruction. Josh S complained about something about the project in Cycle Two, something trivial, but I noted that once we got into the computers and the software he was an intelligent questioner and explorer all the rest of the way through. The class teacher noticed and commented on this as well.

Engagement Snapshot 5: Extract from Year Seven teachers' comments taken at the time of the intervention

I have been amazed at William and Josh; they have just taken to it and really lost themselves in it. I've never seen either of them so taken with anything.

Engagement Snapshot 6: Abstracts from discussions with colleagues on Identity

Colleagues: So, was it using computers or was it using the particular software do you think? Or was it story telling in another medium?

Researcher: The story writing part of the project was conducted in tandem with the software learning. As proficiency with the software progressed the actual creation of the hypermedia stories started. Before this stage was reached the students took part in a number of lessons designed to introduce collective or shared storytelling, as well as how to create branching stories. These lessons were conducted on paper away from the machines. The level of class involvement or engagement though good and reassuring for me was not necessarily any different from any organised well-resourced class until I introduced The Hotel Butternut. This was the Hyper-Studio stack I had created as an exemplar use of the software for the students to follow The reaction was noticeable as the students interacted with the stack - "Cool", "Oh, Great", "Wow" were thrown about. Jessica, who in the first sessions had displayed perhaps least interest – that was just what she did, the teacher told me: show little interest – she got really quite excited about the Interactive Story, as did Dominic another difficult student. I remember the class teacher described it as a "moment of revelation" when the students realised the shape of the project they were undertaking. She acknowledged that the students just couldn't believe what it was that they were being shown how to do. We discussed the fact that this was so far from their expectation and yet so much within their capability

Engagement Snapshot 7: Extract from notes relating to the above comments from the Year Eight teacher

> This is remarkable, what's happened today. I don't think they had any idea what they were doing. It was all a bit exciting and different, but now it's opened up for them. They can't believe that they are doing this stuff. It is just so far beyond what they would expect to do at school and yet as you are showing it's actually just so within their ability and not so difficult to create within a classroom.

Engagement Snapshot 8: Abstracts from discussions with colleagues on Identity

Colleagues: So did this engagement stay at this high level or did it fall off?

Researcher: I believe the level of engagement reached a peak as the students' abilities with the program matured and they came to grasp the possibilities of interactive hypermedia storytelling. With the Year Seven class this was best illustrated when Nadia, Sita and Xanthe approached me excitedly after the project had finished with the news that that were spending their lunch hours improving their story (The Cowboys). The Year Seven teacher noted the increase of interest especially amongst the boys. "You have a winner there", he noted of Ben, one of his negative students who had a history of truancy

Colleagues: So, how did the way they engaged manifest in the way they worked?

Researcher: In both classes the co-operation and sharing of discovery, not just in set groups but also across the class, was, I think, a very good sign of engagement. For instance, there's one aspect of HyperStudio, a feature that reads out typed text in a machine voice, called Blabbermouth; I didn't introduce it to the students because I thought it was too deeply buried in the program and would not easily be found and would just cause frustration and problems. Well, it was discovered by a student pretty quickly and not long this after one student found it, the others, right across the room; they picked it up and began to run with it.

Another thing that showed their engagement was the great detail into which so many of them went; it represented quite intense engagement. The attention to detail of The Shopaholics, for instance in terms of the large number of priced items, meticulously worded signs and the recorded voices, was created by students whose usual output in English classes was at most the required minimum. That was Year Seven but in Year Eight, for instance, the class teacher pointed out she has never had any work at all from Dale C and Jake, yet they both created HyperStudio stacks and didn't just rely on others; they were in there doing the sections they agreed to do and completing it.

For me though, the last word goes to Dominic, who when asked what he thought about doing the project, and this after I had observed his active involvement at the screen for hours, replied: "It beats doing real work"!

Collaboration

Vignette 2: A focus on Collaboration

Collaboration Snapshot 1: Day 6. Computer Lab. Year Eight Class. Period 2 (10.15 am)

A group of students is gathered around a worktable, with a collection of blank storyboard sheets:

"We could have a shopping centre and the girls could do the business stuff and the boys could go off and shop."

"And what? Meet back later?"

"Look, I will do the Sports Power."

"I'll do Maccas."

"We will do the Myer Store, and I'll do the front stuff where people come in."

"Do you actually have to draw the people? Or do we just make it as if we're looking at what is happening?"

"We could use a silhouette or drawing the back of their heads or something, that might be a good idea."

"You're one of the people. Looking in."

"I get that."

"Maybe we could draw people in the background, like …"

"Like going to the movies or something."

Collaboration Snapshot 2: Abstracts from discussions with colleagues on Collaboration

Colleagues: Often I'm seeing collaboration in here but I'm not sure of the extent to which that collaboration is guided and expected by you and is great, but not necessarily anything more than students doing as they are told and to what extent they are working collaboratively on their own initiative at a whole different level?

Researcher: From the beginning of the planning stage of the project I intended to use co-operative groups of students to create the hypermedia stories. The form of the collaborations also needs to be explored. The students were physically placed in groups and the seating in the room was used to facilitate this. The classroom teachers selected sets of individuals to work together. Both class teachers sought a gender and an ability balance. The Year Seven teacher sometimes went out to "pitch opposites" together, with the stated aim of pushing students "out of their comfort zones", so that girls considered "bright and hard working" were matched with boys who were described as "dreamers" or "under achievers. This side of the breaking up of groups was left to the class teachers and there was consequently a whole range of groups, none of them of the students' own making. I was happy to work with this and just see what happened. I didn't have any pre-determined ideas of how it might work.

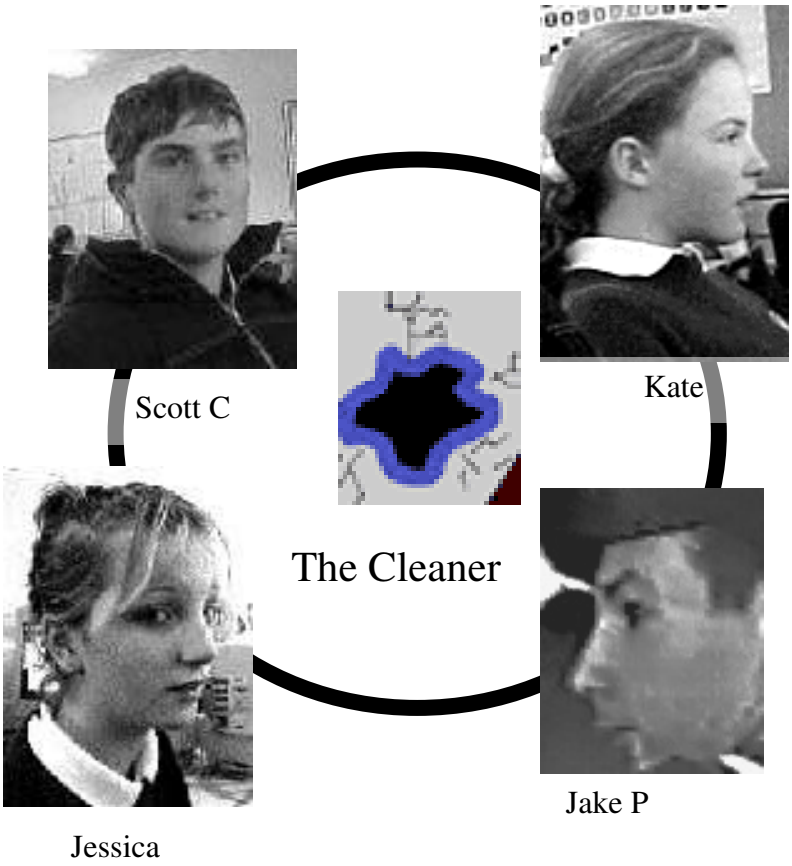
Colleagues: Was there a difference in the quality of co-operation within the two classes?

Researcher: On the whole, I think the groups more closely matched in temperament and maybe a bit closer in ability worked better together to produce coherent hypermedia stories, but having said this others showed really great ability to generally work co-operatively, across as well as within groups, and to split into sub-groups and work on something and then re-form. It was in some ways a more organic, free flowing way of working for the Year Sevens, which I think depended less on my expectations and more on their own innate ability, insight in progressing their own understanding, and producing something satisfactory to themselves. The Year Sevens were maybe more used to working in groups they had not been long away from junior school where table groups and collaboration generally is much more common.

Collaboration Snapshot 3: Collaborative work 'The Cleaner' from Field notes

The teacher explained that she had a collection of boys who believed themselves to be "bad" at English though when they were caught up in the excitement of a project they might forget this and actually succeed at the tasks. She also claimed a set of "normal good bright girls".

The group that went on to create *The Cleaner* consisted of Kate and Jessica, with Scott C. and Jake.



Kate was described by her teacher as the stereotypical girl who: *"Gets 'A' grades regularly", has beautiful writing, perfect grammar, perfect spelling, but her creativity is straight from the Hobbit (standard girl, damsel, prince, looking for fairies and hobbits) very structured, and hasn't anything of a truly original creative tendency".*

For this girl to work with Jake and Scott C and to have drug dealers and people who were shooting and dying must have been challenging, but she got on with it and learnt from working in this way.

Jessica, the other girl in this group was also initially aloof, but soon showed herself to be technologically amongst the most able and literate, or what as Prensky and others call 'a digital native' (Prensky 2001). Bookish Kate and technologically literate Jessica were not particularly

friendly before the intervention. Jake and Scott C, the two boys involved were also not friends. Jake had a history of school refusal, and was part of a remedial “Catch Up” class. He did not attend the first week’s lessons. He had no expectation this would be anything different to normal school and his aim seemed to be to avoid what he could. Once he arrived in the class, however, his attendance was constant. His initial comment to me during a brainstorming session was to suggest sex and rape as one of the genres we could pursue in our hypermedia story telling. Scott C was a shy and retiring boy. Neither Scott nor Jake had contributed any written material so far that year.

This group of apparent opposites sat around and planned out a story. Both the girls had established writing skills; Jessica was proud of the length of her stories and later told me how much she enjoyed writing stories. The process of plotting out the story was relatively unfamiliar to the students and at first the class teacher and I sat in from time to time to move the process along as much as possible. As a group they were initially unsure of a direction. The girls would have liked a fantasy theme but the boys rejected this they suggested a ‘real life’ setting. These initial discussions were interesting to observe as the boys tended not to have definite ideas, though they were aware of what they did not want to be associated with. The girls were keener to get into the actual multimedia.

I suggested that hypermedia, in the style we were using of an explored space, often worked well with a bounded setting such as an island or even a building. The boys were keen on a sports stadium (though if you examine the hypermedia you will notice the lack of any reference to sport). This was part of the pattern of their negotiated hypermedia. At one level, it was a great collaboration, at another level it was a series of compromises and at a third level it was a subversion of each other’s ideas. The girls tended to work quietly together with whatever emerged being presented and talked through by Kate, the most dominant of the two. Still, there was no doubt that both girls were involved and appeared to work well together, even though they had not worked together previously. The boys were clearly dominant in saying not only what they did and didn’t want the girls to fit in, but also in ensuring that their own wishes and desires did not disappear. So, in the end the space became a sports stadium with no sport; one door leads to an explosion (Scott C’s work) another leads to a cupboard full of sarcastic talking cleaning items. This leads to The Cleaner, a story path that leads to the cleaner’s home where she is involved with drugs and later goes to gaol (Jake’s work). The sports stadium idea was later subverted even more by

a new opening sequence (Kate and Jess's work) in which the viewer-interactor is presented with a disorienting blank screen and the direction to "Find the light switch" and, later, a mysterious black hole in the wall (also Kate and Jess's work) and a further subversion of the real world/sports theme with a return to the fantastical.

Collaboration Snapshot 4: Abstracts from discussions with colleagues on Identity

Colleagues: So what does this vignette say about collaboration in this project do you think?

Researcher: I am not suggesting that the positive collaborative nature of this experience is necessarily because of the use of hypermedia or even computer equipment in the English classroom. I am suggesting that the use of computers acted as something of a catalyst that spurred different responses, and the taking of risks in producing schoolwork that the members of the group might not have attempted otherwise and which enhanced the experience of working together. There was a task that linked with aspects of their life beyond the classroom. The task was real and exciting and they connected – engaged with it – and were committed to working however they could, to complete it. Clearly they could learn from and through each other as well as from and through teachers and texts, and they had no hesitation in doing so.

Collaboration Snapshot 5: Extract from Teaching journal on good collaborations

I've started to itemise the different ways in which these students are collaborating. It goes well beyond my expectations.

First, there's the fact that they are just working together, sitting in their groups and getting on with the tasks in hand. There are no complaints about who they are working with or what they have been asked to do.

Second, in the planning of the story, they're given guidance in how to work, but they are flexible in how they do this. It seems as though they're keen to get on with the task and the task is more than creating a story it's having this hypermedia artefact at the end.

Third, they are just so good in sharing skills and in seeking help. They work together, but they move around the room seeing what is being done and how it is being done and learning from each other and there is no jealousy or resentment about sharing and helping.

Fourth (or it might be part of three) they seem happy to support each other in the learning of new things. When they discover something they're very happy to share and not caught up with keeping it to themselves for their own use.

This sort of working together is I think the consequence of a whole range of things coming together. I don't think it would be easily reproduced in classrooms.

First, there is the novelty factor. They know that they want to work on this task but they are unsure how and so they are willing to do as they are requested and work in the set groups.

Second, they really want to develop these skills. They realise that the way to do that is to see what others are doing.

Third, when they do achieve they are proud they want to share

Fourth, they, it just hasn't been set up as an individual exercise where there is individual completion and expectation.

Fifth, they want to complete the task because it is a task they want to do and experience and they want to see the outcome, so they are keen to make sure they stay on task to do this.

Collaboration Snapshot 6: Extract from Researcher's written comments on good collaborations

Good collaboration seems to need a real focus around which individuals can operate. Much of contemporary schooling does not pose a real enough problem for students working in groups, or individually, to engage with. The problems that are used are often artificial 'educational' constructs thought up from the perspective of the teacher. The nature of the hypermedia task, to use this new and different set of technology to create a story, was an engaging and real enough task for the students to encourage them to come together in a collaboratively positive way. In their day-to-day life, technologies like communications and computing are rapidly becoming ubiquitous. When information communication technologies (ICT) are presented in their classrooms they do not see this as novel or threatening, or as "an interesting example of modernity" [Tan 2009, p. 4]; they are just expected.

Identity

Vignette 3. A focus on Identity

Identity Snapshot 1: Day 8. Computer Lab. Year Eight Class. Period 2 (10.30 am) from field notes

Brett is sitting at a computer demonstrating to Holly and Ashley how his interactive story works.

"Now you are going into a cemetery and you can either go to the graves or the gravedigger's hut"

"So who are you? Just a kid?"

"Well you can be a worker … or someone who hangs around graves"

"Cool!"

"Now in the gravedigger's place, you have sort of a mystery, you have to click around to find this piece of paper, and then you have to get back to the graves."

"Look! Who's that? A zombie?"

"It's Johnny Howard and you have to click on him to kill him. Then God comes along and thanks you."

"Only you could come up with a story like this Brett"

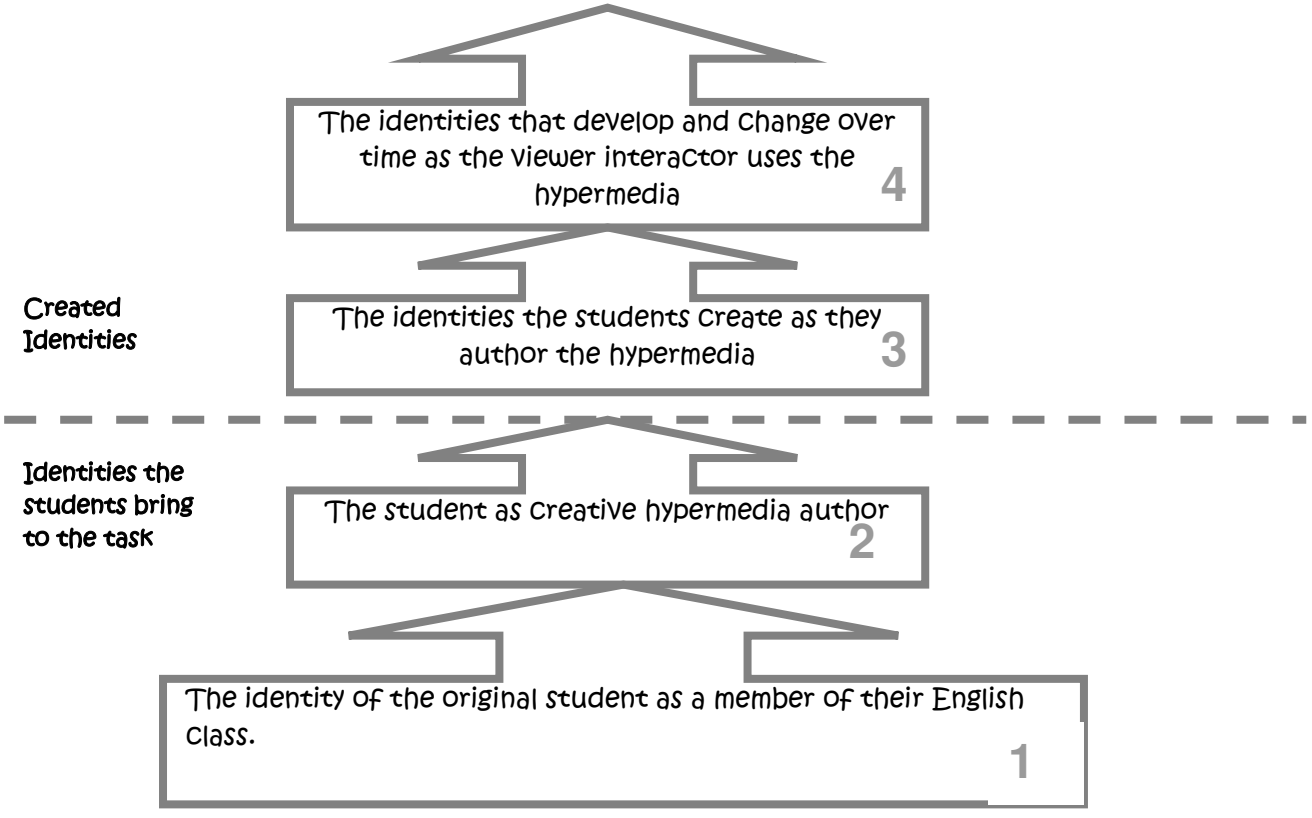
It was clear to me that through this initiative the students had grown in confidence in the classroom, in commitment to coming to the classroom, and in feeling satisfied and rewarded when they were there. They were engaged with the tasks, they were committed in their collaborations and they were being praised and rewarded through the development of skills and through the creating of a hypermedia artefact. It was a little while, however, before they formed the idea that these achievements might be presented as a development of their sense of self and that this might be another lens through which to analyse the intervention.

Reflecting on the theme of identity it became evident that to explore this notion was particularly apt with this hypermedia intervention. In the hypermedia authoring process the students were at one level identifying and projecting through the characters they created and the stories they told. At another level they were gaining confidence and identity as hypermedia authors and at yet another level, because of success in these previous areas, they were seeing themselves differently as competent individuals within the classroom. So, 'identity' here encompasses the notion of self in four distinct ways. This is displayed in the diagram below (Figure 22) where, at level 1, the student's identity is initially engaged as a (perhaps) reluctant member of an English class. This self develops to become a constructive creative member of a multimedia authoring team, represented as level 2. There then comes further development or transition as the student takes on, through their own creation, the characters that are part of the hypermedia story, that have identities within the story (at level 3). These characters re-focus or vector to align with the identity or self which potential readers of the story (the other students in the class, or the viewer-interactor) will use to navigate within and through the story (level 4).

This function of identity can be made explicit by using the example of the group who created *The Cleaner*. Kate possessed that identity in the classroom seen in the comments made by her teacher and quoted above, in her reports and in her own self-descriptions from the survey results as an effective English student. Jake had an identity almost completely the opposite, as a student in need of remedial literacy assistance, a frequent school refuser and at times a disruptive element in a classroom. These identities align with Level 1 of the schematic. In the hypermedia story-authoring classroom both were able to redevelop their classroom identities. Previously, neither had an identity as a user of computers and definitely not as users of a software program like HyperStudio, but they developed this aspect of their identity by engaging with the process and achieved a Level 2 identity as competent in certain skills and as good collaborators.

As they engaged in the activities of creating interactive narratives they created characters with identities for their stories; in Jake and Kate's example it was The Cleaner of the sports stadium. The Cleaner is not particularly complex but she does undertake some actions that further develop her character: she cleans and does a good job; she returns home, there is a domestic side to her life. She goes out and buys drugs

Figure 22 Diagrammatic Representations



and she is caught by the police, arrested and goes to gaol. A bit fantastical maybe, but here is a character brought to life out of two imaginations, each learning and teaching something of their own and of others lives and imaginations as they co-construct the identity of the character who becomes the central player in the hypermedia story.

There is a further identity that is relevant here, not hitherto mentioned the identity of the interactor/viewer who engages with the hypermedia story. In the particular way the students created *The Cleaner,* this exploring character cannot interact directly with the cleaner but is able to follow her through her work her travel home and observe what happens to her. This interactor/viewer emerges through the viewing. Through the viewing they become aware of the creator/s of the story and aware of the skills and talents of these creators and this contributes to the changing identity of the creators at Level 4, as successful hypermedia story creator, as skilled technician, as good collaborator and as someone who has gained success and praise from both teachers and students during the exercise.

In another of the hypermedia stories, *The Cowboys,* the identity of the viewer/interactor is more concrete. The interactive story addresses the user directly and calls her a sheriff. The sheriff has a task to perform, in that she has to solve a crime. Gee stresses in his work that identity occurs in terms of the identity the user or interactor in a game (or in our case an interactive game-like story) wishes to have, as a hero, say, or at least as a honourable person. This is an 'aspirational identity'; it is what we, as a viewer/interactor would like to think we should be, as we interact with the story. It can also be an anti-aspirational identity as adolescents may choose to react in the opposite way to any perceived suggestion of a "correct" or preferred identity.

The hypermedia stories, though not complex and often too short for sustained analysis, are still varied enough that a range of characters being established can be perceived. The grave visitor of the *Totally Wild Cemetary* (*sic*), mentioned in the vignette that introduced this section, has the identity of a solver of mysteries, an explorer of "spooky places" in the long tradition of horror movies and novels. As in a horror movie the character is subservient to the atmosphere, plot twists and sudden shocks of the genre. The character in *The Cowboys* mentioned above, is defined as the Sheriff and has a definite role. *The Cowboys* is interesting too, in the way that the

process of interactivity itself seems to have an identity – and a slightly acerbic one at that – in that it addresses the viewer/interactor as the sheriff personally, telling her to "get on with" the task and not to "waste time".

Identity Snapshot 2: Abstracts from discussions with colleagues on Identity

Colleagues: There really seems to be two quite distinct aspects of identity that are being explored here. The first is closely aligned to creating within the hypermedia story. The second arrives as a consequence of confidence gained in working successfully on the project.

Researcher: That's exactly right, but I think they do come together when the student as a successful hypermedia creator and creator of characters (and identities) within the story emerges as a student who has successfully completed this hypermedia task and in so doing is now seen by others as both a student successful at the hypermedia task, but also a student who has aspects to him, in terms of what he has created, that were not known previously. It's like being good at maths in the classroom doesn't just give you the identity as a good student it gives you the identity of a student who is good at a certain type of thing.

Colleagues: So tell us about the identity of these students as they emerged as students of English?

Researcher: The initial overall aim of the project was to develop the students' ability to create stories and to introduce to them all the elements that make up the storytelling art such as settings, plots and characters, themes and meanings. These are all here in the traditional English storytelling class, but many of these students wouldn't reach first base with this because they hadn't managed to acquire the fundamental literacies to allow them to move into these other more complex areas. But what this project did was show that they could develop these skills and that they were greedy to develop them.

This relates back to the 'Engagement' issue; it was not hard to get these students to put in the work and time to do what had to be done. But put them back into the situation where they were trying to write stories with text and they couldn't. As before they became bored and lost interest. Developing the traditional literacy was still a great stumbling block. The new forms of literacy were not the same issue for them. So the school, or some teachers there, were interested in seeing how they had developed their English story-writing skills after the intervention – and frankly they hadn't. Those who could write stories before could still. Those who couldn't still couldn't. Not surprising to me, writing traditional literacy was not what the intervention was about. What they had developed was an ability to tell stories through hypermedia.

Colleagues: So, those who had been good at writing stories to begin with. Can we focus on them because so much of what has been said is about those who were challenged by traditional literacies and who had clearly gained much.

Researcher: In terms of the text stories they wrote at the end, it is possible that they might have shown greater awareness of setting, plot, character development etc. But to be honest I didn't spend much time analysing this. I never saw this as what the study was about.

In terms of how they developed their identity, yes, they did develop differently; they were seen to be good students to begin with. They didn't have an issue with having to go to school and they liked and were pretty competent at writing stories in the traditional mode. I think their identity developed in part because they became seen as girls, this group was a group of girls, who could work with and get on with students who were typically seen to be difficult. They got some kudos and self esteem from this. Traditional 'straight A' students, like Kate, might be seen to be timid and retiring. I think they might think of themselves in this way. After this exercise they had showed themselves to be far from this and this was great for them.

They also came to see themselves as collaborators, very good collaborators. Again, 'good' students are often encouraged to just get on with their own work and succeed for themselves, which can set them apart. After this there could be no doubt about their ability to work together, to support others and to get help from others themselves when they needed it. In this situation where skills bases were not already established they were just as likely as anyone else in the class to need help.

They also began to see themselves as students who did now have a degree of computer literacy, which is something that teachers and parents and many other kids at that stage would not have. Jess, in particular, was amazing; she picked it up so quickly. She really seemed to have a gift. This was something she established about herself and that others recognised in her, that hadn't been there before.

At the end of the sessions the classes, as groups, had certainly changed their identity overall. I think this was very noticeable. They were more cohesive, more confident as groups.

Conclusion to analysis

Data and discussion that support the interpretation the case study in terms of the three areas of engagement, collaboration and identity has been presented above. In the second half of this chapter I discuss the significance and consequence of such an interpretation in terms of the development and schooling of Middle Years students.

Discussion of the case study and its analysis

At its simplest this study was an experiment in teaching and learning with middle school students. It picked up on a concern of my own – that 13 to 14 year old pupils are often disconnected and disengaged with the 'literacy work' undertaken in their English classroom and yet engaged and excited with new literacies not typically associated with school-based learning, such as video games or at the present time, texting or Facebook.

This half of the chapter discusses what emerged as a result of doing literacy and telling stories differently. It discusses what happened when 13 and 14 year-old students were helped to develop hypermedia skills and to produce their own digital narratives – a task closer to their regular world of both work and play.

The school in which the study took place and its community, can, in many ways, be seen as representative of provincial Australia. A large city was just over the horizon, the major industries were rural, yet increasingly commuters were moving in as farming itself required fewer and fewer workers. The school formed an integral part of the community, and had a long local history; generations of school students had passed between the faux Greek columns at its entrance. The school was reasonably well equipped with information and communication technologies. It had three "labs" of twenty computers each, for a population of 500 students. The state-mandated curriculum was followed, more or less. Many teachers were computer users and some integrated digital technologies into their classrooms, though most did not. Classes were in many ways the same as they had ever been and followed what Tyack and Cuban (1995) call the "grammar of school". Bells marked the day and rooms were organised in rows of desks. Blackboards prevailed, text books ruled, exercise books were filled either with class notes or coarse drawings of the teachers. Same as it ever was.

The purpose of the descriptions above is to emphasise the ordinariness of the setting and the participants in this study. This is done not to condescend but rather to place their ultimate achievements into a context. They were marvellously average in their interests: local sport, television and popular music some computer games yet in a short space of time they all became multimedia authors and digital storytellers.

It is important to note that this research took place at a time when the Middle Years (MY) reform movement was active. As a consequence of attending to both the outcomes of this investigation and being immersed in the concerns of the MY reform movement personally, three major components within the research become central to analysis: these were the engagement of the students in the learning of hypermedia storytelling, the use of collaboration as an element to support learning within the classroom, and the ways in which students developed identity as students and learners within the classroom. These three issues served as an organising structure for analysing the case studies and the following discussion proceeds along similar lines.

Engagement

Perhaps the most noticeable aspects to emerge from the case studies was the engagement of the students with their task of creating the hypermedia stories. In their learning of the software involved, and in their grasping of the concepts of branching, multiple path storytelling that the use of the software allowed, they were engaged and enthusiastic. They moved readily through the set activities and very often went beyond minimalist responses, into creative and complex ones that were opened up by the multiple threads of activities within the larger assignment.

A major concern of educationalists and the wider community current at the time of this research, and continuing to the present day, was the growing alienation of younger people (particularly boys) in their attitudes to schooling (Green, 1993). The causes of the disengagement appear to be varied but in part have been suggested to be a reflection of deeper societal changes, including the use (or lack of use) of contemporary relevant issues and technologies in schools (Cormack & Cumming, 1996a). By explicitly using contemporary technologies as an integral part of traditional subject areas, this research has the potential to contribute to discussion in this area. This parallels the concerns expressed by the MY reform movement (Victorian Department of Education and Early Childhood Development 2009) which also sought to address the alienation of modern students by emphasising the need for more relevant and engaging responses from schools, schools systems and teachers to the needs of contemporary young people. They saw technology as important and emphasised the need to work with computers and contemporary information systems

inside the classroom (Victorian Department of Education and Early Childhood Development 2009). This focus on technology, however, was just a part of the wider discussion and concern about relevance of the curriculum to modern young people.

The use of computers was central to this study. Although they may have some analogies in the printed world, the hypermedia stories created by the students can only exist in cyberspace: that is, their multimedia nature and their interactivity can only be accessed through computer mouse, keyboard and screen. This focus on the computers as central learning devices has major implications for teaching and learning and assessment in the classroom that have bearing on the extent to which the students engaged with this hypermedia storytelling task.

Of major significance is the fact that this hypermedia intervention required a good deal less teacher talk than a traditional lesson. In this case the teacher was no longer at the centre of the action, rather it was the software and what could be done with the software that took centre stage. The teacher's voice as the source of information and instruction, though present in the earlier classes, became less common. There was less 'teacher talk' and as Goodlad (1984) points out, the less the teacher talks the more the students appreciate the subject area; they "prefer to be active participants in learning rather than passive recipients of information". This was very noticeable in the research classes, as the need, and indeed desire, to provide direct instructions became minimal the students became more exploratory in their approach to the software and to the main tasks of planning, designing and creating their hypermedia stories.

The stories in themselves became exercises in problem solving. The students began to ask, and answer themselves concerning, how to create this effect, how could this idea be shown, and, for instance, 'can monsters be included?' This problem and answer approach involved the teacher working collaboratively with the students, but increasingly as the research period progressed the students collaborated together with each other, sharing the results of their own problem solving, swapping explorations, acting as mentors and guides to each other.

A second factor considered significant in the extent to which this project engaged students is the fact that working with computers does, or certainly at the time of this study, did, carry some status. It has status with students because it is a part of

the larger outside world of 'real' things. As one of the students expressed at the end of another long but productive day at the screen: "It feels good to do real work." It had status with staff because it is well supported in the rhetoric of schools and governments though minimally mastered by the majority of staff. This research started at a time when the use of a computer was increasingly being seen less as the preserve of 'nerds and geeks', and more as one of the necessary skills of modern adults. Medicine, science and business were implementing major uses of these technologies and proficiency with their use was now seen as necessary to make one's way successfully in the world.

A current axiom of the time and still current amongst teachers is the saying "I didn't know how to use the computer so I asked my eight-year-olds". This compares with the similar apocryphal feeling of the previous decade that nobody over the age of twelve could program a VCR. This age division that allegedly pertains to computer competence and knowledge, later discerned as the "digital natives/immigrants" (Prensky, 2001 #258) divide, was immediately noticeable in the school used in the study. The students took to the use of the equipment eagerly and swiftly whilst their teachers were hesitant and in some cases reluctant to adapt to or adopt their use. Research (Sefton-Green, 2000; Carrington, 2006) suggests that this is still a quite widespread phenomenon. Paradoxically by acting to reinforce amongst the students the idea that technology was *for them* and was not necessarily a part of their school experience, the use of computers became a part of that experience; and an engaging and interesting part at that.

High amongst the reasons why students became so engaged with the task was the fact that the students enjoyed using the computers. Young people increasingly use computers, computer-based video game consoles and other similar devices as a major part of their leisure activities (Beavis, 1998; Buckingham, 2003) and see these devices as sources of pleasure and excitement. This was the case ten years ago and is even more the case now. In contrast many adults and most of the classroom teachers at the school at which this research was conducted, were uncertain and even ignorant of any real uses, yet alone benefits, of computers. It is not surprising then, that the students became engaged in creating hypermedia stories; they were actively involved in creating something quite like the games in which they invest so much time during their day-to-day lives beyond the classroom walls.

