Primary school teachers integrate electronic storybook software into their teaching/learning practices through addressing issues of pedagogy, organisation and management

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Abstract

The combination of literature and technology provides a powerful scenario for learning in classrooms and it is made a reality through the use of electronic storybook software. Discussion and research concerning the use of technology in learning has been dominated by an examination of what the software does and how the learner interacts with it. Teachers’ views have often been absent. This study redresses this imbalance by giving importance to the everyday decisions made by teachers concerning why, how and in what way learning occurs in their classroom.

Three case studies of primary school classrooms show how the teachers engaged in action research to introduce electronic storybooks into their classrooms. In particular the teachers monitored changes in pedagogy, organisation and management. The case studies confirmed that teachers can integrate electronic storybooks into their classroom practices to create enjoyable and productive learning experiences for their students.

A range of pedagogical approaches was used and in each classroom the introduction of electronic storybooks had a positive effect on student motivation, enthusiasm and achievement of learning goals. The use of this technology resulted in changes in the physical composition of the classroom and the way learning was structured. The teachers received confirmation of their own ability to move forward in the process of integrating technology into teaching and learning. Such progress was mediated, however, by the extent to which the software was made the focus of the learning and by the teacher’s attitude to using technology as demonstrated by their interaction with the software during lessons.

Other teachers may identify with the situations described and the teaching strategies used in the case studies. The problems faced by teachers in this study are those others may face in integrating technology. The results of this study have direct implications for teaching practices and reinforce the need for teachers to develop confidence and competence as technology users.
Chapter 1: Introduction

The enhancement of children’s learning and the implementation of classroom pedagogy that assists teachers in their teaching and children in their learning is vital. With technology reaching new heights and the increasing demand for teachers to pay more attention to its use in the classroom a study is long overdue that investigates the implementation and integration of a pedagogy that not only supports the children’s learning through the use of technology but uses literacy as a core for this integration. This study focuses on the pedagogy, organisation and management in primary classrooms using electronic storybooks to enhance literacy learning through an examination of three case studies in which teachers design and implement a unit of work incorporating electronic storybook software. This study has as its context the interactions between the students, literacy technology and teachers.

The impetus for the study came about when I saw students interacting with electronic storybooks and had teachers tell me, in my role as a computers in education consultant, that they wanted a way to effectively use this software in their classrooms. A number of issues were raised by the use of electronic storybooks: the students were active users of the technology; the electronic storybook appealed to all ages; and the software was not providing instruction on a particular topic, it was providing an alternate presentation format for a narrative. It was, however, an alternative that made use of the multimedia capabilities of the personal computer to allow sound, music and animations to be included with the text. If teachers were already using literature (paper-based) in their classrooms then this new format might also be worth exploring.
The teachers, however, dismissed the most popular of the electronic storybooks, the *Living Books* series, as being of entertainment value only. In contrast, the producers of this software (Living Books/Broderbund) described their electronic storybooks as:

"...stories touched by magic and brought to life with characters and pictures that talk and move and sing and dance. Wonderful words, begging to be explored, open up at each turn of the page. With sound effects, original music, humour, and lots of animations, it's a whole new learning experience." (Living Books and M Brown, 1994, back cover)

A difference of opinion thus emerged concerning the value and worth of this new software. Issues relating to pedagogy, organisation and management in classrooms needed to be addressed in order to provide support for teachers wanting to use this software. The critical questions to be answered therefore became - Would such software be useful in a classroom? If so, why (pedagogy), how (organisation), and in what way (management)? The search for a resolution of this difference of opinion and information about how such software could be introduced into the classroom became the story behind this study.

This study commenced in 1993 when the presence of computers in schools was fairly widespread but CD-ROM technology had only just emerged. The use of a computer was still fairly novel for some students and its use in classrooms generated interest and enthusiasm. The New South Wales (NSW) Department of Education and Training (DET) had responded to this interest by providing computers in education consultants in each region to assist teachers. At the time the study commenced we were introducing teachers to a new technology called a CD-ROM. By the end of the study no personal computer would be purchased without a CD-ROM
drive and schools were demanding the best technology so that CD-ROM drives could be added to their networks in order to maximise student access to this technology.