But this work was not just fun, it was challenging. Another insight into understanding the students' engagement with computers and hypermedia creation relates to a comment from Gee (2003) regarding the fact that the level of respect young people give to their computer games involves their difficulty. A game should not be easy and 'doable' but rather should present a challenge whose completion or advancement within confers of status and signals that the individual who accomplishes this feat has real prowess. This applicability of prowess and status is often transferred to any proficient use of computers, which in this research meant being able to construct hypermedia stories through mastery of the software.

With respect to engagement it is clear that the use of the computers was certainly a major factor, but computers have to be used within a specific context. Computers involve the use of task-specific software and generally (and particularly in schools) these tasks/activities have a purpose: to communicate, to find information, to be creative and to have fun. The purpose in this study was for the students to create stories, which combined elements of all these activities.

Writing stories 'creative writing' as it is sometimes termed, has been an important aspect of the English curriculum for many years, and is strongly emphasises in local state based guides (Victorian Curriculum and Assessment Authority 2002); it was also well established in the school lives of the students in this study. Their classroom teachers had reported on the variety of creative writing exercises they had already done previous to the research, including work on dinosaurs. So although creative writing was an area with which the students were familiar, they were not familiar at all with the use of computers in this context. (In fact this was true of computer use in almost every context outside of the compulsory Information Technology (IT) classes.) This familiarity with creative writing did not mean they had all had success in this area. The teachers though satisfied with the general progress of the classes in previous writing exercises, did remark on the almost total disengagement of several students with creative writing tasks before the research. This is hardly surprising given that some students found it challenging to write text at all, never mind construct plots and characters.

One benefit with using the creative writing slot as a place in the curriculum through which to engage the students with hypermedia and computer use was that,

when it came to topics and subject matter, they were not expected to complete closed tasks resulting in the collection of specific information or facts. In a way this mirrored the exploratory nature of using the software, as students were able in their planning to try ideas out, to map them out tentatively, sharing again with each other, swapping techniques, reaching compromises and ultimately producing their creations. That the finished products were the students' own creations from start to finish also brought with it a sense of owned achievement. Additionally, the creative nature of the task allowed the students to concentrate on those areas most engaging to them as teenagers; topics such as shopping and socialising, murder and death, humour, mystery and exploration were for once worthy of discussion and representation.

There is discussion and research around the gendered nature of students' responses to computers and computer based activities. When creating the hypermedia curriculum I was aware that girls have been reported to be less engaged and less successful in this field (Anderson, 2008). Hypermedia storytelling, with its connection to creative writing activities in which girls are typically seen to be more successful than boys, not exclusively was chosen deliberately; by so doing I hoped to make the whole exercise of computer use more attractive to the girls. Looking at the responses in retrospect, these was something I need not have worried about, as the girls did not display any hesitation in using the computers and by any measure were equal to the boys in terms of the quality of their work. At the same time I was aware from my own experience as a teacher that boys trended away from linguistic fluency with their storytelling, often lacking the textual skills to express themselves as fully as they would wish. I saw multimedia and computers as storytelling devices, a way to give the boys a 'voice' as well.

Linear texts were, and continue to be, the normal way to construct stories in schools. Non-linear texts were certainly available and most students were familiar with the 'Pick-a-Path' novel concept (Packard, 1986) mentioned earlier. Still, the jump from a textual world to a computer-centered world of multimedia and hypermedia creation was new.

Although this hypermedia exercise was similar to writing textual stories – with their attendant characters, settings and rudiments of plot – what was actually happening was that the students began creating worlds. Within these worlds there was

the development of plots but before a plot began to take shape a world was created. As possibilities opened up within these created worlds plot lines opened up. These students were used to plot lines developing through linear text, but the possibility of plot lines developing, meeting, morphing or dividing in hypermedia was a new challenge. Invariably the plot lines expanded the created world and the development of plot and consequently the expansion of hypermedia story world became an iterative process. Some of the groups employed detailed and complex plot lines in stories such as *The Cowboys*, *The Cave* and *Timmy Tigers Fun Faire*, but many did not; nevertheless these groups still expanded their hypermedia world, or *space*. Things still happened but they were not of the nature of the more conventional plot in which significant characters undertake actions that have consequences (Riessman**,** 2008**).** Within this world or space, the viewer/interactor was enabled to navigate forward through the stack and, in most cases, retrace their path and choose another path. Some stories did this more imaginatively than others, for instance, some have elaborate ways to do this, such as *the Cleaner*, in which the young authors deliberately played with the conventions of following a plot with dead-ends, complex asides and an anticlimax ending.

This expansion and exploration of a digital landscape was something new and provided a real element for the students' engagement. The task of moving around and exploring this newly made space or world was a way to proceed. The more complex and traditional notion of the development of plot was less of a requirement than the actual navigation of these hypermedia worlds, and this gave every student in the group the opportunity to contribute creatively.

The choices the students made in populating their worlds added an additional level of engagement. Some chose familiar themes from adolescent literature such as mysterious explorations and murders. Others used ideas from television and movies; such as Westerns and (once again) murder mysteries all of these were often intermixed with elements from their own lives. They were free to introduce drug-taking in their creations; to include late night phone sex ads; and to generally include a variety of gruesome scenes of violence and gore. Instead of describing these scenes they were able to construct them through images, recorded sounds and movement or 'reveals', as an interactive button led to a scream or another scene dripping with blood. This exploratory aspect ties into the ludic experience of hypermedia

storytelling as mentioned above, though interestingly they rarely included the fantasy and science fiction elements common to many of the computer games to be found at the time.

I have argued above that the nature of the task itself was engaging but the task had to be taught and I do believe that the way in which the task was presented, unfolded and supported did encourage students to get engaged. The students were presented with a series of 'goals' which grew in complexity and which consisted of clearly defined steps. This scaffolded structure was important in holding the students' interest. They had the freedom to create stories using the rich resources of the hypermedia as an ultimate goal but the specific requirements of the different stages spurred them to develop the necessary mastery of the software, both in line with the requirements of the set tasks but also in line with their own desire to be masterful with this new medium.

A final point to emphasise is the fact that great effort was put into acquiring large blocks of teaching/learning time for this exercise. This is no small task in a contemporary secondary curriculum but it was strongly argued that focused time had to be allotted, both to signify support of the initiative, but also to present it as a challenging task which required and was given significant uninterrupted time. This argument was put in the initial proposal to the school as a necessary condition for undertaking the exercise. The researcher was well aware, however, that if the students did not engage with the task, working through these extended periods would be a challenge. In the end, the extended time slots were, as predicted, essential to ensure the steady development of the work. With time slots of three periods plus, problems could be hit, explored and addressed. Extended and focused time on task was, without doubt, a significant contributor to the engagement of students and indeed several groups took up additional time by staying on task over lunch breaks.

Summarising the argument for student engagement, I have argued that the significant engagement of students with this hypermedia storytelling task is due firstly to the nature of the task itself. This task involved the use of computers, and computers were seen to be an important, part of the real and advancing world beyond school. Computers had status, for various reasons, with both staff and students and (not least) students actually enjoyed using the hard ware and the software.

It was evident, very early on, that students had a facility with this medium and this was in stark contrast to the often stumbling progress that had been made by some of these students over the last seven or eight years of schooling with more traditional literacies. Computers were part of the world of play and social activity and real work. Beyond this, however, I have argued that the task itself was a challenging one and far from being a turn-off for these students, it was a positive. Gee (2003) has commented on the fact that challenge is seen as a positive for young people in the different, but in some ways parallel world of computer games. Neither the challenge of the unfamiliar software, with its multiple levels and functions, nor the challenge of writing stories in non-linear format was enough to daunt these young people; instead they were excited and stimulated by the challenges.

Finally, however, although much of the argument above has emphasized the extent to which the students connected with the task itself, I also suggest that the actual teaching of the subject did engender and support the engagement of students with the task. The novelty of the project meant that little, if any, of the teaching could be based on previous experiences and the scaffolding and structuring of the exercises were very deliberate and carefully considered. The concepts were unfamiliar to the students and a range of new skills needed. Each skill or concept developed by the students was reinforced in the subsequent stage of the project.

Collaboration

There is a significant change in the way pupils are expected to work at and through their learning once they leave junior school. In junior school much of the work is done in groups and collaboration is expected and encouraged. Once pupils reach secondary school, however, there is a much stronger focus on competition and individual success. This can be sustaining for those who do well, but it can also be the reverse for those students who do less well. The argument of the Middle Years movement is that children of this age benefit enormously from collaborative work. It is a major goal of the MY movement to plan student learning experiences which: 'include processes involving co-operation, communication, negotiation and social competencies generally' (Department of Education, Training and Youth Affairs, 2001). It is argued that in such an environment students can establish their value as a

team member and develop skills and attitudes and respect that will serve them well generally in later life not just in the narrow field traditional competitive academic achievement.

While the value of group is important, the nature of the groups that students work in is significant. Often, even at junior school level, students are streamed so that 'brighter' students and less conventionally able students form separate groups. Often the result is a widening range of outcomes, with 'able' students forging ahead and the 'less able' making slow and limited progress. Accordingly the classes I worked with in were occasionally organised into groups and were more likely to be grouped in terms of existing achievement than anything else. There is much debate around the best way to group students at any age, (Boaler, 2000) but there is an argument for putting students of mixed ability together so that they can support and encourage each other both in achieving the outcome and in learning about collaborating and working together (Clarke, 2008).

My research project sought help from the classroom teachers to establish mixed groups of students to work on the task of creating a collaborative hypermedia story. Students were allotted to groups with the specific intention of breaking and mixing existing friendship groups and ability levels. The intention was to break old patterns and help forge ways of working together on an unfamiliar task and with unfamiliar skills. Working with unlikely partners acted as a stimulus to a range of activities, including the topics the students chose as the foci for their stories and the ways in which they worked together.

The synergies created between students in this situation were note-worthy. Some groups were able to integrate quickly and were readily able to agree on content, style, characters, plots and settings. The group that developed *The Cowboys* in the Year 7 class and that which created *The Zoo* story in the Year 8 class were good examples of groups that hit the ground running, despite being very mixed groups who had not previously worked or played together.

Other groups were more cautious and circumspect; this was especially true of *The Cleaner* team, which needed time to establish a way of working together. In the early stages, it was often the two girls who made compromises (for instance, over the

nature of the story) but there was no resentment in this and very soon there was a sharing of decision making and evidence of compromise by all involved.

Collaborations will inevitably involve some friction, negotiation and disagreement. The aim is not to just get agreement and move forward but to get active engagement of all to work together and achieve more than could have happened individually. Perhaps one of the reasons why these collaborations were so successful was that the task worked upon was an unusual one for a classroom. It involved students working together to create and enter a new world of their own making. At one level it was more like they were 'playing' together. They were involved in an adventure, they were playing with complex new toys the software and the computers, and they were eagerly engaging in experimentation. The hypermedia stories were very much about creating a data-scape, a limited but none-the-less virtual new world of their own.

It would be misleading to suggest that working together in this way was all agreement and compromise. Certainly some of the stories grew very smoothly, such as *The Cowboys* and *Shopaholics* but others grew through dissent. At one stage the students who worked on *The Zoo* split to pursue different ideas but they then brought the ideas back together in an ingenious device. This device was that they agreed upon a location, *The Zoo* and a set of characters, and then created their own sections, referring back to the group for additional ideas and expertise. But all the time they were working separately they were aware of each other's work and to an extent were influenced by it. Indeed the charm of some of the hypermedia stories was through the juxtaposition of these largely separately authored sections.

Students also collaborated keenly and openly between groups, particularly in terms of sharing expertise and discussing the technical discoveries they were making and possibilities they were creating. The excitement generated by 'this or that', student's success in finding a new way to do 'this or that' and the gratification of being able to share and show off and be acknowledged and rewarded for this, was palpable. It meant that the job of teacher was very different from that in a traditional class where the teacher who is the 'expert' hands out the knowledge and checks on the appropriate mastery of that knowledge. Here, short cuts not necessarily anticipated

by the teacher were found and shared with an exceptional deal of good humour and generosity and excitement.

I have commented in the case studies themselves that I did not provide extensive specific direction on how to work collaboratively. I had told the students that it was a large task and that when they had made a joint decision about the plot and general direction of the story they would need to share out component tasks. I was on the fringe keeping an eye and an ear out for any problems and highlighting good things when they happened, as they did frequently. It seemed to me in retrospect the expectation on my part that they could and would work together well was important. It is also the case that once a couple of sessions had got underway and the project was proceeding well, with students engaged and outcomes developing, this way of working together needed little further encouragement from me. Success, like failure is its own best motivator.

In summary, the collaboration amongst these students during this project was exciting and motivating both for the students and for me. These students had frequently worked in groups during their junior years of schooling. So there was a degree to which group work was familiar, but even at junior school level, groups are often ability based. In this intervention almost everything was new, so there were very few existing skills, consequently this was a wonderful opportunity to create mixed ability groups, and perhaps because everything was new, there was generally acceptance that this was the way it would be.

Identity

These middle year students have already begun to form a rigid, classroom identity and for many it was a relatively negative image. They were frequently disconnected from and disengaged with the tasks they were given to do. They found many of these classroom tasks had little meaning or significance and as they got older and their childish desire to please parents and teachers diminished many would fail to achieve minimal competency with these ‘meaningless’ tasks and their perception of themselves as classroom failures would grow.

At one level it is reasonable to suggest that in this study there were many pupils who were already set on the road to a negative classroom identity and seeing themselves and being seen as a classroom failure. I have already suggested that successes at this stage in school life can have a significant positive effect on students and I certainly make the claim that the hypermedia project did this for many participants. At another level, it was a more complex notion of identity at work here and being developed in the students.

Gee makes particular use of the idea of identity (Gee, 2003) in discussing video game players. This has especial resonance with this research as the hypermedia stories created by the students bore many similarities to the video games described by Gee and which were also to be found in the homes of many of the case study students. Video games are often very immersive experiences for the young people who engage with them. In many ways these young people live out the lives of the protagonists – soldiers fighting the Nazis, spacemen battling aliens, gang members on the streets. For the time of the video game they assume the identity of the hero of the game. This process, on a smaller and less sophisticated scale could be seen in operation as the students created their hypermedia stories. Most of the stories featured a relatively unsophisticated 'first person' view. The action on the screen was seen from the perspective of a main character that typically assumed the identity of the author. Sometimes the students played with the notion of identity and the fact that author and viewer would often be different identities. A character may look out of the screen at the viewer and ask a question. Sometimes the author persuaded the viewer to adopt a specific 'othered' identity. In *The Cowboys*, this might be the Sheriff, in *Totally Wild Cemetary (sic)*; it may have been a gravedigger.

This playing with identity was developed in several ways. The novel nature of the project, using computers as part of the English curriculum, creating stories with images, sounds and interactivity all of this, allowed the students to try out several new identities, as characters or heroes in their stories, but also as software creators or multimedia designers. In their communicative, collaborative groups, they were also able to forge new views of themselves as competent workers solving many of the problems they came across. This shift to competent worker also meant a shift to competent student, a move from a perception of themselves and others of them as a student who didn't / couldn't do English, couldn't / didn't do school work, to one of

being a student who could and did do – and could and did do it with gusto and positive outcomes.

This shift in perception of identity was significant. Here was an instance in which they had demonstrated success at school; here was a break in what had become a regular pattern of negativity. Here was a time when it appeared, not just to themselves but to others in the group and to those in authority (myself, and their regular classroom teacher), that they could achieve and that they could be successful. Part of this success was based on skills and insights developed outside of the classroom, but part of it also was based on openness and a willingness to work in a new way on something different. It is important to note that once the confidence of students grew it was some of the less traditionally students who became the best collaborators, who were most eager to share their knowledge and skill and to help others in the groups. It is also not surprising that in terms of identity in the classroom it was those with lowest self-esteem that grew most in their self-assurance and positive attitude during this innovation. For these middle year students it was not too hard a task to turn around a negative self-image as learner and collaborator in a classroom setting.

Conclusion to discussion

It has been argued that the case study offers significant evidence of change in the ways in which these middle school students engaged in this hypermedia task. Equally, it highlights the extent and sophistication and benefits of their collaboration during this task. Finally, analysis of the case study shows that the identities of these students improved in a range of significant ways. There were particular benefits for those students in the class who had been less connected with schooling in general and the English classroom in particular. But those students who traditionally did well were also keenly engaged and involved and benefitted significantly in working and collaborating with students of different abilities and temperaments and experiences. The innovation was acknowledged by the students, by the class teacher and by myself as a successful social exercise and a positive schooling experience and at this level there is reason for satisfaction

Despite all these positives outlined above, sadly this experiment was fleeting. For the participating students, it was a few weeks out of eleven or more years of schooling. The truth is, such an isolated event is unlikely to have a lasting impact and sadly, the Middle Years movement has lost impetus over the past ten years amidst louder cries for 'back to basics' and an emphasis on traditional English maths, reading and writing. It is hard to imagine that a small study like this might have any impact on this trend. Having said this, trends do come and go; in the concluding chapter of the thesis I take an overview of the consequences of this intervention in the light of ten years of developments in schools and in computer technology and in teacher education in Universities.

In the next chapter, I explore the other body of data to emerge from this research intervention; the hypermedia stories themselves. I discuss the development of an instrument to assess and evaluate this work and the evaluation and assessment of each of the stories.

Chapter 6 Teaching and Assessing the Reading and Writing of Hypermedia

Introduction

This chapter examines the development of an instrument for the assessment of the hypermedia stories produced by the students themselves. The assessment of student work, particularly in the area of literacy, is an essential aspect of any secondary school classroom. It is required by governments and is expected by parents. As students progress through the school system the more important it is seen to be to progress satisfactorily and the more important it is seen to be to collect grades and scores to ensure that progression is taking place. This is particularly so in the basic skills areas such as literacy. As was discussed in the literature review chapter, the educational success of a nation's young people has become another proxy for the successful economic and commercial development of that nation.

Lecturers in university education courses also acknowledge the importance of assessment, though often it is another aspect of assessment that they emphasise. The emphasis here is more often on the need to assess student learning in order to give feedback to students on how they are developing and how they might improve or accelerate that development. What is also often emphasised in teacher training is that in order to assess effectively there has to be close alignment with what is taught and what is assessed and this alignment has to be made very clear to students. This notion of alignment and the distinction between assessment designed to offer feedback to students (formative assessment) and assessment that can provide an indicator of what a student must do to progress (summative assessment) is much discussed and debated (Rowntree, 1987).

The present chapter describes the ways in which the researcher worked towards analysing the hypermedia stories that were produced in the classroom during the research described in the case study. At first the aim was to produce a tool to assess hypermedia work, a tool that might be used as a form of both formative and summative assessment but as the analysis unfolded it became clear that this tool would be an aid to teaching hypermedia as it was to assessment of hypermedia.

The Dimensions of Hypermedia

It was noted earlier that literacy is code mastery, and with regard to hypermedia productions, as with other media creations, these codes encompass the operational, critical and cultural dimensions enumerated by Green (1988) and Green & Bigum (1993) and previously discussed. The creator of a hypermedia production functions within these dimensions by displaying literacy pertaining to the designing, programming, illustrating, producing and directing, as well as to the writing and reading of the text. Such an undertaking requires mastery of a range of distinct elements and the development of skills in each of their corresponding areas. As with all media creations these necessary skills include the ability to accomplish an overall *design* that will bring together all of a production's constituent elements, as well as the particular traditional components of media and multimedia presentations in the form of the written *text*, the *audio* input and the *visual* input. Unique to a hypermedia presentation, however, is the requirement for the development of the *interactivity* of the work.

Hypermedia production can be seen as an accumulation and indeed culmination of mastery over the codes of media and multimedia production. If we take as the underlying model of production the writers of text-based fiction, then the element they are working with is *text*: writers design and construct their stories as words; they introduce characters as words; and they use words to call forth all the senses, feelings and responses. (This can also be enhanced, in the case of illustrated works, by the co-ordination of images accompanying the text, but it is claimed a "picture is worth a thousand *words*".) The creator of an audio presentation, such as a radio play or documentary, manipulates both text (in the form of a script) and sound in a manner designed to convey meaning. Further along this continuum of multimedia creation comes the movie director who designs narrative or documentary constructs by manipulating the composition of text (also in the form of a script), audio and image. The author of a hypermedia story, like the maker of a film, utilises all three of these 'traditional' media and adds to it the additional element of their and the reader's interactivity.

This unique capability, or rather quality, of interactivity in the hypermedia production requires its producers to display mastery over unique aspects of design.

Traditional English classrooms have had as their goal the imparting of knowledge, of the codes, necessary to accomplish the design of written productions (composition) and it is the level of a student's ability in this area of design that forms, to a large extent, the basis upon which that student's literacy is assessed. Design in this sense takes the familiar curriculum imperatives of brainstormed lists, essay plans, story webs and the '5 Ws'(Who, What, Where, When and How). As authors of hypermedia, students have these as well as other significantly different elements to work with, and it was the intention of this research to explore the hypermedia artifacts produced by the students in order to discern how their negotiation of these multimedia elements might be assessed. Development of an assessment tool would allow measurement of what constitutes more or less complex (masterful or *literate*) responses to each of the dimensions and what ultimately makes for the *design* of good hypermedia stories and therefore indicates desirable literacy outcomes.

Below is a table containing the five dimensions involved in the authoring of hypermedia and explored during the development of the assessment tool.

Table 1. Examples within the five dimensions involved in Writing/Authoring Hypermedia

Text	Image	Sound	Interactivity	Design
Iconic Words on screen as sounds Wow, Crash. Onomatopoeia.	Still character. Background scene, object. Drawing, photograph. Clip Art, original. Style (see Design)	Music Sound files, mood, singing (related to interactivity)	Link placement How to incorporate navigation. Naturalistic setting, Datasphere exploring?	A concept map The overall idea with indications of setting, character and plot, but also with aesthetic ideas about continuity of other design features incorporating images and sound, touching on colour tone and reflecting the genre or setting of the story.
In landscape Sign posts, advertising, naturalistic places	Animated Short, part of scene (related to Interactivity)	Voice (text replacement) Its place is secondary, where once was king	Link effect What else happens when the cursor moves, sounds, animation, feedback. Adding to engagement.	Pathways The explicit choice of paths that the author has for the Interactive user to make. Why this way? Is there always a choice?
Conversation Talk bubble representing conversation	Image mapping Segmented linked images to progress the plot variations.	Effects Create scene similar to image; related to design. Ambience.	Integration Links forming an integral part of meaningful plot development. Information revealed/denied; character development.	Linear/nonlinear Related to pathways, does the navigation work in reverse?
Screen Caption Explaining the scene but not part of it.	Video. Live action or animated. As part of scene or as replacement for scene. Origin.	Instruction. Audio cues for further advancement through the narrative unable to be gleaned elsewhere.	Contingency The necessity for certain complex interactivity to occur before progress may be achieved. Click links in order to uncover hidden links.	Intention Multiple, exclusive outcomes achieved through calculated interweaving of various internally consistent elements across different narrative streams.

Qualitative Evaluation of Student Hypermedia Work

The range of different skills, highlighted in table 1 above, had to be explored and in some way measured or assessed. The ‘SOLO’ taxonomy (Structure Of

Learning Outcomes) (Biggs & Collis 1982), described in the Methodology chapter of this thesis, was explored as the second axis of an assessment matrix with the five dimensions of hypermedia authoring, as the other axis.

This SOLO taxonomy was adopted because it is a hierarchy that attends to the complexity of student responses to a set task; it is an instrument that takes into account not just how much a student might know about some phenomenon but the sophistication of their understanding. Each of the different levels marks a qualitatively different response to the one beneath it. The lower-level responses are seen to be included within higher order responses, so the taxonomy represents a hierarchy of understanding. The SOLO taxonomy, however, is not content-specific and can consequently be applied to any kind of subject matter. Insofar as this approach to assessment maps and explores qualitative variation within a series of hypermedia stories, it might be described as phenomenographic (Marton & Booth 1997). In phenomenographic studies, categories are typically developed in order to map the range of understandings, within any cohort, of any phenomenon, usually a particular aspect of subject specific content, such as the notion of acceleration in physics (Marton & Booth, 1997). In the present study, however, the different levels within the SOLO taxonomy were used to help the researcher explore the different levels of response to the hypermedia stories and consequently construct a hierarchy of skill-specific learning, in this specific context of hypermedia story telling.

An important aspect of phenomenographic studies and SOLO-based explorations is that the learning that is acknowledged and rewarded is that which highlights a ‘deep’ or integrated understanding on the part of the student, as opposed to that which shows a ‘surface’ or disconnected and ad-hoc approach to the task. A key part of the original phenomenographic research was that it highlighted and tapped into learning that was reproductive and done with little thought or engagement and learning that was more reflective and which aimed to think through and engage with key concepts. In the SOLO taxonomy the main division between deep and surface approaches to a learning task comes between levels three and four. Consequently, levels four and above, those that are judged to be relational or extended abstract, are seen as instances of students responding at a level of learning in which they are moving beyond skills development into an understanding of the underlying purpose of the task, in this case, the creation of a coherent and engaging hypermedia story. This

was seen to be an important division because whilst it was seen as good, indeed essential, for students to develop the necessary skill base, it was hoped that at some stage students might also move into ways of working which were more creative and reflexive.

The matrix which was constituted in the bringing together of the five different levels of SOLO and the five different hypermedia skills (presented in table 2, to follow) requires teachers and assessors to articulate what each of the skills at each of the levels looks like and how one level builds upon another. Within the broad outline of the taxonomy the five SOLO levels are described thus:

- *Pre-structural* – where the response is really not relevant to the question
- *Uni-structural* – where an appropriate but minimalist response is given.
- *Multi-structural* – where several responses (or answers) are given and the responses are appropriate, but there is no relationship between the responses
- *Relational* – where all responses are related into a reasonably coherent argument.
- *Extended abstract* – where responses come together in an argument, which goes beyond the information previously given or hinted at.

In keeping with traditional phenomenographic research method (see Marton and Booth 1997), each of the dimensions at each of the SOLO levels was interrogated by asking of each of them 'what' and 'how'; so, within this a given dimension image, at a given level, the researcher investigated what the student focused on and how it was acted upon.

Table 2, over, shows how understanding of the five different dimensions and the different levels of understanding was originally conceived. Only four levels of the SOLO taxonomy are shown as none of the students' hypermedia works included the 'inappropriate responses' category, reserved for the first level of SOLO. The hypermedia stories themselves, as well as examples of some commercial stories such

as *Myst* (Miller 1996) and *Just Grandma and Me* (Mayer 1992), were used in the development of this table. Table 2 runs over two pages.

Table 2 Descriptors of four levels of sophistication across the five dimensions of the hypermedia stories

Image	Language	Sound	Interactivity	Structural Design
The visual look of the hypermedia. Each screen is made up of pictures, icons and backgrounds placed in a variety of arrangements. The visual elements may be sourced from elsewhere (such as clipart or digital photographs) or original artwork.	The use of written language in the hypermedia. Written language may appear as signs or elements within the "world' of the hypermedia or as captions attached to the screen.	The use of spoken language in the hypermedia, as well as incidental music and sound effects. Audio files containing conversations, commentary or singing may be attached to visual elements on each screen.	The ways the viewer/interactor can deal with the hypermedia. This includes the interactive nature of visual and audio elements on each screen as well as the transitions between each screen.	The designed structure of the hypermedia in terms of the relationships between each of the screens and the ways the viewer/interactor can navigate between them.
Level 1 What is Focused On? The display of simple information. **What is not focused on?** Realism or naturalistic displays **How is it Acted Upon?** Using the painting tools, palette and the clipart collections to construct the visual elements. Simple icons, arrows, monochrome backgrounds, simple foreground images, undefined often clip art without detailed editing.	**Level 1. What is Focused On?** Simple messages to the viewer/interactor **How is it Acted Upon?** Typing comic-like single words and phrases onto the screen. Addressing viewer/interactor directly. Using signs.	**Level 1. What is Focused On?** Simple audio messages. Sound effects when entering pages. **How is it Acted Upon?** Recording spoken comments Addressing viewer/interactor directly. Using signs.	**Level 1. What is Focused On?** Navigation around the Hypermedia **How is it Acted Upon?** Making simple transitions and button reveals, moving from scene to scene. Each scene contains no or few exploratory buttons that move from one card to another. Using devices to allow the viewer/interactor to navigate around the hypermedia.	**Level 1. What is Focused On?** The basic relationship between nodes (the cards, scenes, screens) "which one will I/ can I go to next" **How is it Acted Upon?** Making a number of cards and creating links between them Using a puzzle format structure and a basic linear design. "Return to Start" device
Level 2. What is Focused On? Scenes that illustrate a series of ideas or a plot, without clearly defined characters **How is it Acted Upon?** Working from planned ideas and researched elements, as well as tools to make, more complex images, textured designed backgrounds, worked foreground images with an increasing use of original material. Layering of foreground and background.	**Level 2. What is Focused On?** Language as an element in understanding the plot or meaning of the hypermedia **How is it Acted Upon?** Text in sentences, directions and advice to viewer/interactor. Simple attempts at engagement. Text mainly as information or instruction.	**Level 2. What is Focused On?** Sound as an element of language, also used to draw attention to objects. **How is it Acted Upon?** Simple attempts at engagement. Simplest voice and BlabberMouth usage	**Level 2. What is Focused On?** Interactive elements that advance meaning or plot **How is it Acted Upon?** Making visual and audio elements interactive, as part of an arranged plan Using interactivity in combinations. Objects may reveal voice sounds and transitions to other cards	**Level 2. What is Focused On?** Exploration rather than navigation. Viewer/interactor choice. **How is it Acted Upon?** Decreasing use of puzzles format, More branching choices as a plot element

Level 3. What is Focused On? The visual elements as part of the plot and characters and enhancing the hypermedia **How is it Acted Upon?** Creating foreground images with reflective referential meanings (e.g. used to reference a genre), images are consistent throughout Developing a shared (with-in each group) concept of the 'look and feel' of the story and using a wide variety of sourced or imaginatively created material.	**Level 3. What is Focused On?** Language that Engages with the viewer/interactor and carries them further into the plot **How is it Acted Upon?** Attention to language to carry the plot (or 'world' creation) along. Text as engagement, involving viewer/interactor in hypermedia, Range of audience focus present.	**Level 3. What is Focused On?** Sounds: voices in conversations, or effects that add meaning to scenes and information for the plot. **How is it Acted Upon?** Attention to spoken language to carry the plot along. Creating and reworking audio files to enhance their effectiveness Sound as engagement, Spoken voice most direct way for textual material to be presented. Range of voices present. Singing to establish place and an atmosphere	**Level 3. What is Focused On?** Interactive elements that enhance the plot of the hypermedia **How is it Acted Upon?** Using the tools available to give animated, audio and transitional interactivity to the visual and textual elements of the hypermedia screens Complex combinations of interactivity integrated into the fabric of the hypermedia. Plot or purpose is brought ahead by transitional buttons, exploration of scenes reveals further information	**Level 3. What is Focused On?** The layout of a realised or "created world "where the viewer/interactor is able to explore and where some of the expectations of the real world might be met. **How is it Acted Upon?** Using hypertextual elements to create a world or datasphere to explore, some linearity mixed in
3 and 4 Level is also indicative of the synergies across the elements of the hypermedia story				
Level 4, What is Focused On? The integration of the visual with the other elements across the hypermedia, in a sense where you do not "notice" them independently of your experience of the hypermedia. **How is it Acted Upon?** Crafting a visual experience for a viewer/interactor that is consistent throughout and well integrated in the hypermedia environment. Detailed planning and execution using a range of graphical tools and techniques Complex series of images sustained with-in the hypermedia, awareness of colour and /or texture, consistency of meaning. Images original and specific	**Level 4. What is Focused on?** The crafted use of written text that immerses the intended audience in the hypermedia **How is it Acted Upon?** Worked and reworked text that is incorporated consistently and seamlessly into the hypermedia Confident language use, text as part of enduring story. Audience used in range of levels including reflective (Comparable with competent text use in non multimedia settings)	**Level 4. What is focused on?** The worked use of sound files that allows a greater engagement in the hypermedia **How is it Acted Upon?** Audio elements that are incorporated in a natural way into hypermedia, people will talk if mouse-clicked. Confident sound use as part of enduring story. Voices in range of levels including reflective	**Level 4. What is Focused on?** The Creation of a complex interactive immersive experience. Interactivity is on numerous levels allowing exploration with complex outcomes in a range of media – text, sound image **How is it Acted Upon?** Crafted attention to the integration of visual and audio elements into the fabric of the hypermedia	**Level 4. What is Focused on?** A fully realized created world, a datasphere where the viewer interactor experiences as much as explores. **How is it Acted Upon?** Crafted hypermedia world allowing backward and forward movement between nodes

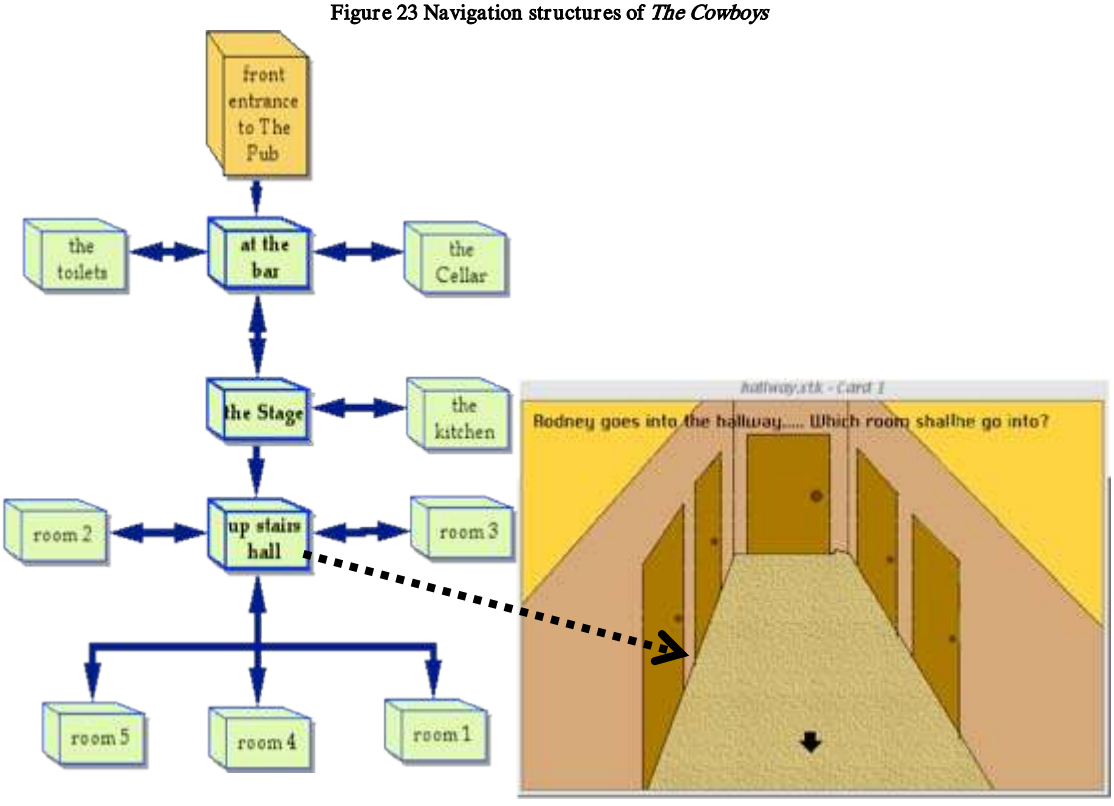
The next step was to use this matrix to explore the hypermedia stories, both to see if they seemed to fit within the schema of the matrix but also to see if they could be assessed using this tool. *The Cowboys*, which was seen to be the most sophisticated of the stories, was worked with as a pilot. Something that was likely to include as much higher-level work as possible had to be worked with to evaluate the higher-level descriptions. It was very much an iterative process, with the researcher using various existing commercial hypermedia (such as *Riven*, *Myst*'s sequel – Miller & Wende 1997) as a notional ultimate standard of what might be achieved. There was, however, acknowledgement that the skill and capacity to carry the story through hypermedia demonstrated by this small group of twelve and thirteen year old country town girls must be very different to that of commercial hypermedia artists. The exploration began with a matrix of the skills to be developed and five different levels of expertise and the most sophisticated work produced by the students.

The Cowboys

The Cowboys was one of the most detailed of the hypermedia stories so was an ideal story to use in an analysis of the levels of complexity achieved within each of the five dimensions – text, image, sound, interactivity and design. Three students created it and became very involved with the authoring process and spent most of their lunch hours, and spare time working on it, as well as the set class time on the project (Wilhelm (1995) also noted this student use of lunchtime).

The navigational structure of the story is displayed, below in Figure 23. Each box represents a scene in the interactive, these are the nodes of Engelbart (1996) and the lexia of Landow (1992), while the arrowed lines represent the direction of the narrative that the viewer or user can take. The three nodes with heavier outlining have a special significance, in that they represent a more central role in the Hypermedia story, as they are "places" in the narrative through which the user "passes" more than once. The busiest of these nodes is the "upstairs hall", which is represented by a picture of a hall with five doors and an arrow indicating a return to the previous scene, "the stage". Each of the doors, when clicked on, leads to bedroom scenes. Each of

Figure 23 Navigation structures of *The Cowboys*



these scenes has a link back out to the hallway.

The first node, the Entrance, is a picture of the building in which the story takes place: the pub. By clicking on swing doors rendered in a style from a Wild West movie, the scene changes to the bar scene. This is the only choice presented to the viewer/interactor. The starting scene is not capable of being returned to as part of the narrative again.

In looking at the five elements that the students used when constructing *The Cowboys*, it is important to remember that the piece works as a whole. The images, text and interaction were designed to fit together, and this should be remembered as the individual elements are examined.

Text

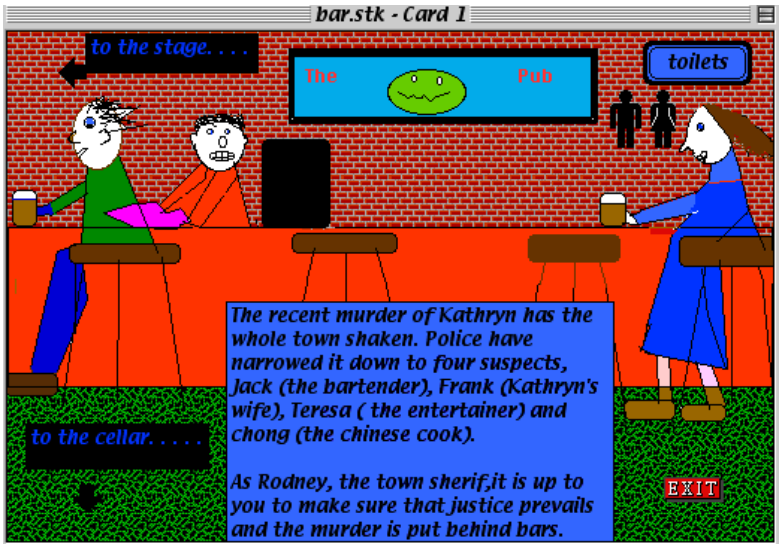
With the exception of one card, written text accompanies each of the cards in the stack. The first card has the word “pub” over the doors, in other cards bottles are labeled “beer”, other signs say “Room”, “toilets”; one character has the word “Coo..” on his clothing, the “k” being out of sight behind a stove in accordance with an accurate, if rudimentary, visual perspective of his placement in the kitchen. These are examples of text as part of ‘landscape’, incidental uses of words we would expect to see if we were exploring this place physically in the natural world.

A further aspect of the use of text lies in its employment as a navigational aid. Small black arrows which are not part of the scene but which occupy a space between the viewer/interactor and the more basic narrative of the images, are sometimes accompanied by words. In the bar scene, for example, there are, in addition to the naturalistic “toilets” sign, arrows pointing to places “beyond” the card: one arrow points left “to the stage…” another points to the bottom of the card with the words “to the cellar…”, implying that the cellar is below the room depicted in this scene. As the viewer/interactor progresses deeper into the hypermedia the arrows lose their accompanying text; it is as if the metaphor has been established and we no longer need the extraneous words. Each of the bedrooms opening off the hallway has a small arrow that takes you back to the hallway when pressed.

The Cowboys uses elaborate screen captions. They are similar to captions found in comics and graphic novels. The bar scene (Figure 24) contains the first such

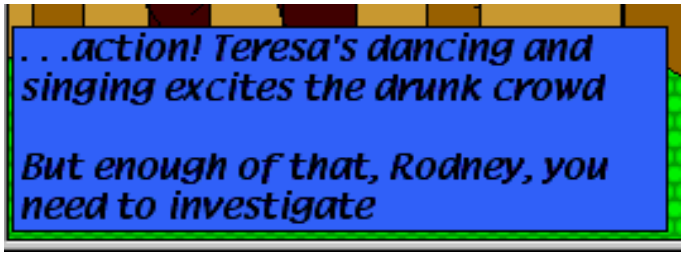
caption in addition to examples of naturalistic text and navigational text.

Figure 24. Bar scene from *The Cowboys*



In the caption, above, the authors address the individual reader directly with an expository passage. This serves to introduce the action – a murder – indicate the suspects, and assign the reader an explicit character in the hypermedia, "Rodney the town sherif [*sic*]". The captions are not consistent throughout the hypermedia, perhaps reflecting the number of authors or confusion over the use of first, second and third person narrative. In the following scene, "the stage" (Figure 25), Rodney is addressed directly:

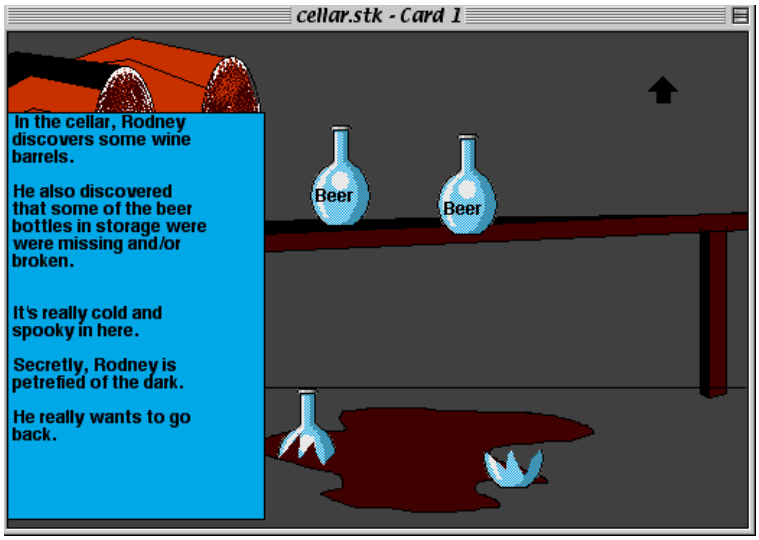
Figure 25. Screen capture of part of the stage scene from *The Cowboys*



In another caption in the cellar he is spoken of in the third person.

This change of person is interesting. The style of the passage in the cellar above contains atmospheric information "It's really cold and spooky" as well as an insight into the character "Secretly, Rodney is petrified of the dark" that would be difficult and clumsy to convey if presented directly as the thoughts of the viewer/interactor.

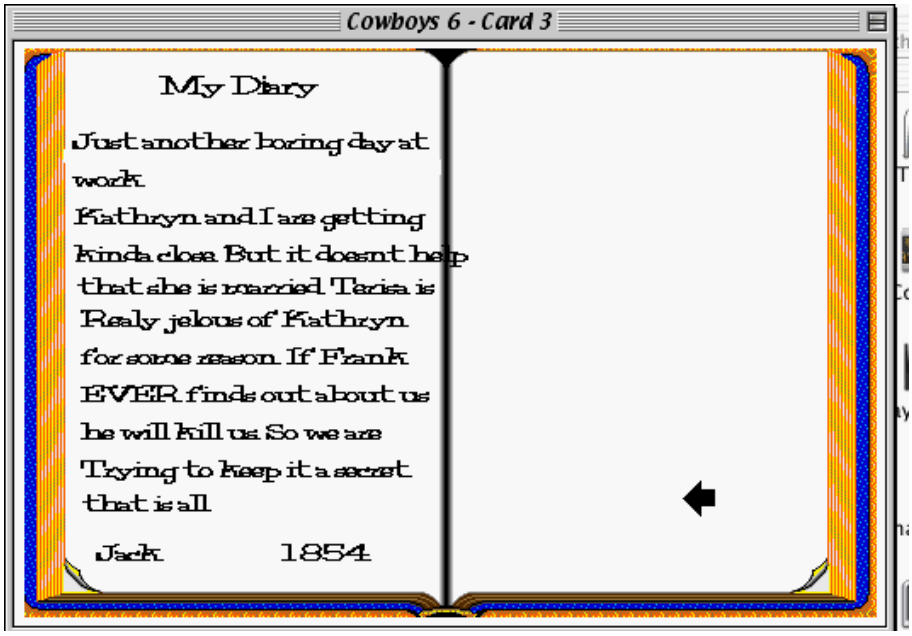
Figure 26. Cellar scene from The Cowboys



Other captions invite the viewer/interactor in both third person and second person, to interact within a scene. The hallway, illustrated above, has the caption "Rodney goes into the hallway. Which room shall he go into?" One of the bedrooms has the caption "Teresa's bedroom has many hidden clues, see if you can find them!!!!!" though it is unclear if this is addressed to Rodney, or to a general viewer/interactor. These textual additions are similar to those navigational texts mentioned previously, in that they are indicating directions to pursue or indicating a range of hidden interactive elements within the scene such as mouse-overs, sounds, or, as is the case in the bedroom, links to other scenes.

Another use of the naturalistic textual element is to be the found in the letter or diary, as in this example from "Jacks Room". These can be considered naturalistic texts in the sense that they are part of the world of the hypermedia presentation; they are also familiar devices from the mystery or detective genre. They serve too as expository texts, as in the example above where the narrative is situated in a specific time – 1854 – by the date on the page. They are also used to reveal the personal thoughts and motivations of the characters in the story, especially those of the murdered character Kathryn, something they share with the interior monologue voiceover sometimes employed in television and cinema drama. In fact we only really meet three of the characters through searching their rooms, examining their possessions and reading their diaries. The entries are all, of course, in the first person.

Figure 27. Jack's diary scene from *The Cowboys*



Hypermedia's historical development and influences can be seen in three text uses not employed in *The Cowboys*, the use of Opening Titles (called 'splash screens' in the digital world) and End Credits, and the use of Instructional Text. The opening screens show the influence of cinema, they give the title of the film and often the makers' or company name. Credits are similarly cinematic. The use of an instructional page shows another significant influence of hypermedia the world of computer games. These pages contain information about the purpose of the hypermedia such as the need to uncover information, as in *The Cowboys*, or to find an object.

In exploring 'text' in *The Cowboys*, using the levels of the assessment matrix, I rated it as at least level three. In terms of the SOLO equivalents, this would be an assessment of 'relational' where the understanding of key ideas are not just demonstrated, but brought together. Translated into this situation, text is used in several contexts and in several ways. The contexts and the ways it is used are related and inter-related through the plot. At times text in this story touches on level four, in that it does not just engage but immerses the viewer/interactor in the story. Again, in terms of a SOLO assessment, this would be the highest level of extended abstract, where the work goes beyond the expectations and limitations of the specific terms.

Images

Under this heading are included clipart, colour, balance, clutter and texture.

The use of illustration is an essential and obvious part of *The Cowboys*. Each card in the HyperStudio stack is presented as a picture either of a room or an area in "the pub" or of an object in one of the rooms. The rooms are generally drawn in a simple perspective with, as can be seen in the hallway, vanishing points. As has been noted, the effect is to create the impression that one is exploring the building as Rodney the Sheriff. The view we see is from his eyes. As part of the lessons conducted during the research project I raised the issue of clipart (collections of images available for insertion in students' work) and using original artwork. The young authors of *The Cowboys* chose to create the majority of their images themselves. The range of styles reflects the number of artists, but they maintain the same general approach.

Figure 28. HyperStudio tool palette

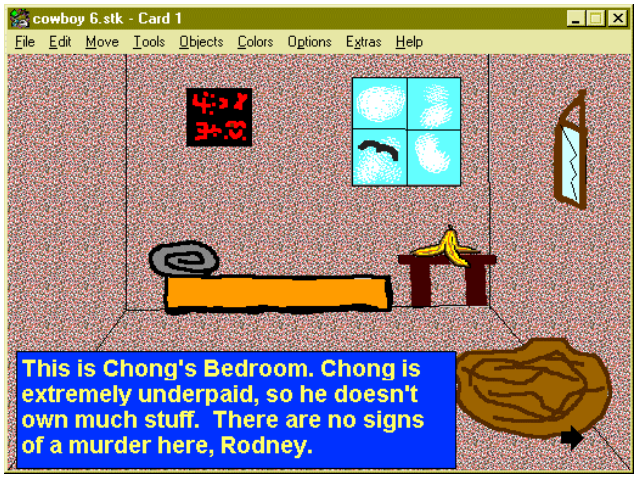
The program used to construct the hypermedia, HyperStudio comes with a range of illustration tools (see Figure 28) including paintbrushes, pencils, colour and pattern fill tools, as well as the selection, copy and paste processes common to illustration software programs. The students used these to draw the characters and scenes of the hypermedia.

The clipart used most commonly was the image of the bottle labeled beer (see Figure 26); this image and the edited broken version appear in four of the cards and tend to suggest the presence of the murder suspect Frank. The images of the bottles – intended for classroom use – are actually flasks more familiar to a chemistry lesson. The resourceful use of text transforms these incongruous flasks into the intended object and careful image editing even adapts them as broken bottles when required by the plot. Another common clipart image employed is the open book used in the found diaries (Figure 27). Clipart has been criticised (Sun & Shi, 2007) as an inhibitor of artistic expression, as imposing American cultural values and as an example of laziness. Certainly in the case of the bottles in *The Cowboys,* the ability to adapt a readily available image for multiple uses serves as a timesaving device to enable more effort to be exercised in other aspects of

the presentation.

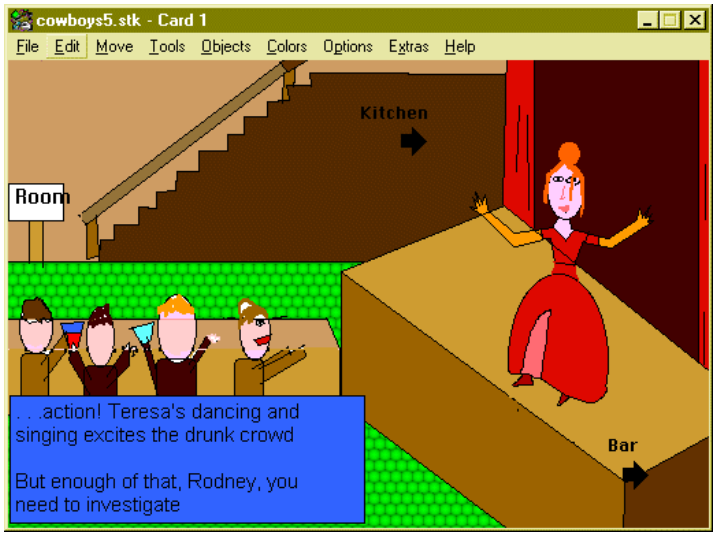
The images and scenes created by the students resemble early comic book art and television animation. They use fully saturated colours with little use of shading or tinting as predicated by the use of HyperStudio's colour fill tool. The program also allows for the use of pattern fills which the students have used to create particular effects such as the brick wall in the bar scene (Figure 24) and the carpeted floor in the hallway (Figure 23). The scenes are often coloured in a way to reflect their use or situation, so the cellar scene is predominantly dark grays and browns, emphasising the lack of light and adding to the feeling of unease. The printed text, the broken bottles, and the sounds, which will be discussed presently, reinforce this. Frank's room is similarly darker than the other rooms, reflecting its content and its position in the plot as the abode of the presumed murderer. Chong's room (Figure 29) is drab through the use of the pattern fill effect on the walls as well as the objects in the room, reflecting his status perhaps. The toilet scene (not shown) uses white, though interestingly the toilet is purple and green. Colour is also used to distinguish scenes. The kitchen (Figure 33) uses blues compared to the browns of the stage scenes and the lighter blues of the bedrooms.

Figure 29. Chong's bedroom scene from *The Cowboys*



The images are often presented with perspective; they have vanishing points created by the use of walls, doors and other pieces of furniture. Figures, such as in the

Figure 30. The stage scene from *The Cowboys*



bar scene, are placed behind objects. The stage scene (Figure 30) creates the effect of having to walk past the singer, Teresa, and the audience to get to the kitchen or the staircase. The hallway is presented with all the doors visible, as the cursor is moved down the corridor the viewer/interactor enters this space. The images are being used to enhance the conceit that the viewer/interactor is exploring this world of the pub in an effort to find clues and solve a murder.

Self-created images are also used to represent the characters in the hypermedia story. Teresa the entertainer is shown dancing *in situ* in Figure 30 above.

Below (Figure 31) are the rest of the characters. The ostensible villain, Frank, does not appear at all. There also appears the *in situ* corpse of Kathryn, the victim. The characters only appear once. Jack is in the bar, Chong in the kitchen, Teresa on the stage.

Figure 31. Screen captures images of characters from *The Cowboys*

Portrait of Jack the barman

Chong the Chinese cook

Jack the barman

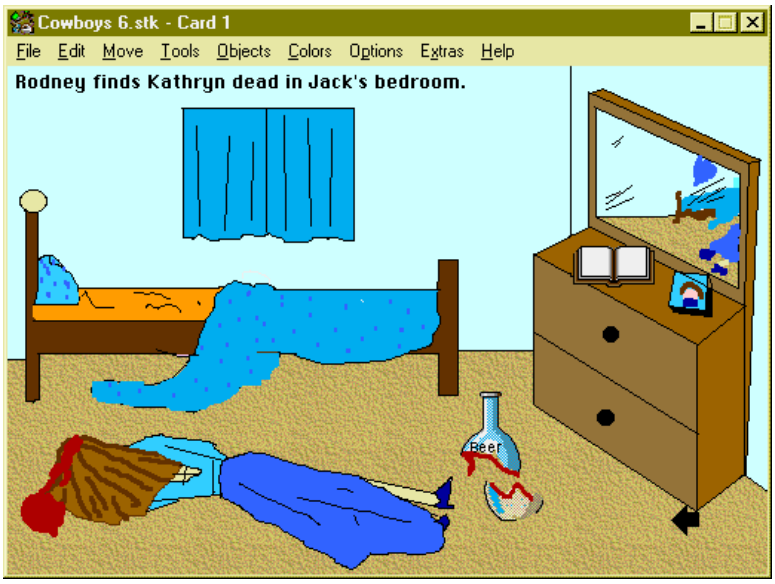
Kathryn the murder victim

As the viewer/interactor passes on to another card/scene the characters remain behind. This is a major difference to the devices used in comic books (which McCloud (1993) terms sequential art) where each scene, usually in a panel, represents discrete moments and the arrangement and presentation of the panels can be used to indicate the passage of time; assembling a large number of panels representing the same scene allows a sense of time passing. Recognisable characters can display a range of emotions in different panels, furious action can be represented, or a flower can lose a petal in each panel. In hypermedia an effect similar to this element of a movement in time is represented by the interactor/viewer being able to revisit each scene again and again, yet paradoxically the scene remains the same and therefore the timeframe remains fixed. The non-linear nature of the hypermedia restricts the number of representations of characters, though the authors in this case were able to overcome this through the use of photos or pictures of Kathryn and Jack placed in strategic places, such as in the bedrooms.

In *The Cowboys* the authors created complex images that seek to tell stories. The addition of text and sound enriches the stories yet it is the visual sense that seems to be most activated. An explication of this will be attempted through examination of that most pivotal place of any murder mystery, the murder scene; in *The Cowboys,* this is Jack's bedroom.

Figure 32 shows Jack's bedroom. The authors have made some attempts at perspective, as can be seen in the lines of the corner and the angle of the dresser. The body of the victim, the unmade bed, the dresser and the curtained window are all neatly arranged to fill the space available. Nothing overlaps or is obscured. The murder weapon (the blood-stained broken bottle) and the wound to the victim's head all lead to the conclusion of a violent attack. Other elements are harder to be sure about, such as the unmade bed, the closed curtains. The dresser contains two items: a picture frame, as mentioned above, poignantly bearing the image of the girl who lies slain on the floor, and a diary; both are interactive links that activate a transition to another card. The mirror scene on top of the dresser is an attempt at added realism.

Figure 32. Jack's bedroom scene from *The Cowboys*



The whole scene seems to work well in spite of the attempt at perspective. The viewer/interactor is able to glean a great degree of information about what has happened, beyond the bare caption at the top of the card. We know the wound was on the top of the victim's head, that she was fully dressed, and the authors placed the suspicious beer bottle for us to draw a conclusion as to who used it to commit the deed.

To conclude discussion of the visual dimension, the scenes of *The Cowboys*, are consistently, richly and imaginatively illustrated and they constantly inter-relate and overlap. My assessment of its level of sophistication was level three. Certainly, the visuals meet the level three criteria of there being 'foreground images with reflective

referential meanings (e.g., used to reference a genre)' and the visuals also used 'a wide variety of sourced, or imaginatively created material' and there was coherence and consistency of images throughout the story. Translated into a SOLO classification, *The Cowboys* is at the level of 'relational'. This is where different styles and ways of illustrating are successfully completed but also presented together, combined or juxtaposed so as to go beyond the impact of any individual illustrations.

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Sound

Sound use in the hypermedia stories, along with interactivity, was a far more novel experience for the students than using text and images. The students used sound elements in three main ways - as music, as effect and as voice. As discussed above, HyperStudio allows the use of a device called 'Blabbermouth', which is the computer system's own electronic voice that can be programmed to read set pieces of text.

As music, the students used recorded sounds of riffs or strings provided with the software to place emphasis on the events in the scenes with which the viewers interacted. In Frank's Room there is an image of his diary on the dresser. When this diary is selected with a mouse click a sound called 'Drama 1' plays as the diary is revealed, with the statement that Frank is going to kill Kathryn. A further click closes the diary and we are taken back to the bedroom scene as the sound called 'Drama 2' plays. Employment of sound in this way is similar to the dramatic mood music played during climactic or revelatory scenes in television dramas or movies. The two sounds are only a few seconds long but act as dramatic emphasis points in the hypermedia. Frank is revealed as the most likely murderer and we have the accompanying sounds to aurally highlight this.

The use of sound effects is more prevalent. In the cellar a broken beer bottle makes the sound of breaking glass, as if it has just been broken as the viewer/interactor enters. The window in Chong's room also makes this sound. The small dog on Teresa's bed barks when clicked. The stove in the kitchen makes a sound that could be food cooking (it is actually the sound of a small stream). The audience in the stage scene applauds when activated. (These sounds are selected from a library supplied as a standard part of the software – a kind of audio clipart). The opening, or splash screen,

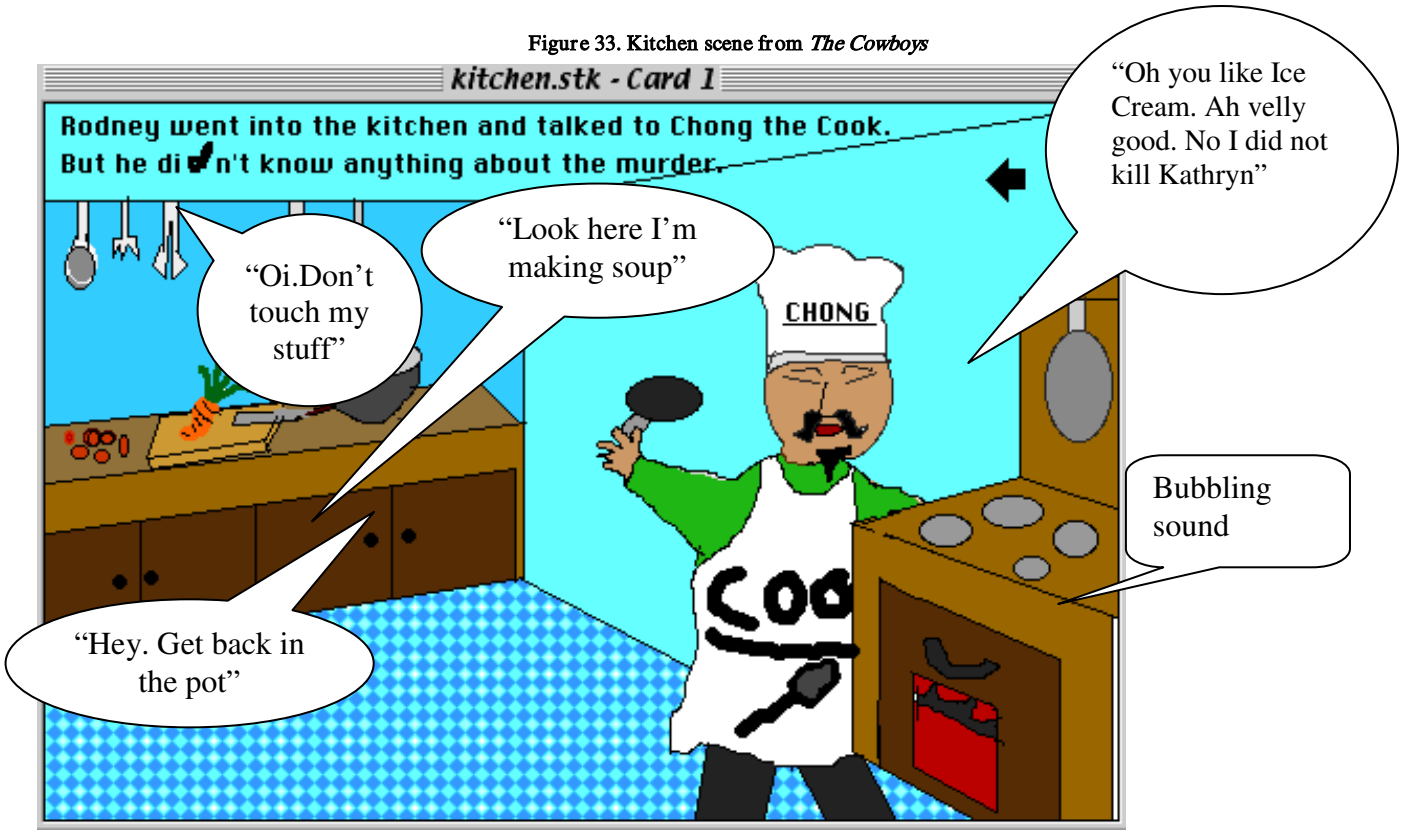
of HyperStudio, the first element of the software the students see, has a sound effect attached to each of the buttons: a camera shutter click. This metaphor is almost a cliché in multimedia design. It gives the viewer/interactor instant feedback as to the active nature of the button. The students have incorporated this idea into their hypermedia stories with feedback for what they feel are appropriate elements. The singer sings when clicked, people clap and characters talk back. Where the students could not find an appropriate sound file they created their own. The toilet makes a flushing sound, created with one of the student's voices and some imagination.

The Cowboys hypermedia story also presents text through the use of the spoken voice. In the bar scene the freehand-drawn character of Jack the barman "talks" when clicked. "Are you going to buy anything?" he asks. This is actually a recording of one of the students in the class, a boy. He says these lines, with what we might generously regard as the accent and emphasis of a bar tender in a cowboy film or television program. Chong the cook says, "Oh you like ice cream. Ah velly good. No, I did not kill Kathryn", in (what the student thinks is) a Chinese accent. In the toilet scene voices are played if the mouse is clicked on the closed doors: "I'm in here", "Get Lost", "Don't disturb me. I'm reading". Voice in these scenes is used as a replacement for text but adds more than the text, in that accent, tone and volume can be made clear. The processes of creating text to place on the page and recording voice and attaching it to the page were equally difficult. That students made the choice of one medium over another depending on overall design decisions, certainly related to the desire to add voice rather than depend on text, but also in some instances possibly related to an avoidance of written text as not situationally appropriate to these scenes.

The use of text as voice here reveals a more sophisticated approach to interactivity. Text on a page in a caption is obvious; it is present when the scene is entered. Text can be revealed as in the found diaries, yet text as voice has to be discovered through the exploration of each card. In the toilet scene clicking on the shape at the back of the open cubicle activates a voice saying in an excited way "Oh. Look it's made out of blood" to provide what may be a significant clue in the plot. The students use this mode of discovery very playfully in all of their stories (especially with sound) and discussion of this interactive dimension is entered into below.

In *The Cowboys* the kitchen (Figure 33) is a fertile area for this playful use of interactive sound. The pots and pans on the back wall all have something to say, as if they have a life of their own, or they may be expressing the attitude of Chong the cook to the presence in the kitchen of the viewer/interactor. The voices and the accents used all seem to be different, so any conclusion is left to the viewer/interactor. This usage of sound certainly adds an element of enrichment to the hypermedia as a whole.

Figure 33. Kitchen scene from *The Cowboys*



In one of the bedrooms we discover the dog sitting on a bed, and when clicked a synthesised voice, courtesy of the BlabberMouth function in HyperStudio, says, "I am eating the curtains". Other hypermedia stories in the project made more extensive use of this feature, though it was never widespread. The BlabberMouth voice is difficult to understand and the ease of using an instant sound recording of the students' own voices made this a more popular choice overall.

The students made use of sound, in combination with text and image, to build rich scenes. For example, the stage scene/card contains a singer and an audience. While the text captions and signs give the viewer/interactor extra information, it is the fact that the singer sings and the audience reacts which builds another layer into the user's experience of the hypermedia. Seemingly paradoxically, it is the use of voice

which allows scenes to be dominated by the visual; the conveying of more information (and thus enhanced engagement) can be assigned to the use of sound, letting the authors decrease their employment of text and allowing the images in each scene to become the most obvious features.

The use of sound is again judged to be at level three on the assessment matrix. Sound includes, spoken language, incidental music and sound effects and all three of these are used thoughtfully and selectively to add meaning and engagement with the various scenes of the story and the overall plot. *The Cowboys* certainly showed the most sophisticated use of sound of any of the hypermedia stories. Concerning the SOLO classification, this would again be interpreted as 'relational' where the range of different ways of inserting and using sound are demonstrated but they are also used together so as to juxtapose and go beyond the impact of individually added sound files.

Interactivity

Interactivity, according to the description of the authoring/writing process in Table 2, entails the ways in which the viewer/interactor can engage directly with the hypermedia presentation. Interactivity is an essential part of engaging with any multi-literate text, but in this instance we are dealing with the authored interactivity of hypermedia. The main way the viewer/interactor can engage with the hypermedia is through the mouse. Clicking the mouse button on various elements of the screen activates events or links the viewer/interactor to other parts of the hypermedia. These places on the screen are referred to as hot spots, links or even buttons.

Interactivity can be delineated into two types: navigation and exploration. Navigation is generally the movement between scenes or sites; exploration consists of the interactivity within each scene or site. In *The Cowboys*, the authors use the metaphor of a pub/hotel or Western saloon; this allows them to use images of doors and naturalistic signs as links to other scenes. As mentioned above, labeled arrows are included to add navigation. The links are generally placed on the left or right of the scene, representing the direction the viewer/interactor would take as he or she walks around the Hotel. The hallway scene has six navigational links (each represented by

doors) leading off into five bedrooms and one back to the stage card. The bedrooms present a challenge for this navigational metaphor and they all contain an arrow link back to the hallway. HyperStudio, along with many other multimedia programs from Microsoft PowerPoint to Macromedia Director, has a transition feature where the change from one scene to another is animated; there are a variety of transitions. The most effective transitions used in *The Cowboys* give some clue as to the direction the viewer/interactor is taking; clicking on "to the toilet" in the stage scene activates a transition that moves the card down, similar transitions move the card to the right or left. Generally transitions are not a strong feature of *The Cowboys*.

In the hypermedia stories each card presents a scene to the viewer/interactor that may be rich with image and accompanying text; it may also contain a range of hidden interactive elements. In *The Cowboys* these elements include the activation of sounds – the voices, music and sound effects already discussed – as well as animations and other special effect features available in the software program. This dimension of hypermedia invites an exploration of each card. The elements can be related directly to the continuation of the plot, as in Chong the cook's answer to the viewer /interactor's question, (we never see the asking of the question, but it is implied by the interaction we have with the character after clicking on him), or the revelation of the diary entries. These audio and visual effects are related to the atmosphere (the barman's words when clicked, the singer and audience), or merely a playful engagement with the viewer/interactor, even a distraction used to surprise.

Several interactions can be activated with one mouse click or by moving the mouse across a link (a mouse-over). Commonly a sound will play with an animation or page transition. As noted, the kitchen scene has a range of hidden voices as well as an animated frog that hops across the card.

Users of hypermedia tend to expect interactions (Kobsa, Koenemann & Pohl 2001) and read with an eye to uncover hidden features, often by clicking on all objects available. Hypermedia made for younger children such as the Broderbund titles in the Living Books series such as Grandma *and Me* (Mayer 1992) and *Arthur's Teacher Troubles* are particularly rich in this form of discovery interaction.

The sense of exploring and navigating the virtual space of the hypermedia - the datasphere or datascape - is an essential part of the hypermedia produced by these

student authors. In the case of *The Cowboys,* there is an underlying reason to explore the pub; the viewer/interactor has been brought into the fabric of the hypermedia with a purpose: to discover the identity of a murderer. Other hypermedia created by the students had related themes such as the discovery of a *Missing Monkey*, or the search for treasure and the avoidance of a monster in *Caves*. Others had less of a clearly defined direction other than basic exploration, such as *Shopaholics* where an exploration of a shopping centre is the central theme.

All the hypermedia created as part of these projects use a naturalistic setting. Doors clicked allow access through to rooms or spaces, holes in the ground lead to tunnels. Links tended to follow a logical path, internally logical to the hypermedia at least.

Of all the five dimensions employed in building this hypermedia story, the use of interactivity is perhaps the most sophisticated. The tools available are worked with to give animated, audio and transitional interactivity to the visual and textual elements on almost all of the screens. There are complex combinations of interactivity integrated into the fabric of the hypermedia, with the exploration of additional features and buttons adding still greater engagement and possibility. Again, with respect to the 'interactive' element *The Cowboys* was the most outstanding of any of the stories produced. It even compared favourably with some of the commercial stories looked at to assist assessment and for this reason was placed above level three, at least half way into the highest level. In terms of the original SOLO classification, level three requires the demonstration of a 'relational' understanding of the use of interactivity. The complex combinations of ways of moving through and into this story certainly achieve this and it possibly touches on the level four SOLO classification 'extended abstract', where the achievements demonstrated go beyond the expectations and previously considered possibilities of those setting the task.

Design

The research project was constructed so that the students worked in small groups to plan out their hypermedia story. Typically each member of the group worked on their own scenes, though there was collaboration within and across scenes. The group members, and other groups, would exchange ideas in dynamic flexible ways, seeking approval and comments from each other, reworking the images, sounds and interactivity until a consensus was reached. This process should be kept in mind when considering the design issues the students confronted as they worked on their hypermedia stories.

The design of the hypermedia clearly shows that the authors deliberately used the elements outlined above to construct their stories. They explicitly made choices of image, of sound, of the amount of written text they wished to use, and modes of interactivity, based on the needs they had to achieve particular ends. Those who were more literate were likely to use text, those less so, to use voice. They also brought into the process the more traditional media concepts of setting, character and plot.

The use of setting and characters in *The Cowboys* displays the influences of at least two television or cinema genres, the Western and the Crime Mystery. The setting of the building: a saloon (though they call it a pub) allows the students to populate their story with bartenders, singers, a cook and a sheriff. They have a bar, a stage where an audience watches a female singer and the bar staff. The elements of a Crime Mystery – a detective/sheriff, suspects and clues – supply many of the rich details of *The Cowboys*. As to the plot … on paper, as a description of what occurs as the viewer/interactor explores the pub, the plot seems obvious: it is a murder mystery and the sheriff methodically solves the crime by exploring the pub and paying attention to the clues. Yet the viewer/interactor is not required to do this. Certainly in *The Cowboy*s the authors have incorporated the viewer/interactor into the plot, and their use of captions and clues encourages the viewer/interactor to seek and discover, but she does not have to do this. She is exploring the datasphere and the wealth of material the authors have left to interact with, but she is not compelled by the interactivity to do anything. She could just stay in the bar/toilet/cellar areas and never explore (or maybe never even discover that there is) the rest of the building. What would be the plot then?

The closed, defined nature of a building like the pub in *The Cowboys* is a common feature of several of the other hypermedia stories produced by the students. Some commercial releases such as *Myst* (Miller et al 1993), *Return to Zork* (Infocom 1992) and *Obsidian* (Wolff et al 1996) extend their areas of discovery across larger landscapes, though in each case they confine themselves to distinct geographical places such as an island, or a town, or even the insides of a mysterious lump of black glass. The use of a place like a pub allows the students to establish a common metaphor with which the viewer/interactor can engage. This use of a metaphor induces the viewer/interactor to expect that a door will lead somewhere, that clicking on a sign or label will take them to a corresponding place, or that images of people will "talk" when clicked.

Overall, in terms of the design of the hypermedia story, these students had created their own data-sphere – their world and their own specific contexts and environments within this world. They encouraged the viewer/interactor to explore and discover and move backwards and forwards and across this world and these contexts and to learn about the story and the characters and their relationship one with another along the way. In terms of assessment on the matrix it was certainly at level three because of the inter-relatedness of characters and environment and visuals and the consistency and cohesion of this. The SOLO classification level three, in parallel, emphasises the 'relational' where the possibilities for integration of all the elements within the creation of a new data-sphere is achieved.

Animation in *The Cowboys* is present but plays only an incidental role. There is, for instance, the clicking of the mouse over a chair in the bar scene which activates a little dog who wanders across the card. Another incident has a bomb inexplicably appearing and falling when a window is clicked. The role of animated sequences is minimal in all the hypermedia produced. It was not a focus during the teaching and it is consequently not explored further in terms of further analysis and assessment.

The Analysis Process

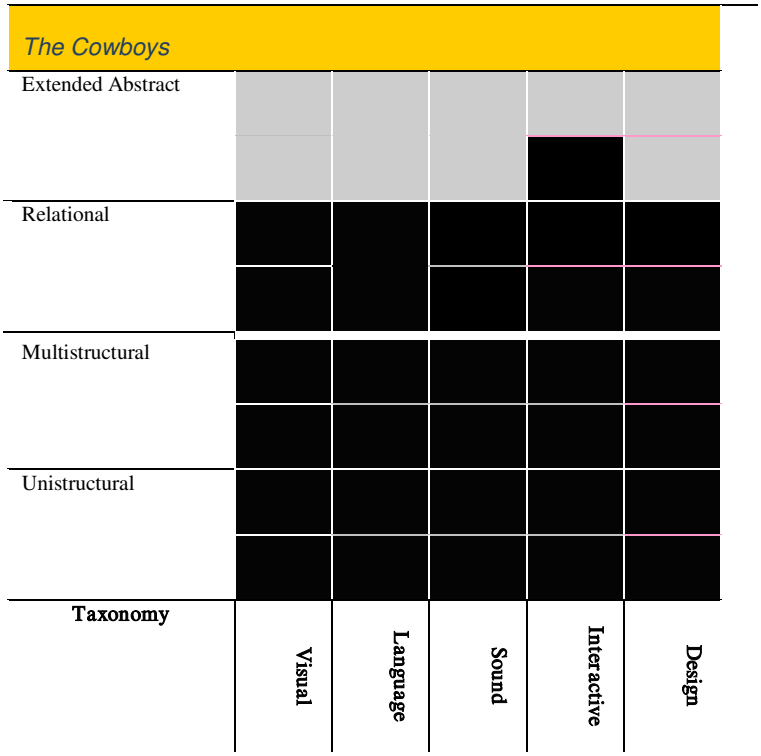
Several weeks were spent exploring and analysing *The Cowboys* as a piece of hypermedia work. It was not initially intended that this amount of analysis time would be spent on the assessment of stories. This analysis was part of the initial process of developing an assessment tool that would support both formative and summative

assessment and consequently be useful in the teaching as well as the assessment of hypermedia.

Over this initial analysis period the researcher shared the data with two other teacher/researchers and discussed categorisation and description. At the end of the process significant agreement was reached concerning descriptions within the matrix and the categorisation of *The Cowboys* hypermedia story. The consultant colleagues tended to temper my own assessment of the levels of achievement of the students working on *The Cowboys* and where I had been tempted to rate their performance on the individual elements at a minimum of level three, as indicated in the analysis above, but in discussion suggested moving visual and design into level four. It was agreed, however, that with the exception of 'interactivity', the dimensions would all be assessed as level three. The argument was that whilst this story was no doubt accomplished when referenced against the commercial hypermedia stories, there was room for further development.

When this process was complete the analysis moved to another stage. With the matrix to assist the analysis of the remaining hypermedia stories, a summative assessment of each of the hypermedia stories was undertaken. The feedback sheet highlighted below was developed as a prototype of such an assessment and feedback tool. A major attraction of this was the icon or graph could give immediate insight to students as to how they had succeeded in each of the skill areas, even those challenged by conventional literacy skills. These assessment sheets were called vignettes to reflect the more limited description and feedback provided by them.

Table 3. ***The Cowboys*** **Comparative Evaluation Matrix**



Summarised Reading the Evaluation Matrix

The Cowboys

All the dimensions of *The Cowboys* lie at, or above, the *Relational* level. In the visual dimension, the scenes are richly created and inter-related. The language use is similarly connected with the meaning making and comes in a variety of forms of written and spoken language. The linkages and interactivity are at an even higher level; they start to create a sense of a complex and well-developed world that could easily extend beyond the confines of the hypermedia story. The design dimension is equally complex and in line with the visual and the language dimensions in creating a complex interconnected story.

A version of the analysis of *The Cowboys*, similar to that shown above was used by the researcher to discuss the summative presentation of feedback with the two other teacher/researchers who had previously supported the researcher in the development of the matrix. It was not intended that this type of description or language would be used with students.

The two teacher/researchers subsequently worked with the researcher to ensure reliable assessment of each of the other hypermedia stories. In keeping with practice in phenomenographic studies broadly (Prosser and Trigwell 1999, previously mentioned in the Methodology chapter) an agreement level of 80% was set as a target. Agreement on all stories was well inside this target.

As discussed above, the initial surveying of the hypermedia skills that students had to develop led to the categorising of five different skills that were referred to as dimensions of the overall skill of developing mastery of hypermedia: a *textual* dimension, generally typed though occasionally hand written; a *visual* dimension of images but also the use of colours and the placement of icons, buttons and other

elements on the screen; a *sound* dimension of music, voices and sound effects, and a dimension of *interactivity* that included the responses that happen through the actions of the viewer/interactor. The *design* of the hypermedia as a whole, including the way or path a viewer interactor would take through the story, was included as a separate dimension.

This way of working and dividing up the dimensions had worked well with *The Cowboys*, the most sophisticated of the stories, but it worked less well with the other stories. The first three dimensions, 'text', ' image' and 'sound' were being evaluated in part on the type of file being developed or adopted by the students and then on the extent to which the inclusion of that file added to the overall look or feel of the story. With visual files, a screen object might be created using the drawing and painting palette of the HyperStudio program, or it might be developed by importing an image from the clipart gallery or from another outside source, and this may add or detract from the sense of drama of the over-all story. When it came to the sound dimension, however, something more complex was at work. Sound files were either created on the spot by the students using the built-in microphones or imported from a library of music and sound effects. But sounds very often took the form of spoken word files and were used to both direct the progress of the narrative and to make sounds that would add atmosphere or drama. It was clear that in the rest of the hypermedia stories sound and text were being conflated as a mechanism to provide direction. In some cases text was being used as a speech bubble in a way similar to a comic or cartoon, providing both speech and direction or comic effect. In other cases the click of a mouse button over an illustrated character would trigger a sound or comment.

At one level it might be argued that it was more sophisticated to make the sound/text division, but at another level, without doubt, the effect on the viewer/interactor was such that the division between whether the effect or direction had come through sound or text ceased to be of much importance what was important was the extent to which the mind of the viewer/ interactor concentrated on the story. In reflecting on the teaching around the task, it was the role of this viewer/interactor that had been emphasised during the lessons.

It also seemed to the researcher (and to the two teacher/researchers) that the initial division into dimensions was perhaps more about a common-sense understanding of media than a consideration of the more mechanistic division into functional use and file types. As Kress (2003) suggests, when discussing images and text it is often a question of which modality (dimensions in the context of this study) carries the meaning. Each of the different modalities has separate aspects and functions; text is usually sequential, it builds on the previous sentence as arguments and ideas are presented and expanded (as is hopefully being demonstrated in this paragraph). In using a sound file in way similar to text, as was done in the majority of these hypermedia stories, the students made the sound file carry the meaning making, in a similar way to the text. They are still very different in some aspects: they have an emotional charge, they are recognisable to the other students as individuals' voices, but they also carry aural meanings even to strangers, who can tell if the voices are male or female or even their age.

From examination of all the hypermedia stories it became apparent that the dimensions that each one used were related to their use in meaning making as well as to the type of file. Manovich (2001) describes new media (of which the hypermedia stories are examples) as having two distinct layers a "cultural layer" and a "computer layer". The students' use of the sound files interchangeably with the speech bubbles was at the cultural layer, but the real difference was at the computer layer and so less important for discussing the various dimensions that the students were using as they created their hypermedia stories. It was a surprising but interesting development to become aware of the ways in which these young multimedia authors utilised the tools available to emphasise messages. It seemed the students did not care that sound and speech were separate modes; to them they were useful as long as they served the purpose of telling the hypermedia story. Another aspect of this interchangeability is that to the students writing a speech bubble or a caption was as complex, or as easy, as recording a sound file; it was all a matter of manipulating a mouse and using the keyboard.

The initial in-depth investigation of *The Cowboys* was undertaking using the original five dimensions; the subsequent analysis of the remaining stories used only four, as speech and text were merged into a dimension of *language*.

Evaluation and reading of the Hypermedia Stories

The following section includes the shortened 'vignette' descriptions for each of the remaining twelve hypermedia stories. Each description begins with an evaluation matrix that shows how the story was assessed in terms of each of the visual, language, interactivity and design dimensions. This evaluation matrix gives an immediate impression of the level of development for each of the dimensions and the overall sophistication of the story. A thick white line marks the division between the multi-structural and relational SOLO levels, discussed above as being the division between a 'deep' and 'surface' approach in traditional phenomenographic studies. Each of the SOLO levels covers two oblong sections of the matrix. This was done as often it seemed a piece of work was edging towards a higher level but not quite there, and this 'half way' feature allowed for the recognition of this reaching on the part of students. The short description by the side of the matrix, 'Reading the matrix', offers a further spelling out of the evaluation in terms of the dimensions and the SOLO categories. The longer description below highlights the specific features of the story that gave rise to its reading and assessment.

The Caves

Synopsis

Hypermedia opens with a title screen then night-time view of a large tree. This leads underground to a cave with three tunnels. Exploring the tunnels reveals a monster in one, a treasure chest in another; the third tunnel leads to a genie that will grant three wishes to the explorer.

Figure 34. ***The Caves*** **map**

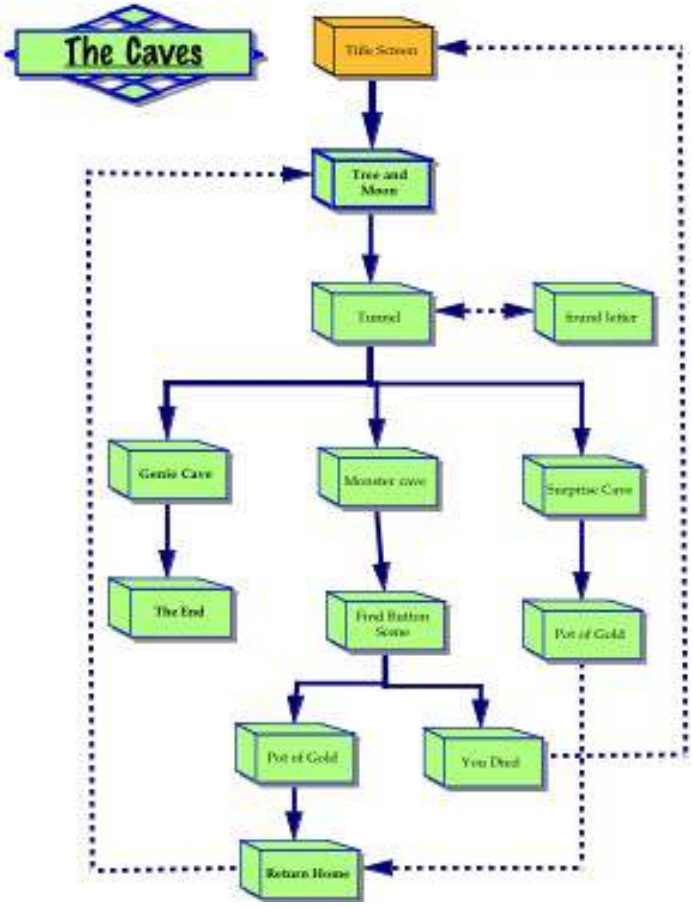
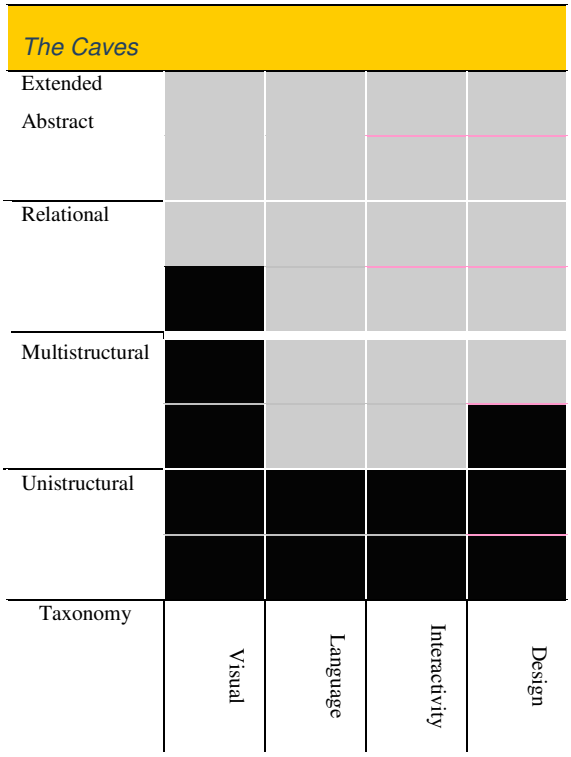


Table 4. *The Caves* Comparative Evaluation Matrix

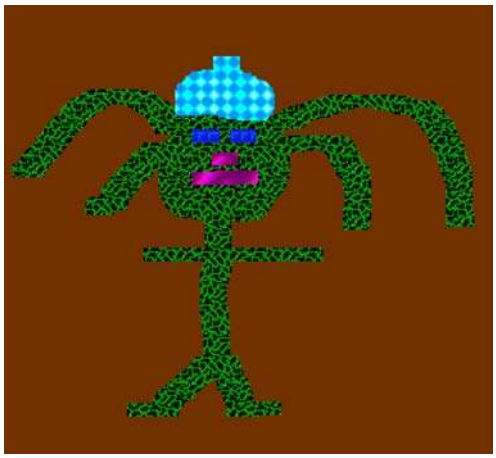


Reading the Evaluation Matrix- The Caves

The Visual Dimension is at the Multistructural level. The attempts to evoke the eerie, in the use of dark colours and the graveyard quality of the tree in the early scene, the genie and lamp in the cave are almost in the Relational area but there are not enough of such elements to justify placing them there. The language use is Unistructural with simple phrases and words attached to scenes or as sound files. The interactivity is also Unistructural, with individual buttons or hot spots that only lead to the next scene. The Design Dimension has some elements of a Multistructural taxonomy; it is non-linear with a range of choices for exploration, though the representational nature of the hypermedia that lies in the relational domain fades as devices such as the Return to start are used.

Visual

Figure 35. Monster from *The Caves*



Some scenes have strongly worked images, and an emerging sense of placement and composition; others are very simplistic, with little of the feel of the more worked images. The tree is very effective and the moon (see the icon above) adds a sense of expectation. Once underground, the nodal 'three tunnels' scene has a range of clues, including a dropped letter. Each cave has a different look; one has suggestive animal footprints leading to it. The walls contain a textured effect and the floor of the cave is a different shade to the wall.

Of the scenes in the tunnels, the Genie cave most closely resembles the

preceding scenes, though the "genie" appears to be an image of the Buddha, coloured blue. The other scenes lack the detail of these images and contain very simple stick figures – such as the monster – or clip art such as a dancing gold prospector.

Language

Aside from the title screen; there is little language use in the hypermedia. There is one simple found text in the 'three-tunnels' card, "Beware of Monsters". Other text examples are simple on screen captions addressing the viewer/interactor, with advice and instructions; such as "If you find the right button you will find a surprise". Voice is used in a similar fashion, but with more effect, in the Genie scene. Here one of the authors attempts an ethereal voice for the Genie "You have three wishes, choose carefully!" The authors also make use of the Blabbermouth device in a similar attempt at using voice to convey atmosphere.

Interactivity

The Caves has several single-button scenes; the tree scene even has a downward button on the trunk of the tree to indicate the direction of the tunnels underground. The 'three-tunnel' scene is the most interactive and serves as a central node in the hypermedia, the links to the three tunnels are here as well as a link to the found text letter. The genie scene has a return button as well as interactive sound. The other scenes are less developed, with invisible buttons hidden on the monochrome background of the card accompanied by textual invitations to find them.

Design

The design is centred on the 'three tunnels' card; the other cards lead here and then the tunnels all branch off from this point. Each tunnel contains a separate experience, though in terms of density of image, sound and interactivity the Genie Card is richest. The hypermedia is attempting to create the atmosphere of an adventurous search but mixed presentation seems to cloud the purpose. The hypermedia starts more strongly than it finishes. The authors fall back on the "return to start" device familiar from board games and early video games.

Legends

Synopsis

The hypermedia opens outside buildings, one of which is the Olympic Weightlifting Stadium. Once inside the locker rooms it emerges that a crime of some sort has been committed and a mystery must be solved. There is mysterious graffiti to decipher, characters to interview, clues in lockers, and some of the links lead to the police being called in.

Figure 36. *Legends* map

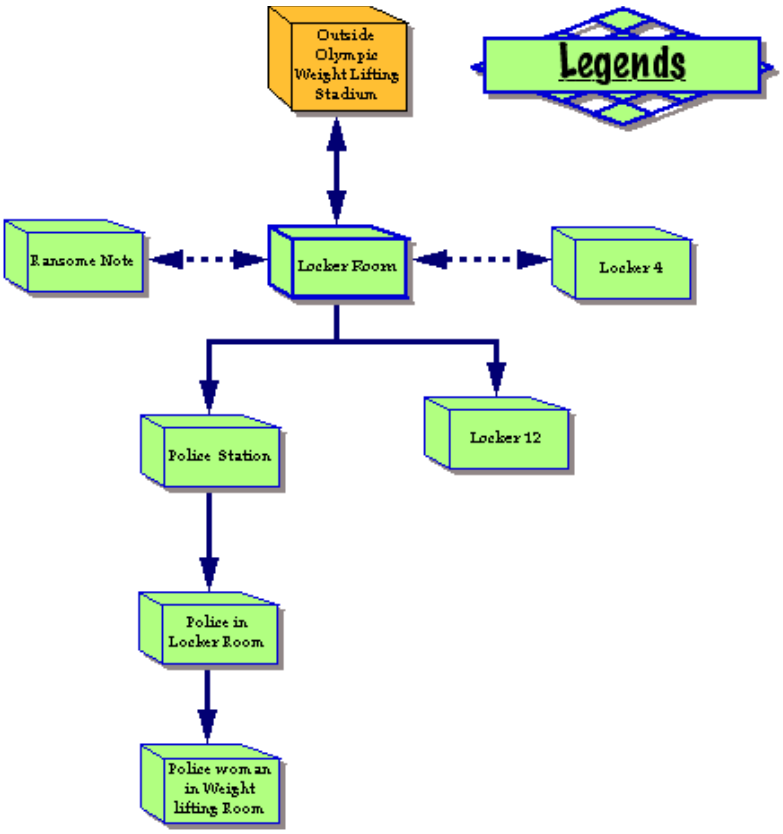
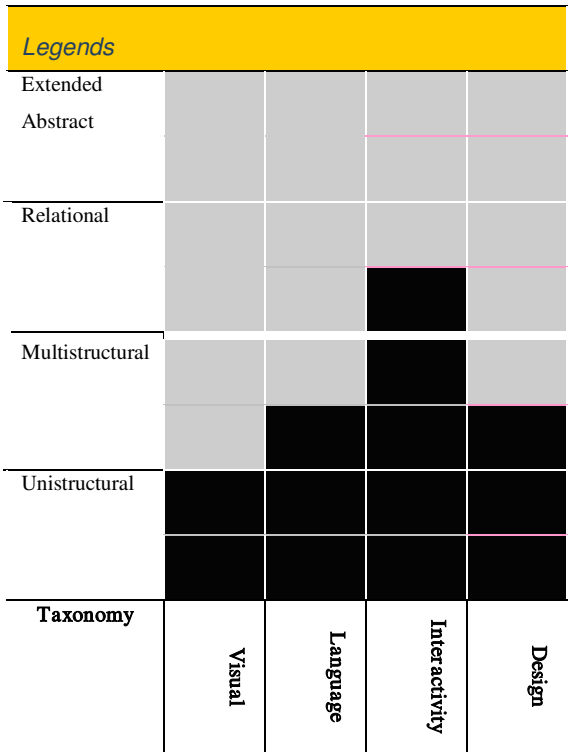


Table 5. *Legends* Comparative Evaluation Matrix



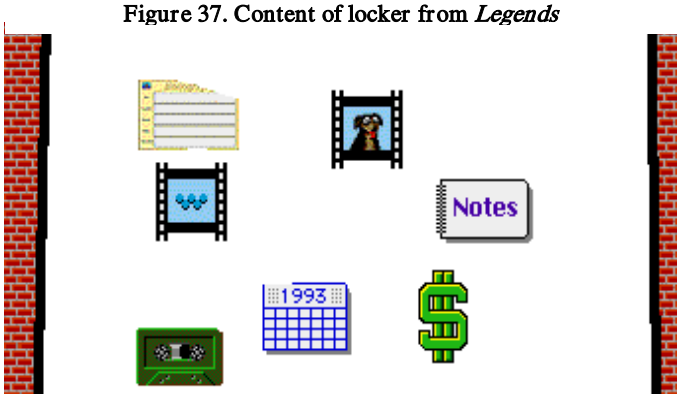
Reading the Evaluation Matrix-Legends

The images used, simplistic hand drawn and clip art, place the Visual Dimension in the Unistructural level. Language use is more sophisticated with a large number of textual types and modes, many advancing the overall sense of meaning of the hypermedia. The interactivity is more complex again giving the visual and language dimensions greater depth. The Design dimension is Unistructural again. It tends to be linear in direction, with some more intensely interactive nodes

Visual

This hypermedia displays a very handmade quality: lines are not straight, some characters are basically thickened stick figures (see logo above) and there is simple use of perspective. Some scenes are made up of collections of icons (see Figure 38). In fact, the mixture of the simple crude work of the school students and the incorporation of finished cartoon figure clipart can be jarring. Some scenes, such as the Flag Room (Figure 38), appear to be conceptual constructions, though on closer inspection the intention may be representational. The mixing of images still creates a compelling hypermedia.

Figure 37. Content of locker from *Legends*



Language

Language use in *Legends* ranges from single word signs on buildings to longer phrases and sentences, such as the diary entry of the kidnapper. The authors have used language in a variety of ways in the hypermedia. There are hidden messages written on walls, captions on a few cards, and a variety of signs, all nicely reflecting such a venue as a weightlifting stadium. The words and phrases are unsophisticated: “I was here and I kidnapped Franky Joe ha ha ha ha ha ha ha etc.”, which align with the naïve look of the visual work. The authors use voice and sound in a similar way. A stick figure character in the early scene says “Let’s go”, and the BlabberMouth device is used in the first card of the stack to inform the viewer/interactor that she is at the “Wrong Door”.

Interactivity

Both the visual and language aspects of *Legends* directly drive the plot development of the hypermedia. The scene is set: a weightlifting stadium; the plot is revealed: a kidnapping; and the characters appear: other weightlifters, the police. All these features of the hypermedia are interactively illustrated by images and language. Characters talk, either with recorded voices or (sometimes incomprehensibly) Blabbermouth; lockers open when clicked, revealing their contents. The rough, unfinished nature of the hypermedia continues in the interactivity where some links do not work. Clicking on one of the lockers leads to another card, while other lockers lead to diary entries. This makes the hypermedia difficult to navigate, more through inexperience on the part of the authors than intention.

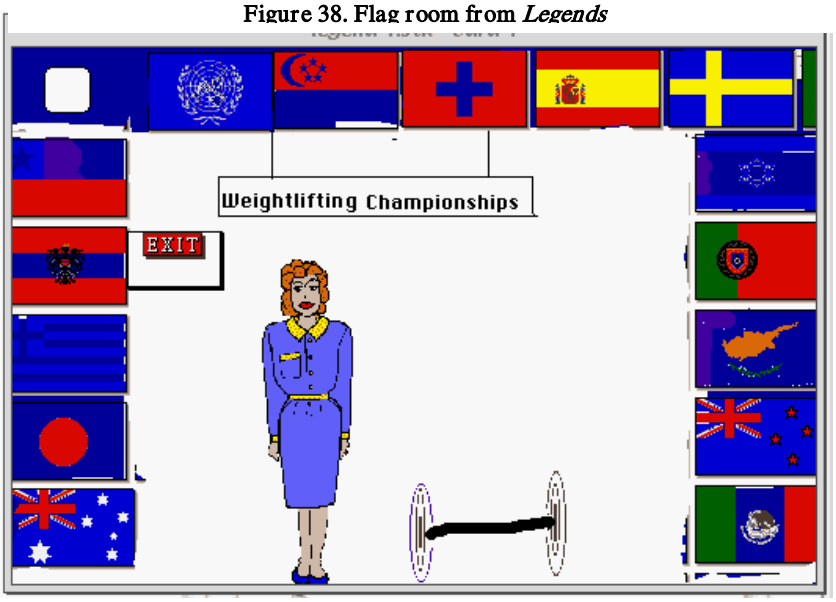
Design

The design of *Legends* tends towards the linear but does include side branches. The unfinished final execution of the hypermedia makes comment on the design speculative. The authors created eight cards, and presented a setting with the generally consistent motifs of a police crime story; a mystery, suspects, police and clues, though they never introduce the villain or show how the story might conclude.

Just as the authors were rough with their visuals and language, they were also inconsistent in their design. There is a mixing of the linear techniques of presentation with hypertextual exploration. They have an opening scene followed by the locker

room, where a crime is revealed, and this leads to a scene of the police being called in and then to a scene of the police in the locker room. This scene is a copy of the original locker room with the addition of images of the police officers. This design bears close resemblance to a comic book or the storyboards of a film, where one event leads sequentially to another. As mentioned, the authors also include interactive features in the locker room, which acts as a central node for the hypermedia. If the viewer/interactor pursues the police station line (as seen in Figure 36 of the *Legends* above) they miss the interactive elements and plot developments of the central node.

Figure 38. Flag room from *Legends*



Shopaholics

Synopsis

This hypermedia concerns the exploration of a shopping centre. The viewer/interactor can enter a variety of shops, talk to shop assistants, learn the prices of items, and leave. She can go to a restaurant; even to the toilet. The mix of voice files and interaction is exuberant, but the lack of purpose aside from generally exploring the area makes it less satisfying than the initial encounter suggests.

Figure 39. *Shopaholics* map

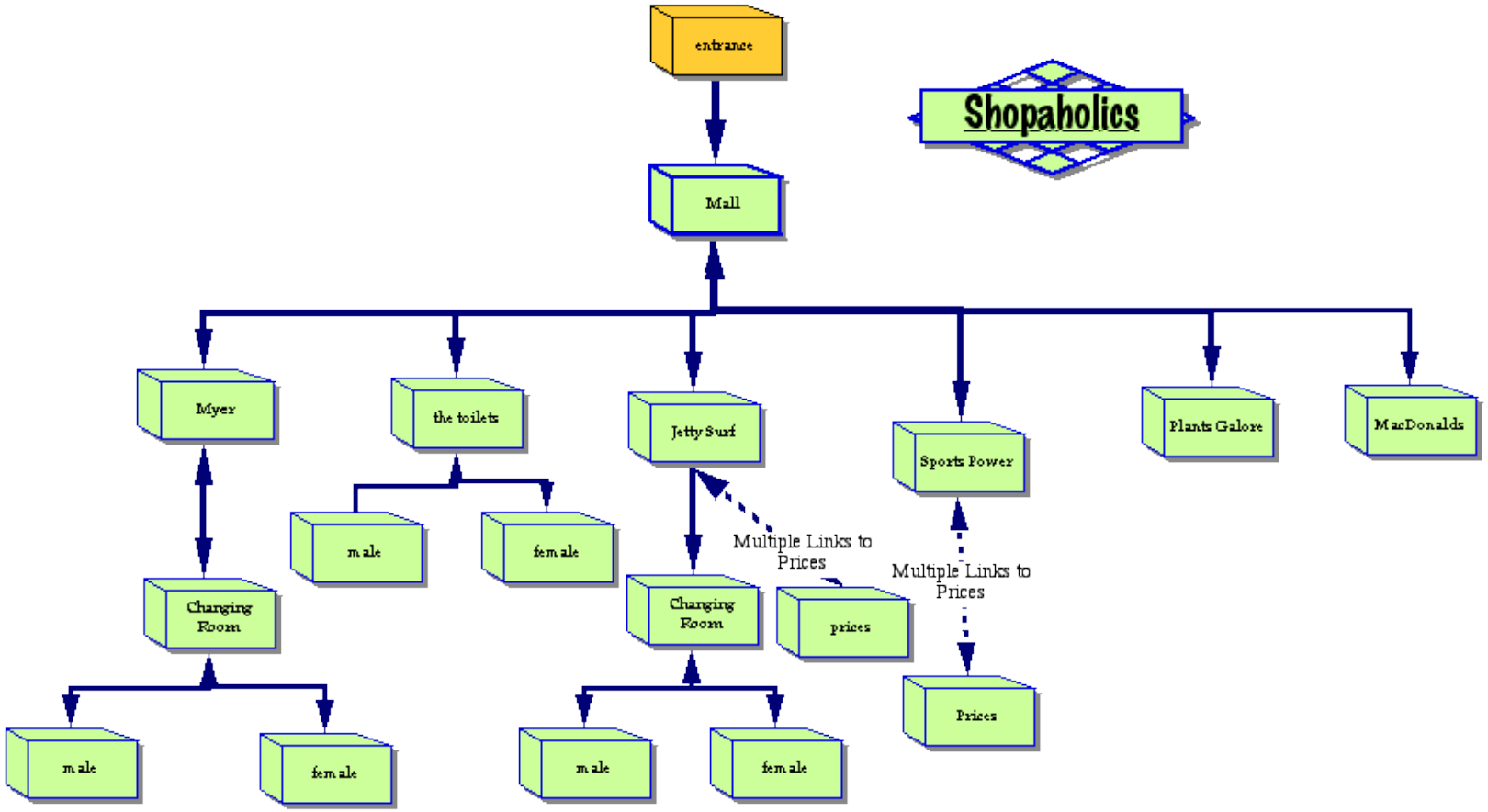
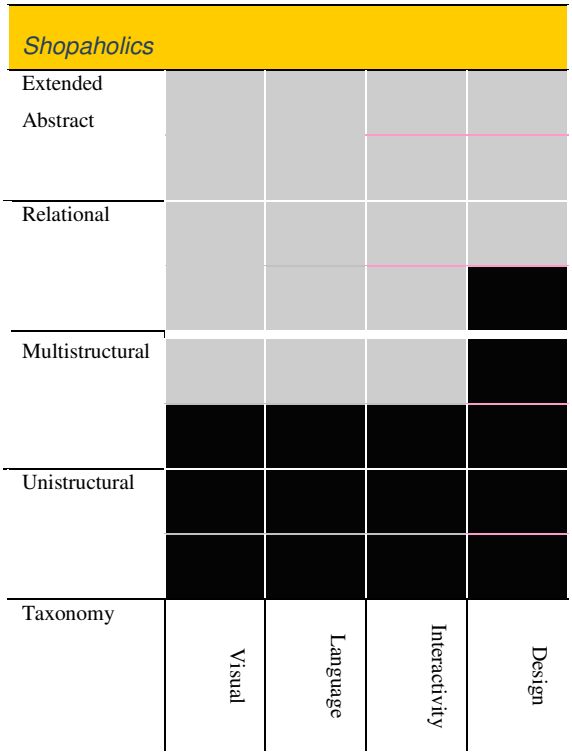


Table 6. *Shopaholics* Comparative Evaluation Matrix



Reading the Evaluation Matrix- Shopaholics

The first three dimensions all lie in the Multistructural level. The common feature is the quantity of elements; there are a lot of illustrations, sounds and text use. Each scene is rich with interactive elements as well, but the weight of elements does not quite add up to the Relational level, lacking an engagement of meaning, in contrast the design dimension is stronger with a clearly non-linear layout, which aided by the quantity of spaces to explore places it in the Relational level.

Visual

Like *Legends, Shopaholic* has a hand-crafted feel. It has thick-line drawn buildings and shopfronts, with strong use of the pattern fills palette in HyperStudio. Aside from "Myer", most scenes tend to be flat with little attempt at perspective. The shops tend to the same pattern: a shop assistant behind the counter, a variety of goods displayed around them. The goods are almost all hand drawn and include sports equipment, clothing, skateboards, trees and shrubs. The "McDonalds" is a rough approximation of an actual restaurant, with cash registers and menus above the attentive (or in this case interactive) staff. The "Myers" store has more of an attempt at depth. The store dummy (see the logo above) has a rounded feel and we can see the Changing Rooms further away in the back of the store. The Changing Rooms themselves are drawn with an attempt at perspective.

The authors have made careful use of clipart, employing a group of cartoon images of people throughout the hypermedia as images of the shop assistants and

storeowners. These have a consistent look about them and combined with their repeated use in more than one setting give a rather uniform look to the store scenes.

Language

The use of voice is the major language use in *Shopaholics*, although printed language is present in the signs on each of the buildings and in the labelling in a few of the stores, especially "McDonalds", where the authors have tried to recreate something of the look of the store. In the "Sports Power" and "Jetty Surf" scenes, clicking on an item takes the viewer/interactor to another card with the price of the item in numerals. In the "Plants Galore" scene this function is replaced with an interactive recorded voice file for each of the items. In this technique the voice is presented as if it was the storeowner's comments: "Bunches of flowers only $3.95 each" is, for example, spoken by one of the students with a deepened voice.

Each of the stores has a chanted voice file interactively linked to it (including the toilet). These are the television or radio jingles of the time associated with the various stores. "At Myer, at Myer, at Myer, Where else?" The "Plants Galore" jingle and the singing associated with the toilet ("come and visit the toilet") appear to be original but are in the same general style. In each of the stores the cartoon-style shop assistants will talk when mouse-clicked: "Hello welcome to Jetty Surf. How can I help you?"

> The "Myer" store has a different feel to that of the other stores. The scene opens on a single dress on a coat hanger stand. The Changing Room door interactively uses a voice file of two girls giggling, "Let's go try this dress on". This is a variation on many of the other scenes in which the viewer/interactor is addressed directly.

Interactivity

The interactivity of this hypermedia fits with the theme of a shopping trip. Doorways lead into stores, and inside, shop assistants will talk if clicked. As mentioned above, there are two types of interaction in the stores, a mouse click will lead to a change of card and the price will be revealed often in garish colours, or a voice, usually that of the shop assistant, will give the price and the name of each item.

The toilet scene, which appears to be a joke area, has singing voice files “Boys will be boys” and “Girls just want to have Fun” attached to the doors.

Design

The plot of *Shopaholics* is exploratory and dense in content. In one sense the authors have captured the feel of a shopping trip in that all the stores are rich with repetitive content. The design is strongly non-linear, based around a series of nodes (see Figure 39) in much the same way that a physical shopping centre is a series of connected hubs. The chief of these is the Concourse or Hall at the centre of the Shopping Mall. There are six branches from this node leading to the individual stores. Some stores, through the interactive use of “price” cards, contain additional twenty or more branches.

All nodes have links “back”, so the viewer/interactor can move from the concourse to the toilets, back out again and into the “Plants Galore” shop. This is the strongest use of exploratory navigation in the collection of hypermedia stories. The absence of surprises, or of any plot features besides the “experience” of a day in a shopping mall, however, gives this hypermedia a less engaging feel than others.

Tigers

Synopsis

Timmy Tigers Fun Fair is a contained world of Fairground or Show attractions. On exploration the viewer/interactor appears to be investigating the death of the manager, possibly as police officers. Various clues are included, as well as several suspects.

Figure 40. *Timmy Tigers Fun Fair* map

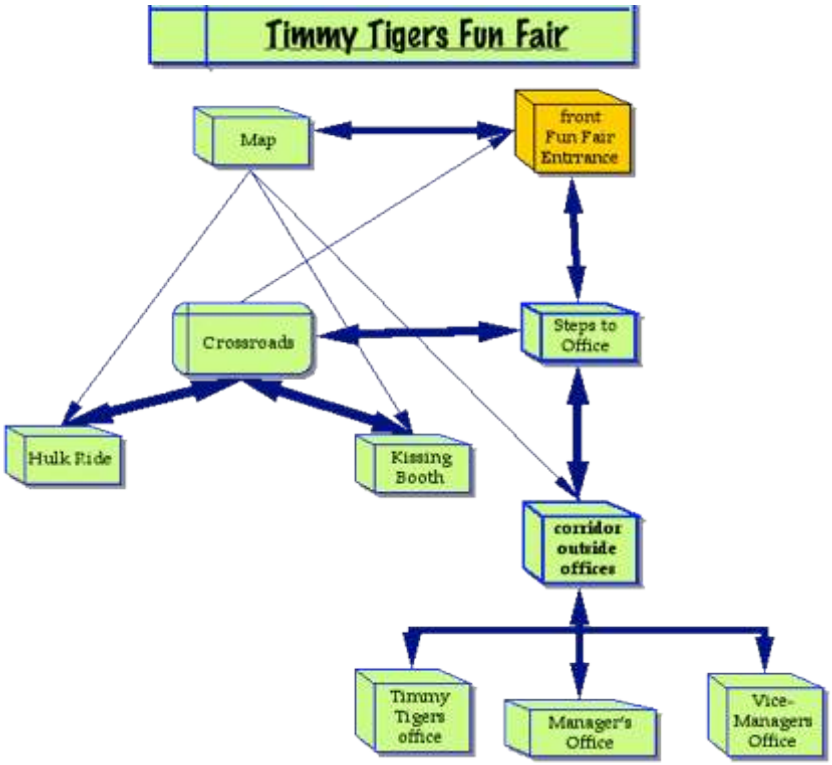
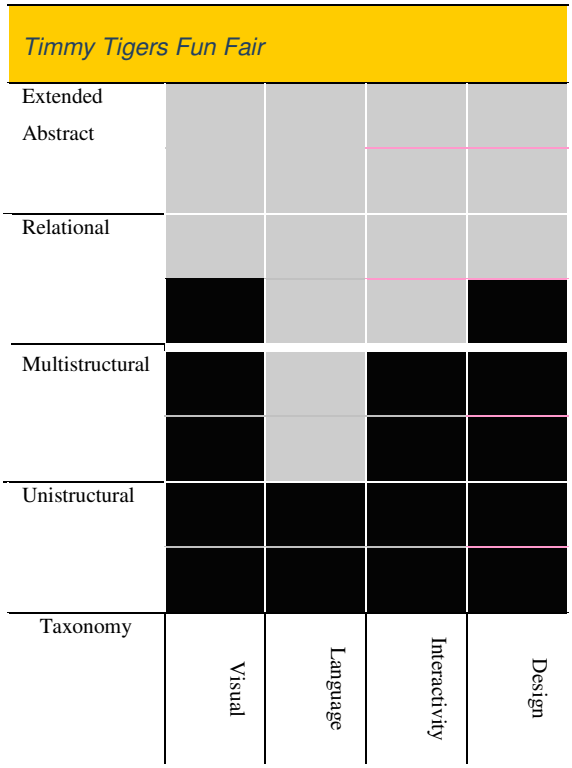


Table 7. ***Timmy Tigers*** **Comparative Evaluation Matrix**



Reading the Evaluation Matrix- Timmy Tigers Fun Fair

The Relational level of the Visual Dimension is seen in the integrated nature of the majority of scenes created. The images create a narrative whole. This level is not reached in the Language dimension, where text and voice elements are generally singular. The Interactivity dimension is Multistructural in the way it uses a variety of elements in scenes. The Design is at a higher level as the hypermedia uses the genre of the detective story to cohesively construct a narrative.

Visual

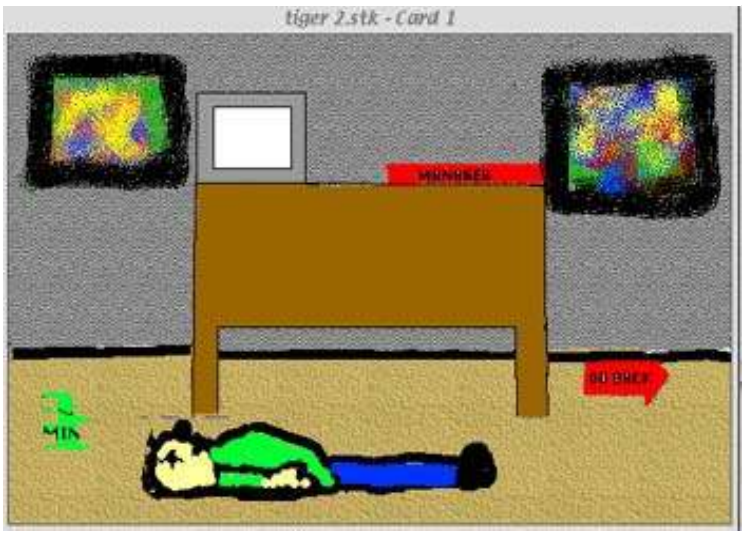
The authors of *Fun Fair* created a range of complex scenes using the drawing tools and textured file patterns. They inserted iconic clipart such as fire hydrants, as well as cartoon-style clipart. The overall style contains scenes full of features, all with attendant meanings. The Manager's Office (see Figure 41) contains a dead body, a desk with a computer, paintings on the walls, and the clue of a torn mint wrapper on the floor. The paintings, though colourful and made using the spray can tool from the HyperStudio palette, are almost abstract. The arrangement of the scene is symmetrical; the paintings balance each other as does the mint wrapper and the "GO BACK" arrow. Other scenes in the *Fun Fair* also show this attention to detail and effectiveness of image, such as in the office's staircase scene, where the hand drawn wall and balustrade coexist well with the clipart character and car. The smiley-faced sun is an example of the playful nature of many of the images. Timmy Tiger himself appears to be a teddy bear. In the same vein *Fun Fair* also makes use of animations.

Small dogs, helicopters, aeroplanes and rocket ships appear sometimes with no connection at all to the plot or scene. These interactive reveals, along with some of the jokes discussed below, reflect the style and humour of the twelve and thirteen-year-old authors

Language

Aside from the situational use of language in signage, the main use of text is in the Timmy Tiger Office scene (Figure 41). “We are now in Timmy Tigers Office”, “Hi said Timmy Tiger”. These two voices, one first person but plural, the other in the third person, are repeated throughout the hypermedia, and are suggestive of a companion or partner for the viewer/interactor. This Office scene may have been an earlier piece of work, with the textual needs of other scenes being catered for with either sound files or Blabbermouth; the dual voices are continued. Many of the characters react with voice when clicked, speaking directly to the viewer/interactor. Objects react as well; in these cases it is the voice of the companion, sometimes with a questioning hesitancy, “That’s the tiger’s cage. We don’t need to go there. Do we?” As can be seen in the visual realm the authors have included adolescent jokes.

Figure 41. Manager's office from *Timmy Tigers Fun Fair*



Interactivity

The *Fun Fair*’s interactivity is closely aligned with the visual and language elements in reflecting the genre setting of a fun park or show ground. Buttons have a

variety of sounds and animations attached to them, sometimes randomly with little meaning other than to provide entertainment. This mixture of the expected and unexpected occurs throughout the hypermedia giving it a distinctive charm. The authors were careful with navigation, often including navigational icons, such as arrows and pointing hands to help the viewer/interactor and also include a map to avoid disorientation.

Design

This hypermedia story like many of the others uses a mystery genre (albeit incomplete). The overall design reflects this through the use of the companion voice, which leads the viewer/interactor into looking for clues, or uncovers the clues on their behalf. All navigation is bi-directional through the scenes. The use of a map is novel; in one way it acts as an alternative navigational pathway through the hypermedia, and in this sense it truly allows for the creation of an alternative plot by the viewer/interactor. Following the map leads to different starting points and so is less linear, with more branching choices, than the other navigational path that leads directly to the offices.

Woop Woop

Synopsis

This hypermedia shares with the *Shopaholics* the theme of exploration. This time there is a town to explore, which can be done by going to the Cinema, the Park or going home; unlike the *Shopaholics* this town seems to be bursting with murder and grim death

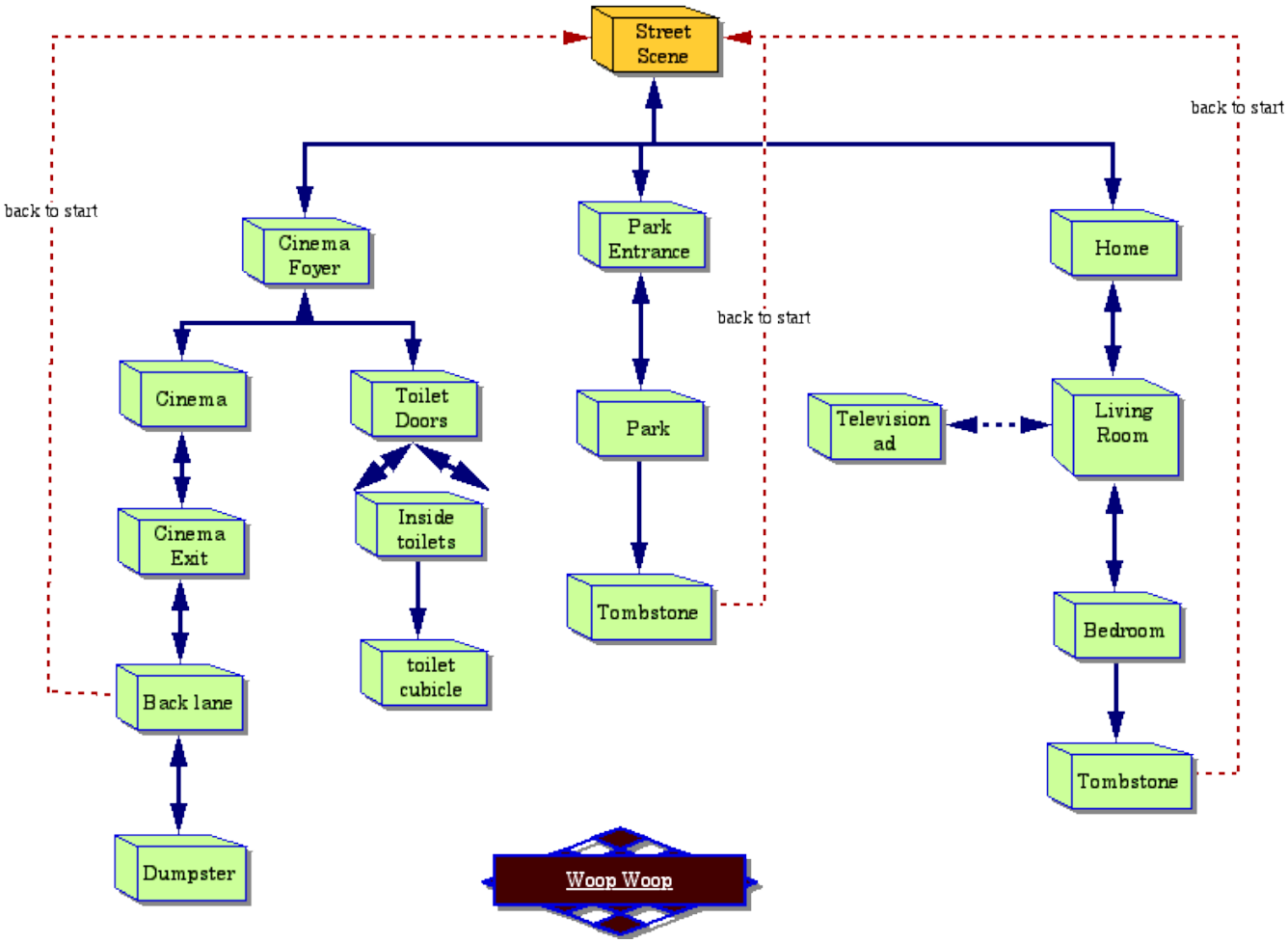
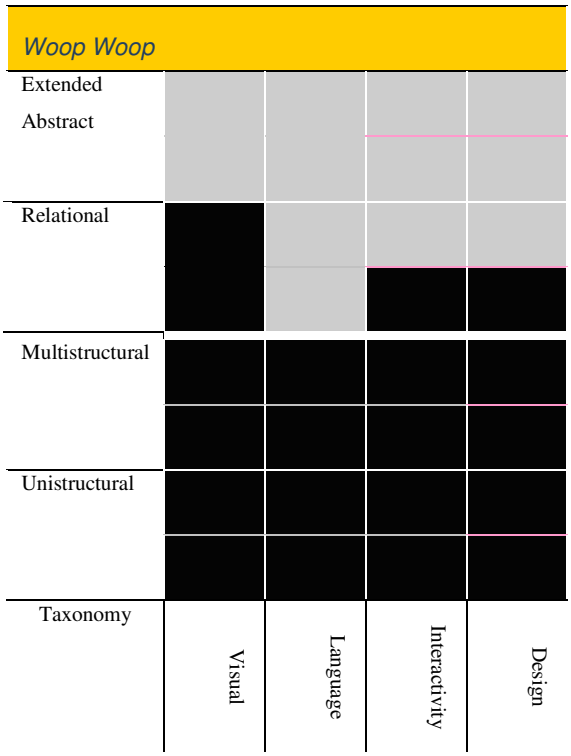


Table 8. ***Woop Woop*** **Comparative Evaluation Matrix**



Reading the Evaluation Matrix-Woop Woop

The Visual Dimension of Woop Woop lies at the Relational level; the scenes are cohesive and the various parts are layered with meaning. The Language Dimension is less integrated, with individual passages of text or sound tending to stand alone with little sense of contributing to the whole. The Interactivity and Design are at the Relational level; the linkage choices and overall structure of the hypermedia work together to produce a meaningful whole.

Visual

The *Woop Woop* scenes are colourful complex combinations. The authors made confident use of straight lines palette pattern fills and perspective to craft full, interesting scenes that invite further exploration. They inserted clipart icons and cartoon characters almost seamlessly alongside hand drawn items and people. Each scene is full of detail. The park scene (see Figure 43) has play equipment; the car in the left middle ground has a rear vision mirror as well as an aerial and lights. The whole screen has a symmetry and balance, which successfully pivots around the inserted yellow-haired clipart character. This almost designer-conscious style is maintained throughout the hypermedia with detailed cinema scenes as well as living rooms and back alleys.

Woop Woop's colourful, dense, almost happy scenes are contrasted nicely with the rather grim death and murder images (see Figure 44). One such scene, which takes

place in a toilet, is particularly gruesome, with lavish use of red spray paint. The other murder in a bedroom is also gruesome and accompanied by the sound of a scream. These sharp distinctions in content or story matter are not reflected in the visual style; both scenes are carefully laid out, with attention to detail – the toilet roll and the window – as well as placement and balance in creating the scenes. The bedroom murder scene also uses sombre colours and the darkened window and moon to establish a night-time setting. The reflective oval of white on the otherwise black head of the balaclava-clad murderer gives a rounded effect.

Language

Woop Woop has several situational uses of text in signs associated with businesses such as shops and in the Cinema. These serve to explain to the viewer/interactor the action or plot, as well as to aid in navigation around the hypermedia. The most extensive use of such text is in the epitaphs on the graves of two of the characters. The authors also make use of navigational devices such as buttons with text captions. These sit on top of the scenes, not as part of the action, and are only present to aid the viewer/interactor in their plot-forming navigation. The navigational devices also sit alongside the situational text.

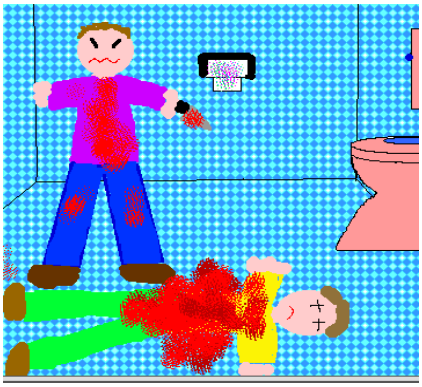
Figure 43. Park scene from *Woop Woop*

An example of this use of navigational devices is in the foyer of the Cinema, (Figure 45) where situational examples such as the “Tickets” sign under the cashier, the advertising poster in the hall and the signs pointing to the movies and toilets are all in the same scene as the navigational text “back to street”. This scene also uses another major element of *Woop Woop*: sound files. The Cashier says, over very noisy

background sounds, “Here’s your ticket. Thank you very much. Please enjoy the movie. Good bye”. A range of textual uses is in evidence in this scene.

The use of sound files, particularly singing, is a major feature of *Woop Woop*. The small girl on the front card bursts into song, and jingles blare out when stores are clicked on in a manner similar to *Shopaholics.* The body of the murder victim in the toilets emits a spiritual song, “In the arms of the angel far away from here…” while the murderer has a mocking laugh. These uses of sounds add a deeper, more interesting element to this hypermedia, especially compared to *Shopaholics* with which it shares many interactive and design features.

Figure 44. Murder scenes from *Woop Woop*



Interactivity

The interactivity in *Woop Woop* is closely aligned to the exploratory nature of the genre selected. It is basically a recreated town with many of the features young people would find attractive such as their homes, a cinema and a park. The authors have infused each scene with a wealth of colour and detail and included much interactivity. Cars make car noises, characters sing or talk, doors lead to the insides of buildings, exit doors lead to alleyways, and small signs on walls lead to closer views of the sign. The authors do not try to force a naturalistic navigation system on the hypermedia. They use navigational buttons in the scenes when there does not seem to be an appropriate metaphor or piece of screen furniture that would serve to represent a link. As can be seen on the opening card, where a “go home” button sits in the bottom right hand corner, the links to the other scenes are the doors to the cinema and the gate to the park.

The scenes in *Woop Woop* are rich with interactivity. The living room of the home has a television set which (when clicked) displays for the viewer/interactor a late

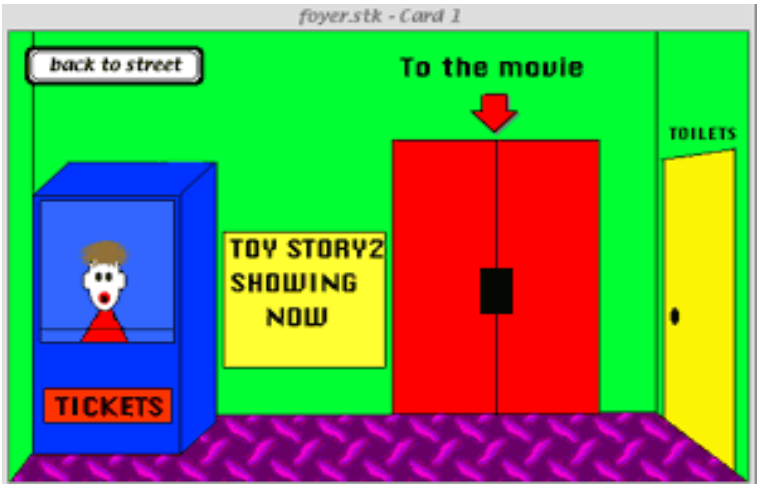
night phone sex advertisement, complete with alluring voice; the small dog also barks when clicked. The close link between interactivity and content can be seen as an important element in the engagement that this hypermedia offers over others such as *Shopaholics*.

Design

As can be seen in Figure 42 the design of *Woop Woop*, though essentially hypertextual, does have four paths which the viewer/interactor can follow: two via the cinema, one into the Park, the last by going home. Each path is bi-directional and all reach a terminal point: three in violent death, one in a garbage bin. The terminal points all display the video game (or any game) device of starting again.

This hypermedia allows for the exploration of a place, in this case a town. As the viewers/interactors explore they do not uncover a mystery plot as they do in *Legends* or *Timmy Tigers Fun Fair*, yet nor is it merely exploration of a place like *Shopaholics.* It is the exploration of a place with secrets and shocks, similar to teenage horror genre where the everyday is turned into a nightmare of unexplained bloodshed and gives *Woop Woop* a particular, if somewhat peculiar level of engagement.

Figure 45. Cinema foyer from *Woop Woop*



The Cleaner

Synopsis

This hypermedia story resists categorisation more than the others. It has a range of ideas linked only superficially together. The ostensible setting is a sports stadium, but it includes a supernatural ‘splodge’ on a wall, an explosion in the locker rooms, as well as a surreal exploration of the Cleaner’s cupboard and cleaning machines. Following this strand in the story takes the viewer/interactor into the criminal world of drug dealing and jail. This diversity reflects the contentious nature of the group of authors who constructed the hypermedia.

Figure 46. *The Cleaner* map

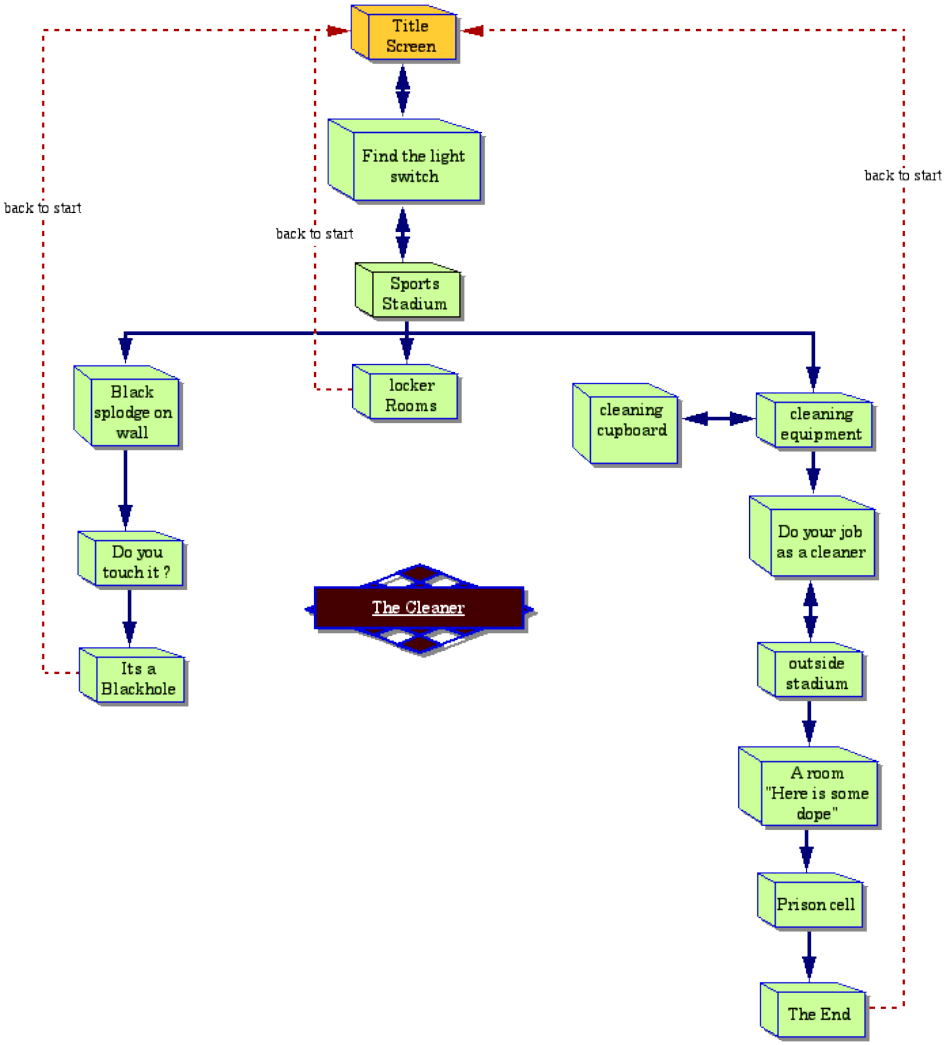
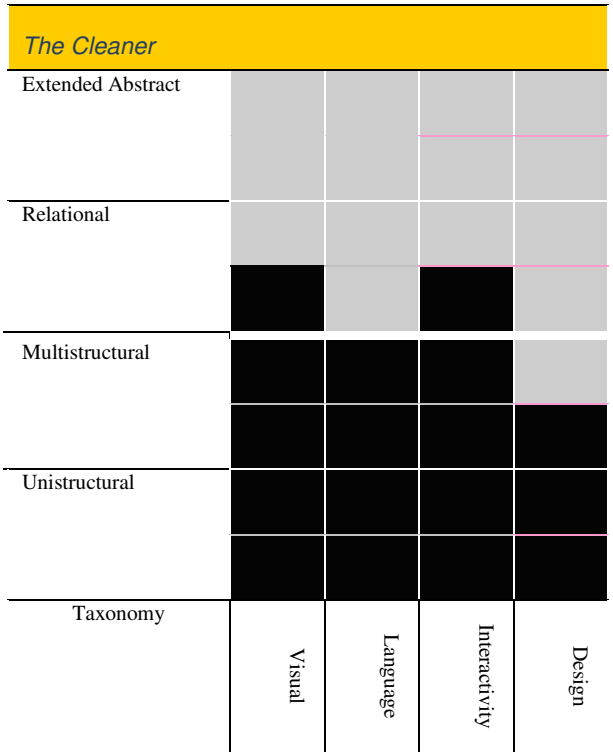


Table 9. *The Cleaner* Comparative Evaluation Matrix



Reading the Evaluation Matrix- The Cleaner

The Visual and Linkage Dimensions lie in the Relational area; the images and interactivity carry the plot and meaning of this hypermedia. The Language use by comparison is a collection of odd jokes and comments and the Design is based around a central node with branching generally linear paths.

Visual

The visual dimension of *The Cleaner* reflects the disparate characters and interests of the authors. A range of image ideas and visual effects is used. The opening title screen and the following Light Switch scene use little but black colouring and text to convey a sense of mystery and unease. The viewer/interactor has to deal with these before they can come to grips with a place where they might think the hypermedia starts, the Sports Stadium. The equally mysterious splodge on the wall also uses little imagery. It is just a black spot on the wall (see icon above) that when clicked leads to a restart of the story.

The central node of the Stadium is simple in design, though the parallel lines of floorboards defeat an attempted use of perspective. The Locker Room scene is very reminiscent of the *Legends.* The scenes in the Cleaner's cupboard, of the Cleaner herself, and of the car outside the Stadium are more evenly proportioned and polished, though the strange shape of the Cleaner's machine (see Figure 47) adds to the overall off-balance feel of the whole hypermedia.

Figure 47. Cleaning machine from The Cleaner

The linear succession of scenes after the Stadium shows little of the style or even content of anything else in the hypermedia: they are obviously the work of another student. They are very rough in execution with an almost wilful sense of shock, from the talk balloon of the two children, to the cartoon dog at the top of the card (see Figure 48). A scene in the Jail shows a more controlled use of the HyperStudio palette.

Figure 48. Dope scene from *The Cleaner*

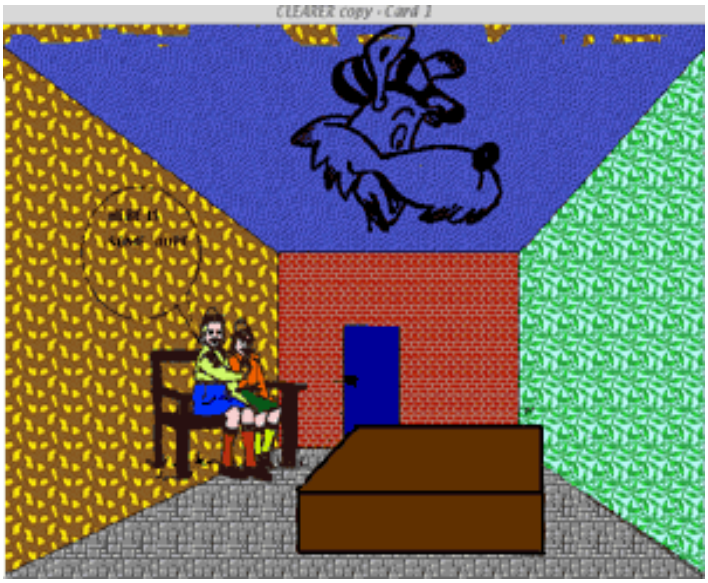


Figure 49. Light switch from The Cleaners

Language

Text use in *The Cleaner* includes the opening title screen and situational text as labels or signs, and use is made of captioned text. The text is directed at the viewer/interactor, inviting her to take part in the hypermedia: “You enter a sports stadium. You are the cleaner. Where do you start?” The captions keep the viewer/interactor aware of what is going on and give instructions as to what to do – as can be seen in the caption in Figure 9 of the cleaning machine, and in the comments surrounding the splodge on the wall.

The Cleaner is also full of voices. These are often sarcastic or ironic, representing another level of playfulness in this original but teasing hypermedia. Dead bodies say, “I’m dead, really! Da Ugh!”, a mop leaning against a wall says “Swish, swish, plop. That’s all I do, all day long and who came up with the name mop anyway. I don’t go on and on and on do I?” Even the moon when clicked says, “I’m the moon, but I want to be a cowboy baby!” This ironic and referential playing with the viewer/interactor is even turned ironically on its self as when the bars of the jail cell are clicked and say, “You can’t expect everything to do something can you! Da ugh!” This last sound (difficult to capture in text) is the teenagers’ cynical universal comment on anything.

Interactivity

The cynical ironic nature of this hypermedia is carried in a way by the interactivity. The world of *The Cleaners* is confusing and unexpected. It revels in juxtaposition such as a black hole and a sports stadium or an electric cord and a sound file. The Locker Room explodes unexpectedly, and no reason becomes apparent even after exploring the whole story. It even plays with interactivity; seen in Figure 49, where an invisible button, the light switch, must be found before any other interactivity will happen. This is difficult, as it requires the viewer/interactor to spend some minutes clicking all over the screen.

Design

The design of *The Cleaner* is mostly linear with a central node being the Sports Stadium. The three possible paths from this point are the black splodge, the Locker Room and the Cleaner's equipment cupboard. There is some evidence in the HyperStudio stacks and from the storyboard plans that the Locker Room sequence was intended to be more elaborate. The pattern is very similar to *The Caves*, though in this hypermedia the story path through the cleaning cupboard is the most extensive. Navigation is deliberately difficult. The navigational logic of a Fun Fair, Shopping Mall and especially a Sports Stadium do not apply. The situational clues expected through exposure to other hypermedia are turned around. The viewer/interactor is presented with the unexpected and comes to expect strangeness as a basic part of this hypermedia.

Ashley's Totally Crazy Zoo

Synopsis

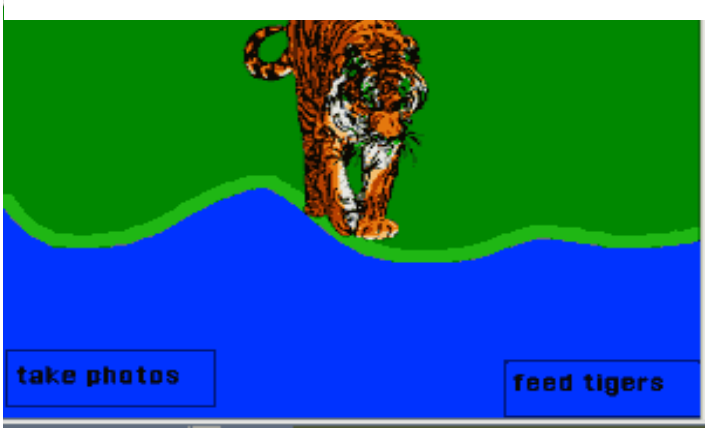
An individual student constructed this hypermedia; most of the others were made by groups of four. Ashley created a variation on a day visit to the Zoo using some initial ideas from her original group.

Table 10. ***Ashley's Zoo*** **Comparative Evaluation Matrix**

Reading the Evaluation Matrix- Ashley's Zoo

The Visual Dimension is at the Unistructural level with singular meaning images. The other Dimensions are in the Multistructural area, there is singing, text and sound in the scenes, there is a range of interactivity and the design (though tending to be linear) has branching choices to follow.

Figure 50. Tiger from ***Ashley's Zoo***



Visual

The visual impact of this work lies in the simple, bold use of colour, and to a lesser extent patterns, with the incorporation of clipart images of animals and people. Many of the scenes appear rough with crooked lines or an unequal distribution of visual elements. The scenes are often based around a central clipart or hand drawn element, such as the Tiger (see Figure 50) or the Café (Figure 52). The out of scale clipart element becomes iconic and stands for the Tiger (or Elephant) in other scenes, sometimes with the surroundings or with other images in the scene.

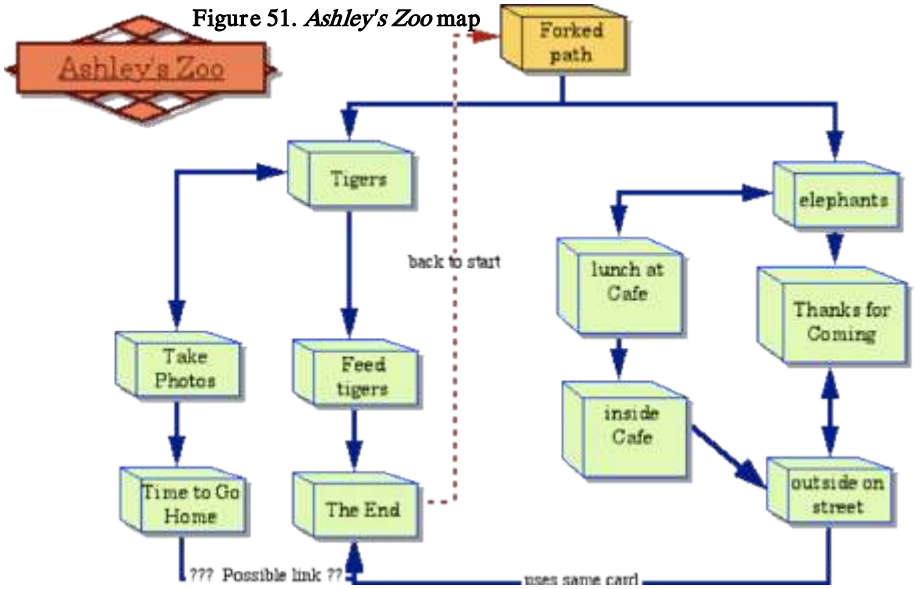


Figure 51. *Ashley's Zoo* map

Language

Textual language use includes single words and phrases as captions for the shared exploration of the Zoo. Examples used include “Time to go home!!!” and “you feed the tiger and the tiger killed you!!!” This style is more reminiscent of children’s picture story books than the comic books from which the other hypermedia stories seem to borrow from. The author also uses on-screen text as choices for the viewer/interactor, as in Figure 51 where the viewer /interactor is offered the choices “Feed Tigers” and “Take Photos”. In a similar way to *Shopaholics* and *Woop Woop*, *Ashley’s Zoo* makes use of the student’s own singing sound files.

When it is time to go home the button click launches a long version of “Chitty Chitty Bang Bang” in the Café a link plays an extended recording of a popular song of the time “Come on over, Come on in, Take a load off your feet”; a digital clock plays a selection of music. Other language use, in a similar way to the simplistic visual dimension, carries only a limited range of meanings. The crowd of characters (seen in Figure 52 and repeated in four of the scenes) when clicked says, “Let’s take a photo”.

Figure 52. Cafe from *Ashley's Zoo*

Interactivity

Ashley’s Zoo is straightforward in its interactivity; the simple scenes contain only a few buttons, generally for navigation. As discussed the café scene breaks into seemingly unrelated singing. The author even uses words as buttons.

Design

The hypermedia is very linear, with two paths represented by a signpost. Its two story paths are very similar and finish with a definite end scene.

Totally Crazy Linking Stack

Synopsis

This stack and the two following are part of a series. The student authors never entirely coalesced as a single group but worked in parallel on three different hypermedia stories, although they retained the name *Totally Crazy* as an overall theme. This stack serves as a linking device for the *Totally Crazy* group. It is a street scene with a range of interactive buttons. Two of these buttons, located on the signpost, lead off to the *Zoo* stack or the *Cemetery* stack.

Visual

The linking stack's main scene (Figure 53) is a streetscape composed of a series of coloured rectangles with some distant hand drawn trees and houses in the centre that suggest a wider world away from the scene. The road section with its two ends leading off the card, the arrows and the obvious signpost, are clear indicators of the intentional nature of this stack, the taking of one direction or another.

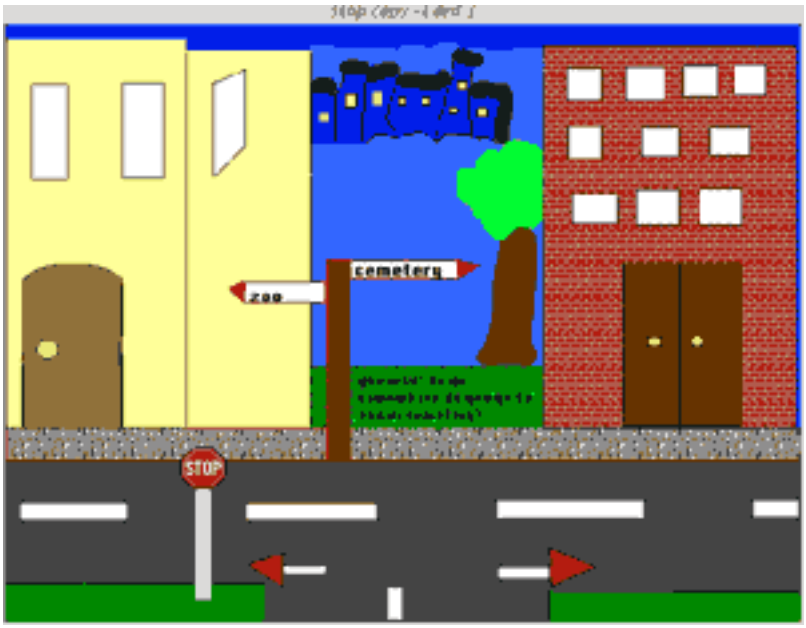
Language

The labelled directions on the signpost, and a caption "you want to go somewhere do you go to Zoo or Cemetery" (which is also repeated in a sound file) are the only textual uses of language in the hypermedia. Yet hidden and interactively available is a wealth of sound files, generally unwelcoming, but including singing and the use of Blabbermouth. The spoken text files consist, generally, of variations on the words "You are not welcome here", possibly as an attempt to make the viewer/interactor take one of other of the choices indicated by the signposts. The singing sound files are an example of the exuberant use of song found in many of the hypermedia, including the *Totally Crazy Zoo*, *Ashley's Zoo* and *Woop Woop*.

Interactivity

This is a very interactive single page, with twelve button hot spots. They lead to voice files, both recorded by the students and using Blabbermouth, as well as singing. A door leads to an open door scene, with a knocking sound. There is even a link to a scream sound file. A signpost has links to the Cemetery or the Zoo, with associated sound files. The stop sign when clicked says, “Stop”.

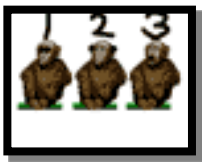
Figure 53. Street scene in *TC Linking Stack*



Design

This hypermedia was designed to link two completely different stacks. The generalist theme of a city acts as an association between a Zoo and a Cemetery.

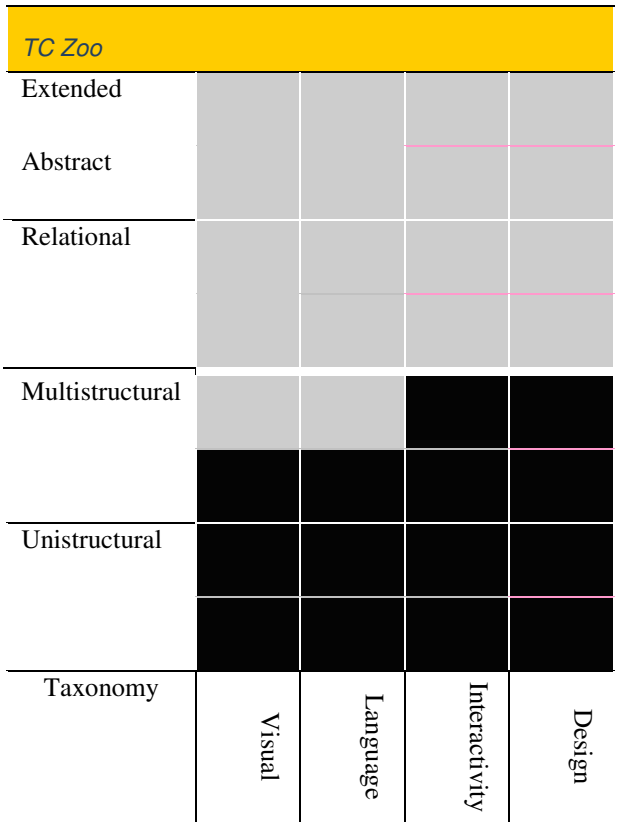
Totally Crazy Zoo



Synopsis

This stack, more than any of the other hypermedia produced by the students is designed like a game or a piece of activity software. In earlier planning it was to be linked hypermedially with *Totally Crazy Cemetery* (below), but it is actually totally independent. It consists of the exploration of a zoo.

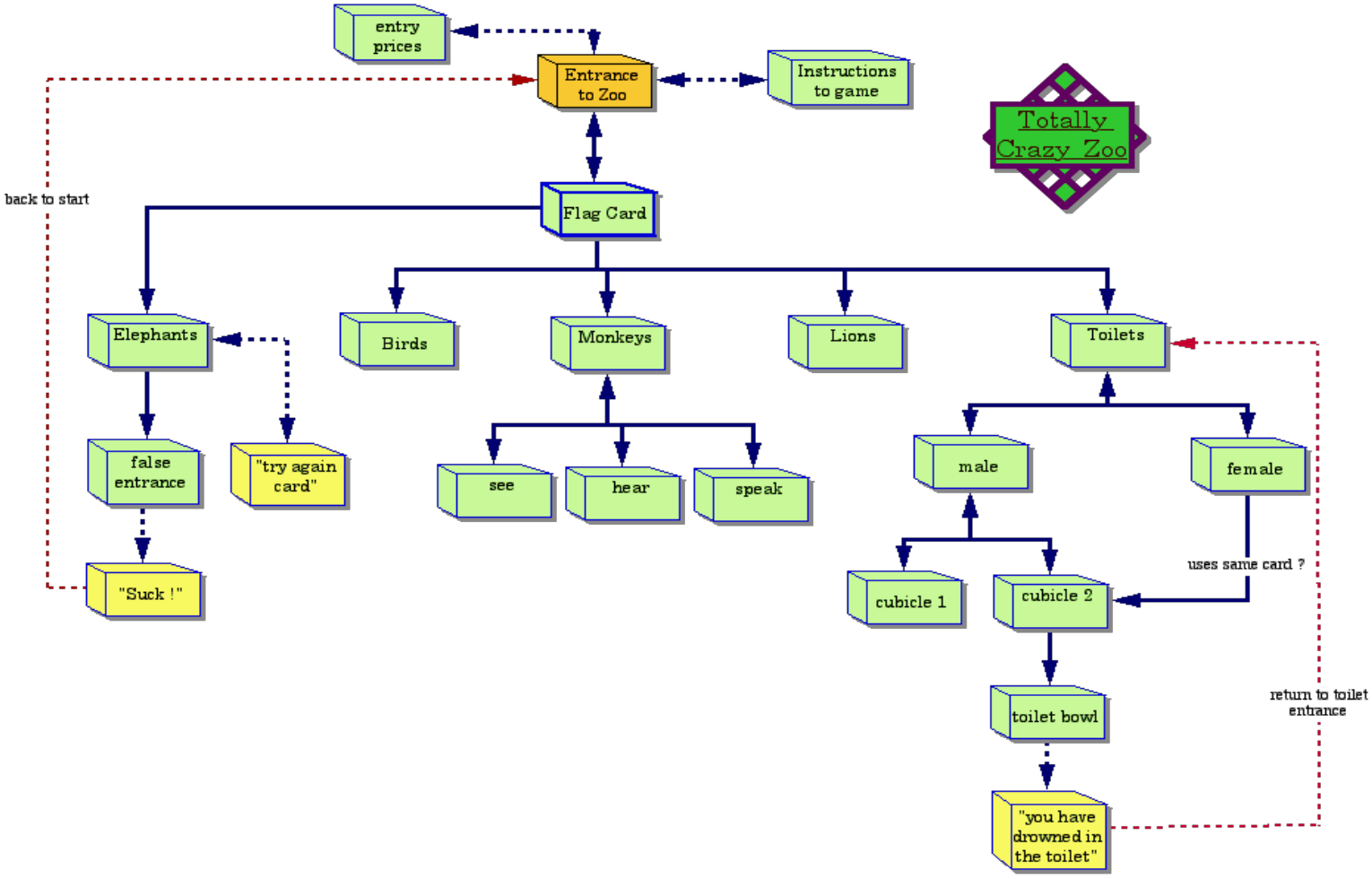
Table 11. *TC* Comparative Evaluation Matrix



Reading the Evaluation Matrix- Totally Crazy Zoo

All the dimensions lie at the Multistructural level. There are elements, such as singing, images, text and interactivity, on a several cards but with out a fully coherent back story to hold the various parts together. The Design tends towards a cluster with linear plot lines

Figure 54. Totally Crazy Zoo map



Visual

In keeping with its game-like or activity software design, this hypermedia is less visually naturalistic than the others. The foreground images are usually clipart, from HyperStudio's collection of animal pictures; individual images are often repeated, some as part of the game set piece cards. In the monkey set, the clipart images were edited to fit the visual story of "The Three Wise Monkeys" (see the logo above); small black circles were placed over the respective eyes, ears and mouth of the individual monkeys. In some scenes the images represent photographic posters for the animals, in other scenes they depict the animals themselves in their animal enclosures, often duplicated to suggest numbers.

Figure 55. Opening screen *Totally Crazy Zoo*

This hypermedia contains only a few evocations of place: the initial start screen and the toilet set seem to suggest real settings. In the other scenes backgrounds are either solid white or seemingly random patterns, an effect that is meant to suggest cages. Perspective is not used, except in a limited and not quite effective way in the opening screen where the doorway of the zoo is evoked (see Figure 55). The authors are content with a two-dimensional feel for the rest of the hypermedia. Pattern use seems to be random. Interestingly, this hypermedia uses photographic images in the toilet scenes and includes the only example of digital video in the study: a film clip of a street band playing music incorporated into the opening card.

Language

The authors made use of simple navigational and situational text, “back to the entrance” and “to the toilets”. They also used instructional screens to explain how to use the Hypermedia, a device similar to that in gaming software and computer console games: “… Try to find the picture of a CD then click on it to end”. These instructions prove to be ironic, as they are the set up for a joke when the viewer/interactor arrives at the screen containing the CD. This is a playful contrast between the sensible and the anti-instructional, perhaps suggested by the use of the deliberately misspelt word “Crangulations.” The linked scene contains the text “Suck. You actually really believed there was an End”.

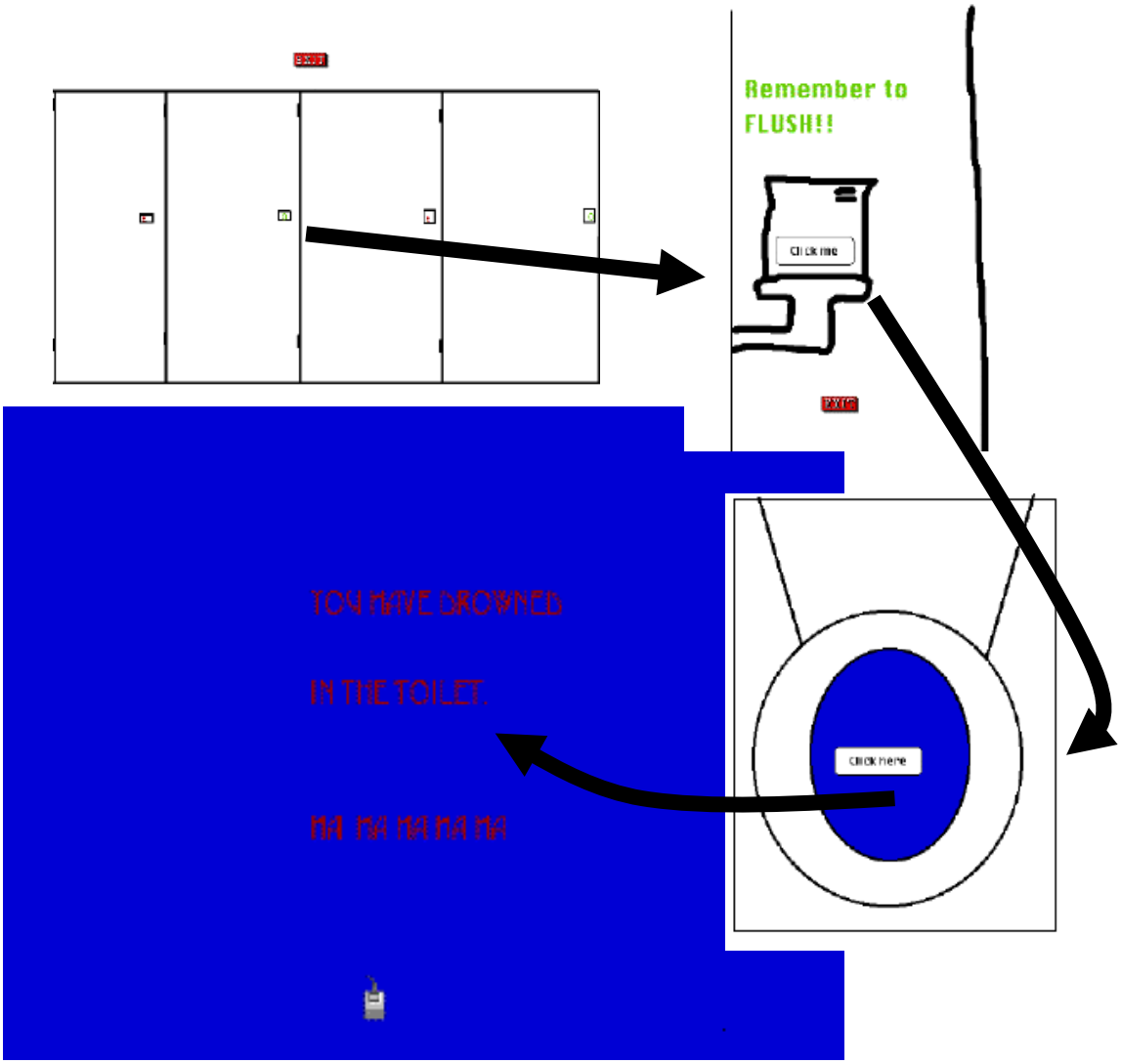
The humorous nature of this hypermedia, and its game-like quality, is continued through the use of sound effects of animals, by incidental button music, in the number of set jokes and by the instructions. The instructional screen makes the suggestion “If you want a bit of fun make sure to visit the toilets”. The toilet scenes contain several sound files, including “go away’ and “I’m in here”, as well as written captioned versions of the same.

Interactivity

The interactivity of this hypermedia though navigational in a limited sense allows more for an exploration of set-piece jokes and game-like scenes than the Zoo as a place. The toilet set contains invisible buttons over the doors that are linked to sound files. One door leads to a toilet which the viewer/interactor is invited to flush, this leads to a toilet bowl which when clicked leads to a blue screen, representing water, with the words “You have drowned in a toilet Ha Ha Ha” (see Figure 56). This level of interactivity is continued in the scenes linked to the central node.

The scene called “The Three Wise Monkeys” is more non-linear in its arrangement; the Bird scene has two examples of animation: a jumping man who seems to serve no purpose, and a flying goose which can be loosely associated with other birds perched in a tree. The Lion scene and the Elephant scene provide the most game-like elements, as recommended in the instructional text linked to the Zoo entrance scene. Selecting the “right” elephant leads to the “Crangulations” scene described above.

Figure 56. Toilets from *Totally Crazy Zoo*



Design

The *Totally Crazy Zoo* is the most explicitly game-like of all the hypermedia stories in the study. This can be seen in the instructional screen where the viewer/interactor is told to "First click on the entry to the zoo and on the way visit all the animals starting with the birds, then the monkeys, then the lion and last the elephants. If you want a bit of fun make sure to visit the toilets. Try to find the picture of a CD then click on it to end. HAVE FUN!!!" The sparse design of many of the scenes, such as the Lion card and the Monkey cards, continue this expository rather than exploratory theme. The "constructed world" nature of many of the hypermedia is continued here but at a less realised or fleshed-out level. The scenes in the toilets are exploratory, detailed with interactivity (in pursuit of the jokes as outlined above), whereas the scenes with the lions and elephants are quite linear and sparse with interactivity.

Totally Crazy Cemetery

Synopsis

Figure 57. ***Totally Crazy Cemetery*** **map**

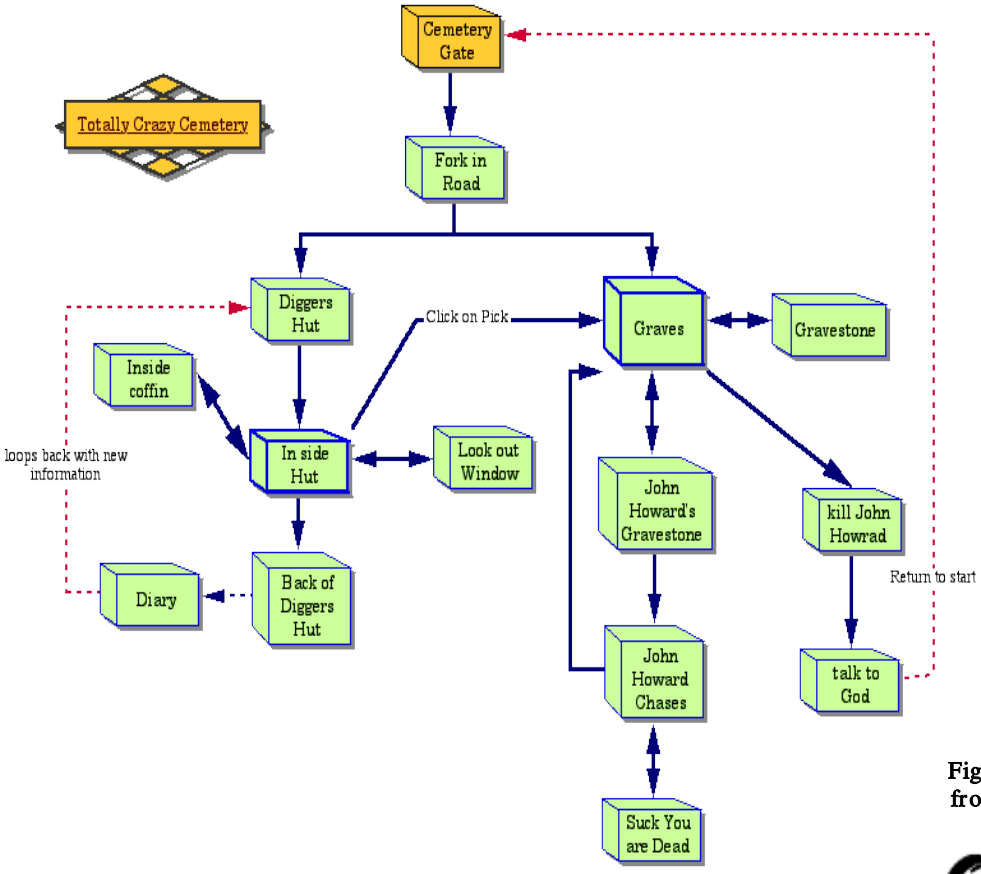
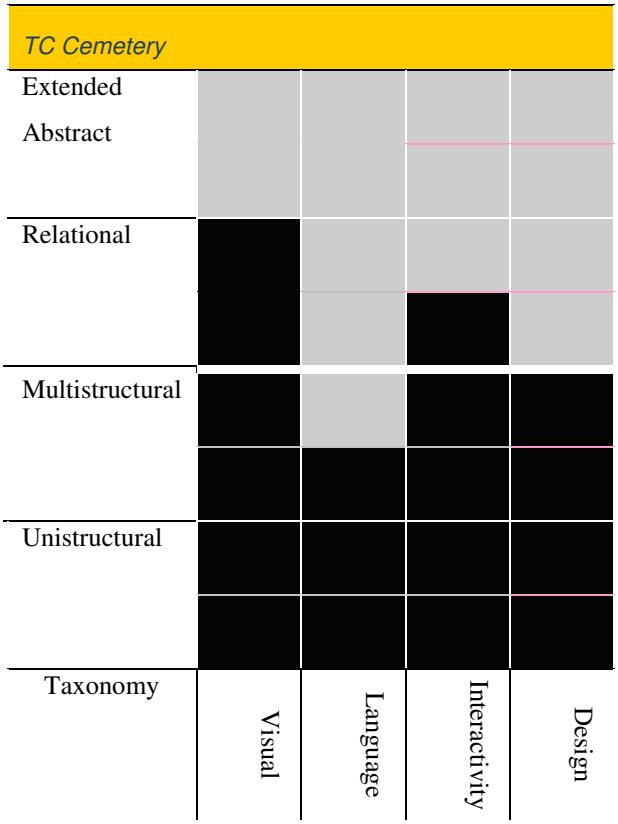


Figure 58. God from ***Cemetery***

This is the fourth hypermedia story from the *Totally Crazy* group and involves a visit to a cemetery. At the cemetery a "zombie" or "raised dead" John Howard is a danger. God appears to congratulate the viewer/interactor when John Howard is destroyed.

Table 12. ***TC Cemetery*** **Comparative Evaluation Matrix**



Reading the Evaluation Matrix- Totally Crazy Cemetery

The Visual and Interactive Dimensions are at the Relational level, they are rich in meanings as well as integral to the plot and movement of the hypermedia story. The Language use is Multistructural though; the elements are often unrelated and tend to be "stand alone" in meaning. The design though multi-branched follows linear paths.

Visual

The cemetery authors attempted a stylised visual approach to the look of each card in this hypermedia. A close attention to detail and a sense of balance and placement helps make the scenes atmospheric and attractive. The use of the black sky for the night, the looming thunderstorm and the great yellow moon turn a HyperStudio card into a menacing and foreboding painting (see Figure 59).

This thoughtful approach of creating evocative visions is continued throughout the hypermedia. The images are not sophisticated but their shared ambience and the sense of story helps create an impact unique amongst the other hypermedia stories in the study.

Many of the scenes are made up of crude looking individual elements. In the gravediggers hut the authors used simple perspective and two fill patterns from the HyperStudio palette, the brick wall and a grey concrete to create the impression of a narrow room (see Figure 60). The hand-drawn tools in the foreground, and the door,

window and coffin in the back, are all simple images made using the basic tools from the art palette, yet the very selection and combination of them helps establish curiosity and interest in the viewer-interactor. The horror genre feel of the whole hypermedia creates a sense of expectancy, and the viewer-interactor comes to expect certain meanings being attached to objects. The coffin will normally be empty or contain a dead body.

Another major component of the visual impact of this hypermedia is the sense of fun. The horror genre is really a spoof; the villain zombie monster is the then Prime Minister John Howard (see the icon above). God appears as an ungodlike clipart

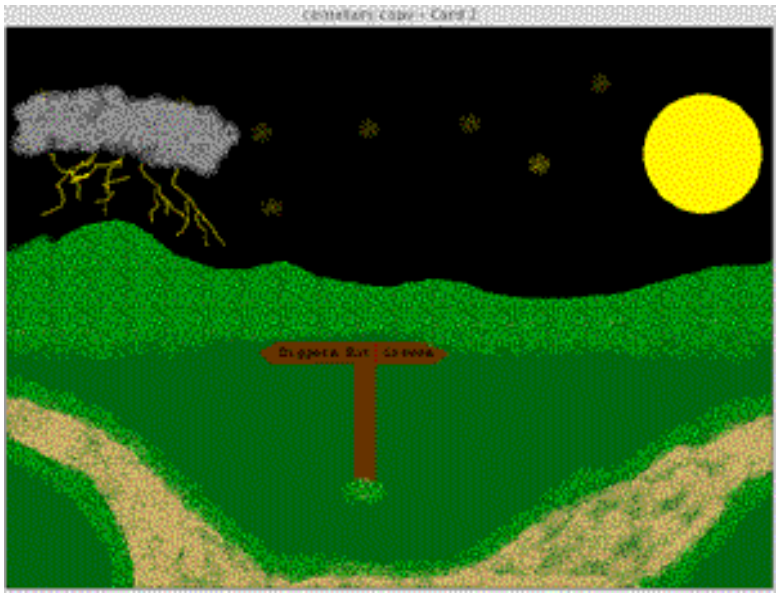


Figure 59. Signpost scene from *Cemetery*

cartoon (see figure 58) an aeroplane flies over the cemetery without reference to other aspects of the hypermedia. The image of John Howard is covered in blood (red coloured pixels).

Language

Textual language use in the Cemetery is limited. There is only occasional situational text such as signs, although the graves have epitaphs that continue the humorous vein of the visuals: “R.I.P Here lies John Howard He died. So on.” There are also some captions offering advice such as “Run”. There are two longer passages: a found diary, which gives instructions from God to the viewer-interactor as a character in the hypermedia and congratulations from God after the viewer-interactor has destroyed “the terrible curse of the evil John Howard [who had] been bought back

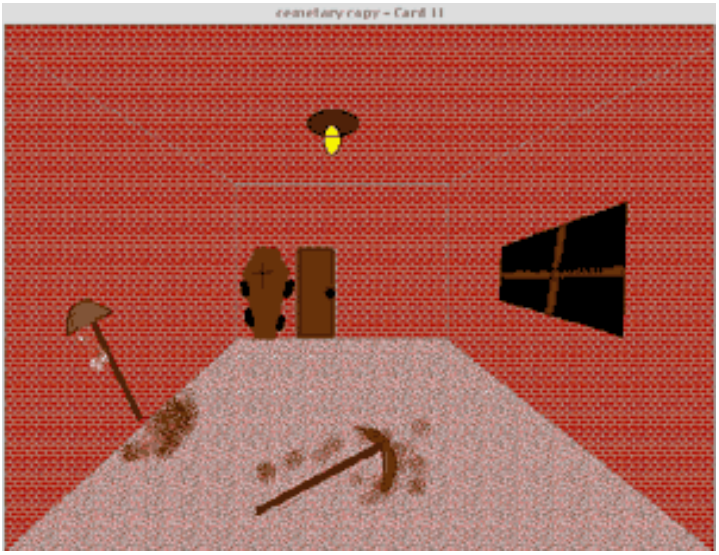
to life". These passages continue the faux horror style of the visuals with their air of matter-of-fact adolescent humour, "take the pick to use as a weapon".

The authors did not use spoken voice or the Blabbermouth, though as will be discussed below they did use musical 'stings'.

Interactivity

The interactivity is clearly linked to the established horror genre design. The viewer/interactor has a set of expectations that are generally followed in this hypermedia. The gates open when clicked, coffins contain dead bodies, clicking on gravestones reveals their epitaphs and clicking on freshly dug graves makes the dead come alive. Other interactivity fits a more general expectancy: the arms of the signpost (in Figure 59) lead to the two branches of the hypermedia, doors lead to the inside, and clicking on pieces of paper reveals their contents.

Figure 60. Inside hut from *Cemetery*



The scenes in the Cemetery are of two types. The important nodal scenes, such as inside the Gravedigger's hut and the Grave scene, are dense with interactive choice, whilst the majority of the other scenes contain very little interactivity at all, usually only a button that leads out of the card. This goes someway to explaining the attractiveness of this hypermedia as the authors adopted a rather impenetrable design that requires considerable exploration of each scene to establish meaning. Many scenes contain details that hint at meaning but are actually non-interactive, such as a

tool leaning against the Gravedigger's hut, or not as interactive as expected, such as the window in the hut and the moon that appears in many other scenes.

The authors also use musical 'stings' as part of the transitions between scenes, activated by a button click. These stings are part of the HyperStudio program, which has a collection of a dozen from which to choose. They are attempts to create a suitable atmosphere, though the young authors, in line with their other visual and language jokes have included musical jokes as well: a bugle that plays in the scene of the body in the coffin, or applause that plays as God congratulates the "destroyer of the zombie".

Design

As indicated above, *The Cemetery* uses many of the features of the horror genre, including an ironic mocking tone common in more recent cinematic forms. Portentous music, the use of dark sombre colours, the iconic locked gates, gravestones, thunderstorms and lightning, and the large menacing yellow gibbous moon combine to create an engaging tale.

The Cemetery is designed around a signpost at a forked path. The left hand path at the signpost scene takes the viewer/interactor to the Gravedigger's Hut, while the right hand path goes directly to the graves and a confrontation with the "monster", a cartoon version of the Prime Minster of the day. The exploration of the Hut is in contrast to the Gravesite. The Hut contains many interactive objects and a door leading outside which contains a note detailing the action the viewer-interactor needs to undertake. This attempt at explaining meaning for the viewer-interactor is also an indication that the real action of the hypermedia is elsewhere. The Hut also contains a device borrowed from computer games in the revelation of the element (the pick) that is needed to "win the game" (often, as in this case, it is a weapon that will defeat an opponent, but it can also be keys, documents or even characters). The limited functionally of HyperStudio and the students' level of programming ability did not enable a realisation of this plot device. Taking the Gravedigger's Hut path actually has no effect on the outcome of the confrontation with the zombie, which is destroyed in either case. In terms of the satisfaction a viewer/interactor may feel, the activity of exploring the Hut pathway and discovering the letter from God increases the depth of

the hypermedia, and without it the Grave pathway (see Figure 59) and the fight with the zombie has less meaning and perhaps less entertainment value.

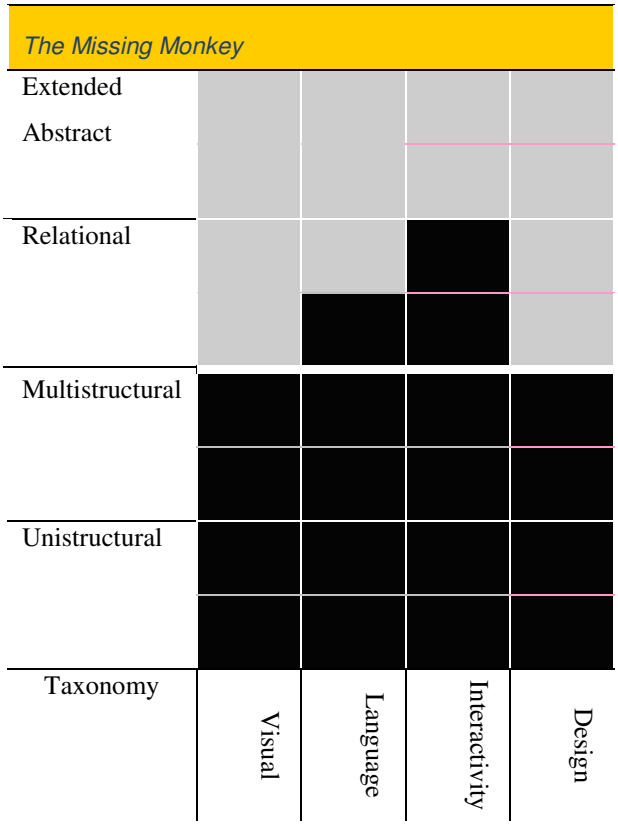
Overall, the quirky subject matter, the playing with genre and the oddly ironic humour make this one of the more engaging of the hypermedia stories.

The Missing Monkey

Synopsis

This hypermedia is ostensibly about the search for a rare missing monkey in a zoo. This premise allows the viewer/interactor to explore the site.

Table 13. The Missing Monkey Comparative Evaluation Matrix



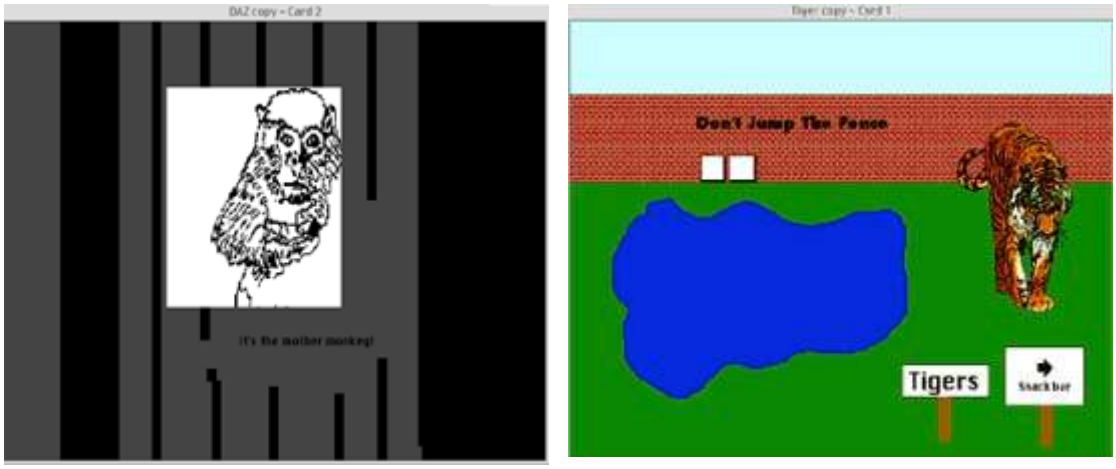
Reading the Evaluation Matrix- Missing Monkey

The Visual Dimension is Multistructural; the scenes contain a variety of images, some complex and engaging but tending towards individual meanings rather than contributing to the whole. The Language Dimension and the interactivity associated with it are at the relational level, through the use of sound files and links between and within the cards to advance the meaning of the hypermedia. The Design though is less integrated with a reliance on a linear progress through the hypermedia.

Visual

This hypermedia contains a range of visual styles reflecting the division of labour in the team of authors who created it. Some of the cards have simple created backgrounds, green to represent grass, or stripes for cage bars with clipart images inserted (see Figure 61). In the 'Monkey Cages' scenes the same monkey image is used, sometimes as a transparent image sometimes as a block image as seen in Figure 61.

Figure 61. Simple images from Missing Monkey



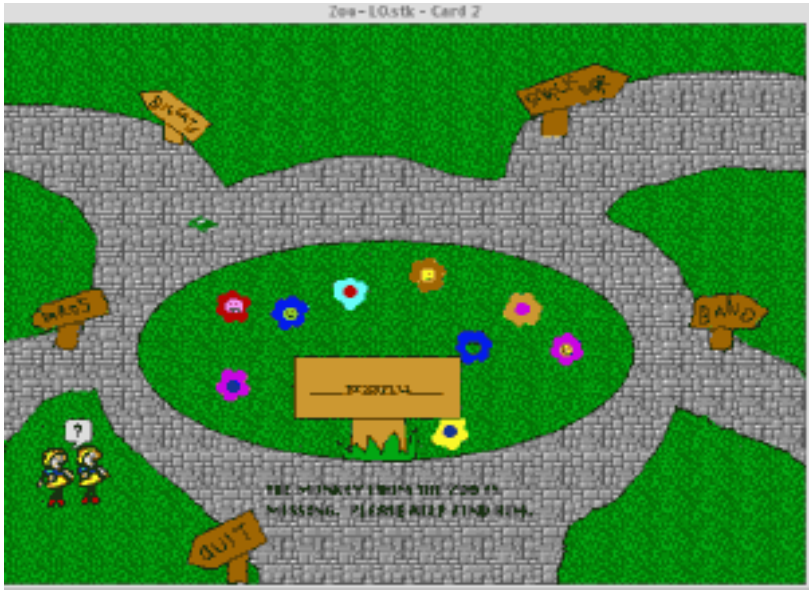
Other scenes are more densely filled with images, often freehand drawn, with a variety of implied meanings all reinforced with interactivity. These scenes are also central nodes in the hypermedia design, such as the five-path 'Garden Menu' scene (see figure 62) and a Snack bar scene (Figure 19 in previous chapter).

This lack of continuity in the visual style is a dissonant element in the hypermedia. The Monkey Cage scenes, though presented in a cartoon type sequence as part of the plot of the story, are too crude in their appearance, lacking enough elements for clear meanings to be apparent.

As in many of the other hypermedia stories humour is present (see Figure 62). Visual jokes start on the first card where one man is apparently slapping or touching another's nose. The card containing the birds is meant to be funny; it is also a very

effective example of clipart used to create an engaging impact The Tiger Cage scene (see Figure 61) contains an animation of a man running suggesting he has been caught on the wrong side of the wall.

Figure 62. Garden menu scene from *The Missing Monkey*



Language

Language use in *The Missing Monkey* is varied and layered. The authors use situational text in many places, especially linked to the nodal cards mentioned above. Longer passages of text, such as the menu items linked to the Snack bar, have a voiceover comment too, reinforcing the joking nature of the hypermedia as well as adding to the plot. Most cards have writing associated with them as well as vocal comment. The Garden menu card tells the viewer/interactor that "The Monkey from the Zoo is missing Please help find him", the flowers in the middle ground all have comments when clicked on, some refer to the plot, most do not.

One of the most striking features of this hypermedia story is the number of objects that talk. Characters, flowers, the monkeys, signs, books and icons all have an interactive voice. Generally they are ironic or whimsical comments and jokes, sometimes self-reflective admonitions to continue searching for the monkey, others elaborate set-up jokes. One flower says "Don't talk to the brown flower he goes on and on on and on on and on on and on on and on on and on on and on [giggles] on

and on on and on"; the brown flower says "Hi I'm Frank and I'm a flower and I'm ten years old and no one's ever listened to me before. I don't know why, but no one wants to listen to me, it's, like, just so weird and all this other stuff. But, hey, you're listening. Aren't you?"

The Monkey Cage sequence's cruder visual approach is also reflected in the language use. The male voices associated with this set speak less and say less engaging things.

Figure 63. Visual jokes from *The Missing Monkey*

Summary of Evaluation of Hypermedia Stories

In terms of skills development the exercise was a significant success. All the stories showed evidence of movement into the multi-structural levels on most of the dimensions, so the students as a consolidated cohort were moving beyond the most simple and straightforward planning of story and execution of skills.

Nine of the 12 stories, including *The Cowboys*, moved into the relational level on at least one of the dimensions and six of the stories moved into this category on two or more dimensions. The stories *Woop Woop* and *The Cowboys* were assessed as being in the relational category in three dimensions. I concluded that a substantial majority proportion of the students were moving beyond straight forward skills development and into a level of understanding where the underlying purpose of the task (in this case, the creation of a coherent and engaging hypermedia story) was clear to them.

This outcome was achieved in a period of just four weeks. It was the first time these students had been supported in the development of such work and the first I or anyone else in the school had tried to teach this way. A fuller discussion of the achievements of these students and of the development of the matrix is offered in the following chapter.

Chapter 7 Discussion of the development of the evaluation matrix and student assessment

Introduction

In the previous chapter I described the development of an assessment matrix and showed how each of the hypermedia stories measured against this matrix. In the present chapter I take a more reflective gaze to that assessment exercise. I look at both the nature of the matrix itself and attend to its potential strengths and weaknesses as an instrument that might be used by teachers for assessing student hypermedia projects. I also look a little deeper into the significance of how the students fared when their work was measured against the matrix.

The evaluation matrix

This matrix was developed with reference to Bigg's Solo Taxonomy (Biggs & Collis, 1982) with its five levels of learning outcomes: level 1, where the student response is inappropriate; level 2, unistructural, where the student focuses on just one aspect of a possible response or answer; level 3, multi-structural, where the student response has two or more foci, or responses, but these are in no way connected or brought together; level 4, relational, where the student response has several responses and these responses are related into a coherent overall response; and finally, level 5, where the response actually goes beyond the limits of the task in hand and brings in broader insights.

SOLO was used and developed because it focused on the idea of qualitatively different levels of outcomes. The concern was that in applying this type of assessment to the students' work I would get a measure of the level to which students were developing in terms of the complexity of their understanding, not just the extent to which they were doing more or less of something. There are various assessment devices or rubrics (Jonassen, 2008) which might aid the development of criteria and standards but working with the Bigg's instrument focused on the notion of qualitatively different levels of complexity and the extent to which students were able to tune in to the multiple levels of understanding in this task. This qualitative variation is not a necessary quality of rubrics more generally. The capacity of students to

attend, in varied degrees and levels, to this necessarily complex hypermedia task was important to understand if hypermedia storytelling and other digital literacies were to be argued for within the core curriculum of middle year students.

The matrix developed here can be used to interrogate each student's approach to the component dimensions and the skills related to that dimension and how well that student is integrating these skills and understandings into an overall story. The qualitatively different level of skills development and the integration of skills into the telling (and reading) of the whole hypermedia product was what the matrix was measuring across all the dimensions. The reader is reminded that the basic level of the matrix, where a student's response is inappropriate, was not used because it was not observed during the research. A full explanation of how student work was measured against the matrix is provided in the previous chapter; here, I briefly remind the reader, using the visual dimension as an example, what the qualitatively different levels of response looked like and how they were related one to another.

First, at the most basic relevant response, uni-structural, students focused on the presentation of simple images; there was little or no thought of how one image might relate visually to another, or how the combination of images might contribute to the overall plot. At the second level, there was attention to illustrating different aspects of the story, but no development of character or plot across the story. At the third level, the visual was used to develop characters and to integrate characters into scenes with some consistency throughout the story. At the highest level, which was not found in these stories, there would be the utmost attention to the visual carrying a complex story line across the production and to the creation of an overall sustained experience on the part of the viewer. As reported in the previous chapter, this hierarchical progression is a feature of all the dimensions.

The Dimensions of the Matrix

I moved from an initial development of the matrix and the levels and dimensions when working with *The Cowboys* story, into a further developmental stage where all of the stories were considered against five dimensions and four levels. As emphasised above, the most basic category in SOLO 'inappropriate response' was not relevant for any of the stories. At this stage, there was some confusion on the part of myself and my colleagues assisting with the assessment and categorisation of the

stories around the ‘Sound’ and ‘Text’ dimensions. The students used the inbuilt microphones to create sound files on the spot; they generally took the form of spoken word files, which pushed the narrative along, rather than aids to the development of the atmosphere and drama of the story. Apart from in the hypermedia story *The Cowboys*, there was very little use of sound apart from voice. Also, across the hypermedia stories sound and text were pulled together as a mechanism for the direction of plot, for instance, text was sometimes used as a speech bubble, as in a comic strip, giving direction and a touch of comic effect. In other cases the click of a mouse button over an illustrated character would also trigger a sound or comment, which similarly gave direction and comic effect. The consequence of this was that, after some discussion it was decided to pull the two dimensions of ‘sound’ and ‘language’ together in order to assess these particular stories and to have a single category of ‘language’.

It has already been argued in the previous chapter that to understand and act upon the possibilities of ‘sound’ as a separate dimension to language involves a level of sophistication that might subsequently be explored and developed in the teaching of hypermedia authoring. In this instance, however, the dimension of sound, which involves language communication and music or other atmospheric noise, was not focused upon or taught or explicitly explored during this hypermedia innovation. Indeed, as already emphasised, it is a distinction that was largely only developed in the single most sophisticated of the stories, *The Cowboys*. What had been focused on during the teaching was the planning of the story and the pulling it together through a range of media and the inclusion of opportunities for viewer involvement and interaction.

Kress (2003) suggests the need to establish how much each of the dimensions (he calls them modalities) carries meaning, or whether there is a sharing of meaning between them. Each of the different modalities has separate and distinct aspects and functions and possibilities. Text is usually sequential: it builds on the previous sentence as arguments and ideas are presented and expanded (as is hopefully the example in this paragraph). In using a sound file of a spoken voice in a way similar to text, as was the case in the majority of these hypermedia stories, the sound file carried the meaning making it similar in function to the text. After careful examination it becomes evident recorded voice files can have a strong emotional charge, a distinct

advantage over text when attending to directions to develop the involvement of the viewer/interactor. On reflection, it is not surprising that students out to engage and make an impact with their story should often use these files to carry meaning rather than text and the decision was made to conflate the speech files and text together into a general 'language' category for the assessment of the stories beyond the pilot assessment of *The Cowboys*.

Manovich (2001) describes new media, of which the hypermedia stories are examples, as having two distinct layers: a "cultural layer" and a "computer layer". The cultural layer relates to the way the medium is used to make meaning. The computer layer relates to the way skills are developed and used. It appeared that the use of the sound files interchangeably with the speech bubbles was a cultural choice as much as anything else. These students were tuning in to the culture of related media with which they had familiarity, such as 'games' and 'videos' and comics and mixing these together to create their story.

It was surprising, and interesting, to become aware of the ways in which these young multimedia authors used the available tools, and cultural references, to emphasise the messages and meanings they wished to convey. In brief, it seemed they did not care that sound and speech were separate modes; to the students they were useful as long as they served the purpose of telling the hypermedia story. Another aspect of this is that to the students, writing a speech bubble or a caption was as complex, or as easy, as recording a sound file. It was all a matter of manipulating a mouse and using the keyboard.

In consequence, although the initial exploration of the hypermedia story *The Cowboys* was undertaking using the original five dimensions, subsequent analysis of the remaining stories used only four. Although it would have been possible to use the five, it seemed artificial to do so in this situation, where clearly the majority of the students were seeing the divisions differently. Without doubt the strength of the matrix is dependent on finding the right dimensions to work with. In subsequent teaching there would need to be a greater awareness of the parallel of speech files and text in the minds of young people and also the need to help students explore the possibilities for using sound files to develop atmosphere.

Using the Matrix to grade student work

I have argued above that the success of the tool is dependent on finding and using the right dimensions but another major factor relevant to the success of the instrument is the extent to which it can be used by a teacher to make a judgement (either formative or summative) and the extent to which it can be used by a student to see the strengths and weakness in what they have achieved. So how challenging was it to read each of the hypermedia stories in terms of the SOLO type levels?

When assessing student work, the question is often raised as to whether other assessors would make similar judgments of a piece of work and give similar grades or feedback comments. The assessment of work in this study was In line with the principles of phenomenographic method; that is, students providing evidence of a particular level of understanding across each of the dimensions must demonstrate learning outcomes. The levels of understanding within each of the dimensions of the matrix, developed in the previous chapter were explained and discussed with two colleagues. Within phenomenographic method this type of interjudge validity aims for agreement in two out of three cases in the first instance and a further two out of three cases after discussion. In the present study there was a much stronger level of agreement found, largely due to the precise explanations around each level and dimension of the matrix.

The two colleagues who worked to ensure validity in the assessing of student work against the categories developed by the researcher had minimal difficulty in assigning levels to each of the dimensions of the stories and, after discussion, agreeing on that assessment. Perhaps one of the things that made this reasonably unproblematic was that there was no single dimension on which all groups did well or badly, so there was a range of examples of achievement across each of the dimensions that made comparison and eventually assessment reasonably straightforward. This was useful in terms of ease of assessment, but would also have been useful in terms of providing feedback to the groups. To be able to point to significant achievement in a story and perhaps hold this up as a strong example to other students is motivating for that group.

In terms of the level of achievement reached by the groups, all the groups moved into the second level (multi-structural) on two or more of the dimensions, and

there were only two stories where the authors did not move into the third 'relational' level, in at least one of the dimensions. Moving into this third (relational) level, was especially significant as working at this level indicated that the students were engaging with the task in a way that went beyond the simple demonstration of what they had been told or taught to do, they were going beyond information given and developing personal insight and working intelligently and creatively (Marton & Booth, 1997). Only *The Cowboys* story, however, approaches the highest, 'extended abstract' category in just one of the dimensions. The interactivity in this story is such that there is a sense of being in a complex world that might easily extend beyond the confines of the specific hypermedia story told here.

The relational level in the hypermedia stories

In the following section I highlight some of the stories to demonstrate how even the less outstanding ones were of the 'relational' level of achievement in one or more aspects of their hypermedia story development.

The Caves, a story that was weak in all other dimensions excelled with the visual. In this story, the visual was used in creating atmosphere and developing the overall feel of the story, it was not just limited to illustrating aspects of the story or showing what characters looked like. Attention was given to thinking about and working with the ways in which an audience might 'feel' as they viewed the images and moved through and across the whole story. There was also a coherence and imagination here that pushed assessment of the visuals in this story well into the relational category.

With *The Legends*, the visual is particularly simple and the language and overall design, only slightly better developed, but in terms of interactivity, it was a significant piece of work, which was assessed as fitting easily within the relational. Indeed in this story, most enhancement and engagement came from the interactive elements that were linked to visuals. Mostly these were connections to recorded voices, sometimes to other messages and sometimes to another scene. The complex nature of these interactions meant that the story was at times difficult to navigate, but these authors had certainly demonstrated a capacity to think creatively and a little more time would doubtless have meant they had solved the navigation difficulties.

The Shopaholics was strongest in the design dimension. The visual, the language and the interactivity are all at the multi-structural level. There was a lot of work, lots of individual screens (cards) but in the first three dimensions it was largely 'more of the same', reasonably competent but not really going beyond what had been suggested or provided in the teaching. When it came to the design dimension, however, here the story appeared to move into the relational dimension. The repetitive feel of the shopping trip, in and out of different shops, in and out of connected hubs, similar routine and predictable action in each all of this pointed to a significant level of design skill.

The Missing Monkey is the only story, apart from *The Cowboys*, to move into a relational level with language. Almost all the scenes have both text and voice-over. The voice-over often gives additional emphasis, atmosphere or humour, whilst sometimes repeating what is provided in text. But text and voice over combine into something that is clearly beyond the level of achievement in all the other stories.

I have so far argued for the appropriateness of the dimensions and the levels used in the evaluation matrix. I have argued that the students' work extended across the range of levels on almost all of the dimensions and that those teacher/researchers involved in this study, in placing each dimension of the students' work at a specific level, were able to do this with relative ease. In other words, it was relatively easy to perform an assessment with the matrix.

Some comment is required, however, on the fact that, as can be seen on the illustration of the matrix itself, a division was made within each of the levels. During the assessment, it became clear that some stories fitted snugly into a category, with many instances and examples of work and thought at that particular level, where as others just sneaked into a category, with perhaps just one or two examples of work at that level. This notion of just over the line on the one hand, or fitting firmly within the category on the other, is demonstrated clearly on the matrix with a mark being drawn just half way up the square that represents each level. This idea of half-way was seen to be an important notion for formative development purposes that is, it was seen to be potentially helpful in assisting students to see what it was within a particular dimension that was giving them that extra level and to reflect on this and think how the story might change in order for their work to judged as fully within that level.

Using the Matrix to help improve student work

Moving back to a focus on the assessment tool itself, I have argued that formative as well as summative judgements would be aided by the use of this matrix: that is, it would not only assist teachers to give a reasoned and explainable grade to a student but it would assist students to understand what they might do to go to the next level of achievement and complexity with their work. By using examples of student work from across the dimensions and levels, teachers might help students to understand what would have to be done to their work to take it to that next level.

In this study, the assessment tool was developed after leaving the school in which the innovation took place. There was consequently no ready opportunity to take the tool back to the students and explore how, and if, it helped them or how it might have been received by teaching staff within the school. Having said this, in designing the tool, I did focus on its practical application within a school setting. The ease with which teachers might make judgments regarding student achievement was tested, to some extent, by the teacher/researchers assisting me in the inter/judge validity exercise. The extent to which students might use the assessment tool to improve their work was important for me and a major reason for adopting this matrix. This was a tool that ensured teachers and students were aware of what was valued and to be assessed. It encouraged teaching to focus on the key dimensions and the different levels and to explain and show how work might progress and eventually to give examples from students' own work of how and why different aspects of the work might be improved. Examples of how variations of this tool have subsequently been used are described in the following concluding chapter.

The look of the matrix and the extent to which it could be read easily, like a graph, would assist students grasp in an instant to understand how and why their work was being assessed and valued, and where they might improve, and what improving might mean in terms of what they might do. This was particularly important for students who would struggle to read (or perhaps simply ignore) a complex feed-back statement.

My concern, always, was to assist students to develop literacy in the broadest, and most contemporary sense, and to support and encourage classroom teachers to make this happen. The development of this matrix, as both an assessment device and as a teaching aid, together with examples of my teaching plans and materials, was intended to assist regular class teachers to do this. Although the matrix could not be used in this way by me at the time of the innovation, it has been adopted and adapted by me subsequently, in my life as a teacher of teachers, and used as model to assist student teachers to assess and develop teaching innovations, particularly in areas such as the development of digital literacies, I discuss this further in the concluding chapter of the thesis.

The students' performance

The focus above has been largely on the matrix, its development and use, although this has necessarily drawn on aspects of students' achievement. In this section, however, I shift the focus more directly onto the students' development.

All the groups, as has been emphasised previously, produced work at the lowest used level of the matrix, along the uni-structural dimension. What it took to achieve this was a basic mastery of the skills required to put together a story; so, information had to be collected or created and moved into the hypermedia story file. At this basic uni-structural level, with attention on the image dimension, images had to be sourced clip art chosen or drawing and painting skills developed within the HyperStudio program. Again, at this basic uni-structural level, concerning the language dimension, audio files had to be created and placed within the story file. On the interactive dimension, at this level, students had to develop skills to move minimally around a screen but most importantly forwards through subsequent screens to the end of the story. Design at this basic level involved students having awareness and giving some attention to the development of the story across the screens. The student had to progress the story in some minimal way, card by card, screen by screen. All the students and groups achieved this within the short four week teaching program.

The level of skill development demonstrated by these students was a significant achievement that involved an understanding, at a minimum level, that stories have a look and a feel that is created through the development of a series of scenes and these scenes are created by the development of a series of specific skills. Many of these

students had got nowhere like this close to creating their own story when using traditional literacy in all their years of schooling. Indeed for many of them the basic reading and writing skills of traditional literacy were still minimally developed. The consequence was that higher order skills relating to the putting together of stories were never tapped into. But once these students got a handle on this alternative mechanism for storytelling, they typically moved quickly to practise and advance those skills. They became excited by the potential in this act of creation.

All groups moved into the multi-structural level or beyond on two or more of the dimensions. They picked up and further developed the basic skills very quickly and moved confidently and excitedly into the next phase, where they essentially did more and more of the same thing, creating many images, creating language files, inserting text and creating interactive links. Largely this was doing more of the same, but it demonstrates some mastery of working with skills and at this multi-structural level most scenes in the stories were rich in image and colour and interactivity. The groups demonstrated again and again how they could develop files, sound and image and put them together in some sensible layered way and take a viewer through and into the story, again in an understandable manner.

At the multi-structural level students were demonstrating their capacity to do basic reading and writing within hypermedia; it might be claimed that developing hypermedia skills using text, visual, sound, design and working on the overall interactivity of these is more complex than traditional reading and writing. What is certainly the case is that when the majority of stories moved into the next level of complexity, the relational level, these students were taking their storytelling a long way beyond that which many would have been done in their traditional English classes. They were seeing connections and storytelling consequences and attending to the overall look and design of their creations at levels of sophistication that surprised them and me and their regular teachers.

These students were being pushed into paying attention to what it takes to create a story what it takes to develop a narrative that was not achievable when they remained stuck on getting the fundamentals of reading and writing text. These stories could not have been created and navigated and understood with the limited facility with text that many of them had achieved. Freed by this new media, however, these

students could develop stories that engaged themselves and their peers intensely. In the final presentation of the stories, which was done as a grand finale at the end of the second intervention, there was complete attention and engagement as one after another of the groups presented and talked about their work. This is something that would be unthinkable in a traditional literacy class, with students presenting or talking about their text stories.

It was emphasised in the Chapter Four how students collaborated and how ideas and skills were shared and taught amongst themselves and how they worked together as well as working on the story. The stories that emerged could not have created solely by individuals. They would not have emerged, firstly, because a great deal of work was involved in producing the individual cards; they would certainly not have emerged in the form they did because the stories were in no case the result of a single imagination. They engaged all members of the group and drew on all of their experiences and insights and capacities.

One of the stronger observations to be made of the students' work is the ready transfer of meaning making away from text. Like other students studying subjects across the Key Learning Areas, the participants of this English class used hand written text or computer typed text as their main medium of expression and communication with the teacher; it was their textual output that displayed their understandings of the learning with which they were engaged. In the hypermedia stories they were presented with access to other non-textual dimensions: using sound, images, illustration and interactivity. They took to these dimensions strongly; the previous seven or eight years of their schooling, with its concentration on reading and writing words, sentences and paragraphs, was largely put aside and the relatively new arts of interactivity and hypermedia navigation were adopted. Text continued to be used in contextualising material, as well as in captions and speech bubbles similar to those found in comic books but the spoken word was used increasingly to replace printed text.

One obvious difference between the hypermedia stories the students produced during the course of this study and the essays, stories and reports they had previously created in their English class involved their use of images. The hypermedia stories are full of dense primary colours, patterns and colourful objects; foreground, background,

landscapes, night scenes, diagrams, maps, gateways, interiors and exteriors. Images are used by the students to carry meaning in their narratives, far more than in other narrative materials they created previous to the research work. The works they created were rich in imagery and almost certainly influenced by their familiarity with computer interfaces, especially games, outside of school. “Are we working on our games today?” the students would ask me. The students’ ease with rich imagery almost certainly reflects their exterior culture more than it does the world contained in their schooling, although as Kress (1996) points out, school text books have developed away from their text-heavy emphasis of the past to an image-heavy present. This is a trend also observed in the media with which the students were familiar, especially popular newspapers and magazines. But in terms of school being a preparation for life and work in the adult world, it seemed to me that this exercise was giving them a preparation and a confidence that was often not to be found in their regular classes and lessons. At one level, a matrix was not required to understand this about the exercise. My task, however, was to convince my colleagues and specific measures of levels and skills were necessary to make this argument in the formal confines of an educational setting.

Summing up

In the English classroom the reading of printed text is emphasised above all other forms of literacy. This is in stark contrast to the world outside the classroom, the real world, where the notion of literacy changes where it is constructed and reconstructed through an array of media. Even confining a discussion to printed texts sees young children learning to read from *picture* storybooks; as the children age the storybooks mature with them and comic books and magazines are added to their literary diet. All these types of media require a literacy that combines the image with text. Yet in the specifically literacy-based classes that young people attend in school this concept of a combination of literacies is ignored. Web pages, computer interfaces and games require similar literacies as well as the addition of the requisite hypertextuality and interactivity.

In this study I aimed to develop a tool and a way of teaching that would help convince my educational colleagues, particularly those working in the schools, that

there was a way of creating literate scholars that didn't rely on traditional literacy and that didn't pronounce a significant minority of students to be failures and 'illiterate' before they began their adult life. It seemed to me that this tool was a mechanism for working towards this. I make no claims of it being an ultimate anything. It is a step in a direction that proved useful for this study and is best seen to be useful as a way of thinking for me in other similar situations.

My main aim in working with the matrix was to show that it was possible to assess this work and to do this with relative ease. Teachers in schools increasingly often have to explain what it is they are teaching and why and how they will know when students have achieved minimally or excellently. Without attending to this it seemed to me that there would be limited possibility of a broader notion of literacy taking hold.

In the end, the assessing of this work gave me increased insight into what and how the students worked with the assignment – and how I, or others, might teach a similar intervention subsequently. Having created this assessment matrix and measured the students' work against it I was impressed more than ever with what the students had achieved and more intimately involved with their process of development. I could see how groups had moved through the stages of minimal competence at uni-structural level, to a greater mastery and familiarity of the basic skills at multi-structural level, into a thoughtful reflection of their overall intention and purpose in developing the story at the relational level and finally, in the case of one group, moving way beyond my initial expectations of what students of this age and familiarity might do.

In the following and final chapter of this thesis I comment on how this work has been used subsequently in supporting student teachers in teaching literacy and assessing alternative forms of literacy. I also reflect back on how schools and teaching have developed in the ten years since this work was originally undertaken.

Chapter 8 Conclusion

Introduction

I began this research by asking if middle school students could develop the skills to tell short stories using computer technology and hypermedia software. I was led to this question, and other related ones, through my own experience with students of this middle years age group. These students were very often disconnected with English classes in particular, but very often schooling in general, perhaps surprisingly because they had spent seven or eight years not learning the dominant classroom literacy and all they had to look forward to during school time was another three or four years of a similar experience.

I was also strongly influenced by my own interest in computer technology and in its developments, especially the possibilities of hypermedia story telling. When I tried introducing aspects of computer technology (particularly hypermedia) into my classes in 'one-off', informal sessions it seemed that students tuned in and began to show real interest. Here was an opportunity to engage students, particularly those students who were not engaged with English in traditional literacy and story writing. I believed that if these students could have some success it might positively affect their confidence, their self-esteem and their attitude in school more broadly.

But there are teachers as well as students in schools and I was convinced that winning over the school and its staff, and persuading them to allow me to take the time and the lesson allocations that I believed would be necessary to make a difference, would be a major challenge. In the event I was pleased to be surprised at the ease with which I gained the support of the Principal and the school and I was able to undertake a two-month experiment of teaching hypermedia and helping students to develop hypermedia stories. Nevertheless, undertaking one-off short-term initiatives is one thing, introducing new movements into a school is quite another. In this conclusion I reflect on the research I did but also attend to the ways in which the type of work I explored ten years ago is still seen to be experimental, despite shifts in technology and culture that it might be thought would have sped its introduction.

I begin this concluding chapter by summarising the outcomes of my research and what I take to be the main outcomes. A research thesis has to do more than tell a story about research, however, it has to engage with questions about what is now known that was not known previously and also what overall effect the work has had. Consequently, the second part of this chapter looks back to the literature and makes some comments on what can be said in terms of how this work has advanced knowledge and literature in the area. The third and final section of the chapter addresses the question of what has changed overall in Victorian schools over the years since this work was done and the relevance of this work for modern classrooms.

The Case Study and its Consequences

As a consequence of the study, students, even those perceived to have limited skills and abilities in English, were shown to be able to create complex stories through hypermedia. They learned to use images, sound and text to create stories that had plots and characters and that were significantly more complex than any story they had previously created in their English classes. But these students barely missed a beat. Students who had proficiency in working with more traditional text-based literacy were able to readily integrate text into the design and telling of the stories. Others, minimally proficient with text, were able to engage in the new medium and enter into the new 'discourse' without sustained experiences of writing text. These students readily picked up on the fundamental ideas of developing a plot and characters, relying largely on sound files and images. Importantly, they also caught on to the fundamental idea in hypermedia of creating a data-sphere and drawing the viewer/interactor into the story and plotting pathways and experiences through this data-sphere. The two boys who contributed to *The Cleaner* are a case in point. They engaged and often led the development of this story yet the classroom teacher specifically pointed them out as students who had not completed or submitted any other written work so far that year.

The skills students developed are important, but of at least equal importance are the ways in which they worked together and the extent to which they developed confidence and commitment in the classroom. At least one third of the students in these classes were considered to be either 'not engaged' with schoolwork and 'non-

completers' of assignments or potentially 'disruptive' in the classroom. The task was deliberately a collaborative one where disruption and non-engagement would readily threaten the outcome for all students, but in no case did this happen. The students were given a task they were expected to commit and complete, and it was a task that they eagerly and readily engaged in – a task that had meaning for them. They were able to be involved in working in a new way that had parallels with the computer games some were familiar with; they were also able to work with any topic they wished, or that the groups agreed upon. What they had to do, however, was work as a mixed gender and ability group. They did this readily working out complex collaborative arrangements in order to create win-win situations within their groups. So, once committed to a way of working and an outcome that genuinely interested them, that constantly rewarded them through gaining new skills and successes, they went on to achieve outstandingly. A keynote presentation made in mid-2010 by Professor Erica McWilliams at the 5th International Middle Years of Schooling Conference in Adelaide emphasised the benefit of what she called a 'low threat, high challenge' curriculum in the middle years of schooling. What she described was something with significant similarities to the initiative described in this thesis.

The other aspect argued here (also picked up by Professor McWilliams) was that offering a 'low threat, high challenge' learning environment can help develop a significant sense of achievement, particularly in students not used to achieving. This was certainly the case in this study, as students developed a new sense of who they were or could be in the classroom, a new sense of identity. They were no longer the 'disruptive' student or the 'non-completer', they became the students who could and did work with new and complex media. They were the students working on new digital literacies that were closer to games and movies and which others in the school, teachers and students, had no ability with or insight into. They became the students who 'did' and who 'could do' in the classroom and this had an iterative effect on how they behaved and worked throughout the period of the intervention. Other staff acknowledged that as a group as well as individually their 'attitude' improved.

These outcomes were more than I could have hoped for and indeed the success of the project was acknowledged by most teaching staff and the Principal. It was consequently with some sadness that I left the school and the experiment, knowing it was unlikely that these students would get another taste of doing literacy differently.

It is one thing for a school and its staff to acknowledge the success of an innovation, quite another thing to take up further work along these lines. As already flagged this argument is picked up later.

Assessment of hypermedia stories

The reason behind the development of the assessment matrix was a desire to demonstrate that this type of complex hypermedia work could be evaluated and could consequently fit into the contemporary secondary classroom where assessment of key areas of learning is essential. What was required was a method that could cope with the multi-dimensions of the concept itself but could also attend to the idea of qualitative development in each of the spheres. There has been a move over the past ten years to emphasise the complexity and multifaceted nature of any task and to attend to qualitative, rather than just quantitative, development in each of the domains being evaluated (see Victorian Curriculum and Assessment Authority, 2010).

The type of matrix I developed, although novel ten years ago, is now more common. It would fit into a type of assessment known as rubrics where different dimensions are measured across a range of levels. Movements towards increased assessment in Victorian and Australian schools has meant that the development of assessment procedures and the uptake of rubrics is increasing, and an assessment device of this type is more likely to be accepted now then it was when it was developed around the time of the intervention. Whether hypermedia as a relevant literacy would be accepted is another issue but again, this I will explore later.

The main challenge with any rubric is that the dimensions being assessed are seen to be relevant to the teachers and students involved. In this study the dimensions changed along the way. The matrix began by including a text and a sound dimension but the majority of students so readily transferred meaning away from the text dimension that in the end the text and sound dimensions were merged into a single ‘language’ dimension. In the hypermedia stories these students were for the first time in their school careers presented with easy access to other non-textual communication strategies, and they took to these dimensions strongly. The previous seven or eight years of their schooling with its concentration on reading and writing works,

sentences and paragraphs was largely put aside and the new arts of interactivity and hypermedia navigation were adopted. Text was still used as part of the environment of an image, also for captions and sometimes speech bubbles, similar to those in comic books, but the spoken word was used regularly to replace the printed text.

A second major challenge for the matrix was that it could highlight the different strengths and weaknesses of individual stories but that it could also show variation and range across the whole group. In an earlier chapter I emphasised the level of competence displayed by the students across the cohorts. In terms of the level of achievement reached by the groups, all the groups moved into the second level, multi-structural category on two or more of the dimensions, and there were only two stories which did not move into the third 'relational' level on at least one of the dimensions. All the stories had at least one praiseworthy aspect and at least one that they could be supported to work to improve. The stepped assessment levels made it possible for teachers and students to understand exactly what improvement might look like in any particular dimension and examples at this higher level were present in other students' work to offer as a guide.

As a teacher myself, I had no doubt that the matrix was a useful and workable tool and my two colleagues who assisted in the analysis and development of the matrix were equally persuaded. I will discuss the ways in which the matrix has been subsequently used by my student teachers, but for now I return to some of the literature that originally influenced this work and consider the ways in which this study contributes to the field. In particular I focus on the work of Green and Lankshear (Lankshear, Snyder & Green 2000) and their ideas about the three different facets of literacy.

Main claims for the research

In brief, the results of this study suggest that students, even those who have limited skills and ability in traditional textual literacy, can create complex stories when working with multi-media. It goes on to suggest that they can work collaboratively to do so and that doing so assists them to develop a more positive sense of themselves as school students who can have success as skilled communicators within and outside of the classroom.

Here I draw on arguments developed in the early part of my thesis to suggest that the development and use of hypertext in the classroom is not just a possible and fruitful way forward, it is much more than this; it is an obvious and almost inevitable development of traditional literacy. The ostensive aim of the English curriculum in Australian schools, both currently and traditionally, is to assist pupils to become skilled communicators of and in the accepted language, to be able to make narration and description using the grammar and conventions of the day so as to be easily understood by those in the larger community. At one level this is strongly acknowledged in contemporary curriculum documents (VELS 2010). At another level, however, there is the need to integrate the grammar and skills associated with new technology into the school curriculum as a whole. I return to this point later.

The introduction of electronic technologies, the internet and computers, make it possible to integrate other communicable aspects of our culture with the written text. It is possible to use images and sounds, music or voice. We can capture speech and play it back at the touch of a button. We can use text alone or we can hear the words as they were spoken, or we can combine text and audio and introduce the visual, be that photograph, video, painting, drawing or motif or plan. We can combine all of these functions and we can interact with the production, sometimes adding a further contribution of our own, at other times moving at will through, across and back over the sequence. This is hypertext. It is a complex literacy, a complex set of skills but at its core are traditional reading and writing skills. In one form it is at the heart of the innovation featured in this thesis. In a more advanced form it is also now used regularly by our high school students in their day to day social lives as they text their friends, add their photos and a latest pop song, or update their status on Facebook. It is, however, rarely used this way in the traditional classroom.

Here, at the end of the thesis, I want to reintroduce the three facets of literacy expounded by Green (Green, 1988) and again Lankshear (Lankshear, Snyder & Green, 2000) and I want to reflect on how these dimensions – operational, cultural and critical – might be interpreted in terms of the innovation at the heart of my research. The operational dimension involves the use of tools, the learning of alphabets, of reading and writing, grammar and spelling. It is this operational dimension that typically forms the core of traditional English (as a subject) curriculum. The cultural dimension involves the way literacy impacts on a society and

on its culture, how it is used day-to-day. The critical dimension relates to how it is positioned and considered and critiqued, its status within and between different groups within a culture. I discuss these three dimensions with relation to this study and to the use of hypertext in the classroom more generally.

Just as the teacher in the English classroom focuses largely on the operational dimension, so I, as teacher in my hypertext classroom, expected and planned for much time to be spent on the acquisition of the basic tools and skills essential to the production of this form of literacy. Fundamental concepts relating to the nature of the medium had to be taught and practiced, for instance, an appreciation that this was a non-linear way of working, that there would be a range of ways that a 'reader' might interact with the story, that there would not be a single pre-determined route though the work. Specific skills such as creating, drawing with the mouse, adding voice, including clip-art, creating sound bubbles, turning a page and saving work had to be developed. And whilst the lessons were planned and undertaken by the pupils in the classroom with the support of guides that I constructed, the pupils actually proceeded with a spirit of enthusiastic experimentation, finding key-board shortcuts, extra programming features, techniques for creating visual effects using what they knew and learning as much from others as from my guide about how to proceed. I called this way of working 'bricolage', from Papert's description of the term (Papert, 1993). In the classroom innovation commented upon here there was no heavy labour over the acquisition of basic tools and grammar quite the reverse; the students were eager to experience hypertext. The drudgery that is often associated with learning the operational aspects of English was largely absent from this classroom experiment. It was real and it was exciting, it was 'real work' as one enthusiastic pupil told me.

The cultural dimension relates to the way the practice of the literacy is caught up in the social, every-day aspects of life. With traditional textual literacy it is the way that everywhere around us there is text; on posters, as directions on objects or artefacts, as information in newspapers, in books and of course on computer screens. Our culture is steeped in and geared to a textual literacy; its history, its news, its information; much of its entertainment is experienced through this form. Once a child has mastered some of the operational aspects of reading and writing text, it is very readily reinforced and practiced by just being a part of the larger culture. As I introduced hypertext literacy to these classrooms I was aware of the many examples

of hypertext that operate day-to-day in our lives, such as interactive maps in large shopping centres or the automatic ticket machines on public transport. I was also keenly aware of the youth culture of which these students were part and I knew that their experience of PlayStation games and small hand held devices give them some familiarity with hypertext concepts. Nevertheless I was very surprised at how quickly they picked up the key ideas, how they seemed even at this stage (ten years ago) to be 'wired' to this way of working of reading in a non-linear mode, to be able to move through a text following an individual path using a range of cues to establish meaning. Now, in the second decade of the 21st Century, a hypertext literacy is acknowledged, recognised and reinforced socially and culturally more than ever, although (as already acknowledged) the area where it is most out of place is in the traditional classroom.

The final dimension is the critical. Lankshear describes this as being a vital relatively advanced dimension. It addresses the critiquing of how literacy is created and used and presupposes a deeper knowledge of how literacy might be used and given depth and impact and sophistication. At one level it might be assumed that for novices this dimension would be of less importance. Having said this, once a student moves on from the reading of a literacy and addresses the writing, particularly the telling of stories, then they quickly develop a new sophistication and ability to critique. This emphasis not just on reading and absorbing information through a new literacy, but an emphasis on students creating their own hypermedia stories and artefacts, was an important part of my study. Highlighting different aspects of expression and creation, the visual, the textual, the audible, the interaction, the overall impact of the story and the making of judgments about the quality and strength of these different aspects of the creation; these facets are exactly what the structured assessment aspect of the hypertext work was about. It was a way of focusing on, and engaging with, the critical dimension of this new literacy and supporting its acceptance in the contemporary classroom.

This study was an example of these three dimensions in operation in an average Australian classroom, with relatively unsophisticated country pupils in years 7 and 8. These students were able to connect creatively and excitedly into the hypermedia task that was set and with relative ease and smoothness engage in an innovation which, (I claim) had the potential to change lives and learning. One

teacher, with the support of one school was able to introduce this and make it work ten years ago when the technology was in its infancy.

This study showed that, in a time when students were much less immersed in a digital, hypertext culture, they could readily take to it and that they thrived and learned in it. The study also showed that it is not hard to develop assessment devices to help support not just the measurement of the student's competency in this literacy, but that will also support the learning of this new literacy. Inevitably, my conclusion at this stage in this final chapter is that hypertext has come of age. It stands up to scrutiny as a legitimate 'literacy' that builds on our traditional textual literacy and that has already been widely adopted by large sections of the culture and society. This study shows that it can be readily adopted and assessed in classrooms; however, this is not the situation. Hypertext is not emerging in schools as a new form of literacy, even after more than ten years of digital communication and hypermedia having had such a major effect on culture and society the world over.

In the following and final section of the thesis, I look back at the last ten years in Victoria schools, across the time when this innovation was undertaken. I look particularly at the classrooms of those middle years where my interest and this study has focused and consider why it might be that classrooms have changed so little.

Up-take of hypertext and related ways of working over the last ten years

At several times across the years, whilst struggling to complete this thesis I have thought that maybe work done so long ago is no longer relevant. Time and again, however, I have visited schools and realised that in fact most of our secondary schools have moved very little in terms of their understanding and teaching of literacy over the last ten years and that this study is perhaps more timely to report on now than at the time of its undertaking. Then, ten years ago, hypermedia might have seemed an exotic beast and teachers and schools and governments might well have been reluctant to attend to calls for its adoption. Now, however, when we are all so embroiled in digital literacy, it seems extraordinary that an extended notion of literacy is not being more stridently developed.

This is not to say that there are not examples of students working with hypermedia in different ways within the curriculum, developing 'YouTube' or

'Facebook' assignments, but to work in this way is not mainstream, far from it. Most often, it seems, the pressure through schools and from governing bodies and governments is to restrict access to these 'alternative' literacies. I suggest there are at least three major obstacles to the uptake of hypermedia. First, there is a need for many more teachers who are confident and knowledgeable to teach in this area and to engage in comment and critique and be advocates. Second, there needs to be a willingness on the part of schools and school authorities to acknowledge the significant social and economic benefits to having computer and hypertext savvy students graduating from schools. Related to this, thirdly, there needs to be less of a focus on maintaining 'traditional' standards at all costs. There is only so much that can be learned in a school life. It may be better for students to engage with hypermedia willingly and beneficially than traditional grammar negatively. Each of these obstacles is commented on below.

Teachers with knowledge and confidence in using technologies are essential for students to be engaged in a modern information and communication-rich world. Such people are not always present, however, in educational settings. Government reports and statistics back this up, (Johnson et al 2010, Black et al 2009) there is a real lag between the use of technologies in the world outside schools and those that happen within schools.

Prensky's popularising of the Digital Native /Migrant divide is a useful metaphor to employ in this situation. The Digital Natives are the students who live with and interact with technology through their mobile phones, iPods, video games and Internet enabled computers. The Digital migrants, the teachers, have half their minds still in the "old country" of books, pens and blackboards. Because it is hard to make the changes they often bemoan them and express exasperation with the innovations that they must confront. Such stereotyping is of course unfair both to students and teachers but there is some truth here. Most teachers do not conceive of communication in the same way as their students. Furthermore, teaching is not under the same technological pressures as commerce, industry or medicine where, innovative technologies are part of the landscape and it is imperative to maintain close contact with all the latest innovations. This lack of incentive for technological uptake is compounded by the rising average age of the teacher population in Australia and

Victoria in particular (approaching 55). Technology use in the wider community tends to decrease with age and this is reflected in schools.

The professional development of teachers would seem to be an obvious way to improve this situation and there are certainly professional development programs available to teachers to explore and expand their own understanding of newer digital technologies and adapt their courses and teaching accordingly. Every Australian state offers these programs, which encourage teachers to develop their skills in using digital technologies; a glance at the programs on the web site of 'Aussie Educator' (www.aussieeducator.org.au/teachers/professionaldevelopment) will confirm this.

As already flagged, however, the problem is complex as there is ever increasing pressure from school authorities and from sections of society to maintain standards and maintaining standards typically means hanging on to old standards, particularly with respect to literacy and numeracy. The notion of communication may have changed dramatically within most professions but an almost universal expectation remains that these students will have standards of grammar and old literacy comparable to those of the senior people who went to school twenty to fifty years previously.

Most Australian universities and other higher education institutions publicly, state the skills they expect their students to have on graduating; these lists always contain communication skills, including computer and on-line literacy as well as basic textual and verbal communication skills. The Business/Higher Education Round Table launched a position paper (Hager, Holland & Beckett 2002) which made it clear that business organisations and universities expected and wanted school leavers who were proficient communicators in the broadest sense. Rarely do employers complain about the computer proficiency of their new employees, but very often they complain about their ability to write the letters and reports that used to be the bread and butter of office life. The consequence is that schools feel themselves increasingly pressured. Often it seems this pressure is interpreted into an emphasis on preserving traditional standards, because this is what students seem to be having increasing difficulty in learning whilst teachers find similar challenges in teaching new literacies.

Sadly one of the places where this push for traditional standards has been particularly felt has been in the primary and middle years of schooling. The National

Assessment Program – Literacy and Numeracy (NAPLAN) involves students in Years 3, 5, 7 and 9 from all Australian States and Territories. The focus on very formal and public assessment of traditional numeracy and literacy has meant that the ambitions of Middle Years educators are, for the time being at least, being compromised. Professor Erica McWilliams, in the key-note presentation to the 5th International Middle Years of Schooling Conference (mentioned earlier in this chapter) advocated a 'low threat, high challenge' curriculum for the middle years of schooling and also criticised the focus on very formal and very public assessment of traditional notions of numeracy and literacy. Many in the Middle Years Movement are expressing concern at the ways in which schooling is developing and while there is much to lament, it is also a time when more complex means of assessment are being focused upon and when there is growing support for the use of multi-dimensional assessment matrices such as the one I developed for use with my students' hypermedia stories. It is something of an irony that the main focus of this thesis – the development of hypermedia in English classrooms – struggles to be adopted, whilst the mechanism for making this initiative more palatable, a matrix for assessing the hypertext artefacts that resulted, has been much more readily embraced.

Where to from here?

This brings me to the final section of this final chapter. It is a brief comment on the ways in which I have used ideas relevant to this hypermedia study with the student teachers I now supervise. The student teachers I work with now in universities are largely young people who have grown up with digital technology. Indeed, these students are around the same age as the students I taught in this research intervention would be now. These young people are, typically 'wired' for the technology and I, of course, from my position of commitment to an expansion of literacy and ways of communicating in the classroom, work with them to introduce innovations that use technology to expand literacy in its broadest form into their teaching placements.

Students, however, have to work within the limits of the schools in which they do their practice and very often they are frustrated at what they are allowed to do. Innovations such as the one I undertook necessitate having the whole school on side, and although some of my students have been able to introduce small-scale hypermedia projects within individual classes, work on a scale that I undertook has

not been able to be replicated or paralleled. The trouble is not that schools do not have the equipment; schools are increasingly well equipped indeed in many schools every student has a laptop computer. The problem is still more about how the computers are used much the same way they were used ten years ago. They are still used overwhelmingly for finding information and for working with text, rather than as a mechanism for communicating and creating with a range of media. So, they are used either as a means to access information sources, as advanced typewriters or as the basis for 'skills' lessons, and are often not integrated into the curriculum as a whole.

A recent Australian Federal Government report 'Partnerships in ICT (Information and Communications Technology) Learning' (Pegg et al 2007) indicated the depth of the problem that is faced in schools. The report suggests that the digital education revolution remains a long way off, and an 'avoidance culture' had developed on the part of both Australian teachers and schools. The report goes on to suggest that teachers are unwilling to be involved in ICT projects because they saw them as 'peripheral' to the main game in schools, not guaranteeing improved learning outcomes and outside of their experience and expertise. It is hard to believe that our schools and their teachers are still displaying such dangerously dated thinking when digital technologies have become the most popular way of communicating amongst the younger generation and is increasingly accepted and used in teaching in universities and in commerce and business internationally (see for instance www.unescobkk.org/education/ict).

The UNESCO document cited above implies that the adoption of a broader definition of literacy may be an innovation with which developing countries can lead the world. The report describes exciting examples of ICT use in schooling and shows how it is embraced as an important part of building educated populations and nations. Perhaps the reason is that in developing countries, because traditional English literacy is not so privileged most people have their own native literacies as well as standard English and sometimes other colonial literacies to content with. They are adept and keen to take on whatever will work, and clearly they have made a decision that digital literacy is key.

Whilst the focus of this thesis – the use of hypermedia to tell stories and develop communication skills and literacy more broadly – has not been embraced in

Australian classrooms, the matrix for assessing completed stories and supporting teaching and learning, has met with some success in the classrooms in which my students have worked. It is strange that the assessment developed to make the uptake of the hypermedia story telling more acceptable should in the end be perhaps be more successful than the initiative it was designed to support. As previously indicated, however, contemporary classrooms are places where most things are now measured and even much simpler outcomes than a hypermedia story have been graced with sophisticated matrix measurements.

In conclusion, it seems the time for change is almost up on us. It will obviously take a lot more than one study to convince teachers and schools that hypermedia and ICT is the main game, and that the purpose of schooling is to prepare young people for the world in which they live and communicate, not to initiate them into an archaic culture. Nevertheless it seems certain that the time will come when students and schools will recognise the necessity to move with the technology and when it happens, it is likely to happen quickly. The next generation of teachers, the students I teach now in my university, are technology savvy, and in another ten years from now, these students and others like them will outnumber traditionalists and things will change.

Teaching must change for literacy, at its core, is about communication, about speaking and writing and reading the writing of others through the development of a complex set of tools and skills that are simultaneously as old as the hills and very new. The tools that make up reading and writing (that makes up literacy) do change over time. A stick in the sand, burnt wood on pale bark, scratches across stone, stylus pressed into wet clay all represent the technology of a communicated language. Over time the technologies change, they evolve as the life and changed social patterns of the people they serve evolve and the users themselves become more fluent and imaginative in their use. We are almost there.

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