This growth in technology has impacted on the study. At first only a few teachers were able to comment on electronic storybooks. By the end of 1996, teachers assumed CD-ROM technology as the norm. Teacher expertise grew during this time with teachers becoming more confident in using the technology but also more critical of the software available for use. Also the use of literature (paper-based) in reading programs was well accepted, however, the consequences for education of transferring literature to a digital format were relatively unknown. This study required the merging of the knowledge and pedagogy surrounding the use of paper-based literature in classrooms with the emerging knowledge and pedagogy relating to the use of CD-ROM computer technology. The opportunity that might be provided to improve literacy through the use of this software was attractive to teachers as there were many students who found paper-based text difficult to access.

Concerns about community standards of literacy had been voiced loudly for many years. Brock (1997) detailed published reports from 1948 to 1996 emphasising declining literacy standards. Brock himself was critical of these reports and the data analysis involved, but his work illustrated that literacy - however it was defined - was a controversial issue. In 1990 the Commonwealth Government’s White Paper: Australia’s Language, The Australian Language and Literacy Policy presented a definition of literacy which in 1997 was adopted in NSW schools as part of its State Literacy Strategy.
Literacy is the ability to read and use written information and to write appropriately, in a variety 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. Effective literacy is intrinsically purposeful, flexible and dynamic and continues to develop throughout an individual’s lifetime. (Brock, 1997, p. 13)

But while this definition of literacy encompasses reading and writing, the role of oral language, viewing of visual texts and the impact of multimedia texts were issues still to be resolved. The traditional view of literacy was one of possessing the tools of reading and writing. In the 1970’s and 1980’s the culture and context of the literacy activity was acknowledged as well. Literacy, however, was still concerned only with reading and writing text. Reading itself was seen as an active process, one that involves the reader constructing meaning from text (Smith, 1978; Goodman and Goodman, 1982; Weaver, 1994). Traditionally this has been text on a page but now it is a range of text, pictures, sounds, animation, video, hypertext on a page or computer screen. The reader brought to this reading process - knowledge, skills and imagination - and made use of many tools - phonic, semantic, and syntactic - in order to construct a meaning.

When considering which text to use, teachers access a range from texts based on a basal reader concept, with restricted language and sentence structure, through to a literature-based programme providing a wealth of written texts for learners. As the stories presented on CD-ROM were not basals but rather previously published children’s literature, these texts were more appropriately used within the whole language approach to the use of literature in classrooms (outlined extensively by Weaver, 1994). Until the early 1990’s almost all this
literature was paper-based. Very little was presented on computer because presentation of a screen full of text was not attractive and often very difficult to read owing to the poor quality of the screen. One form of literature used in classrooms was the narrative in traditional fairy tales, picture books, short stories, novels, big books or the students’ own writing. Those narrative texts which were once solely paper-based, but which are now presented on CD-ROM, are known as electronic storybooks. These electronic storybooks, and why, how and in what way they are integrated into literacy learning in a variety of classrooms, are the subject of this study.

The extensive use of computer technology, easy access to the Internet and a demand for multimedia in presentations of any kind, meant that the concept of ‘text’ has expanded. In examining electronic books it has been necessary to move beyond language which is represented only by a graphical symbol – i.e. text, to include for example: listening to an oral reading of text; pictures - still or moving; sound/music; conversation/talking by characters on screen; and interaction by the reader with the text to reveal hidden data for example, word meanings. Visual texts tend to be multi-modal, for example picture books, film, TV, and advertisements and are now commonplace. Multi-media texts incorporate a variety of modes: written, visual and aural, a variety of media: text, illustration, sound, video, animation and make extensive use of a non-linear and interactive structures. An electronic storybook is an example of a multi-media text as it incorporates text, illustration, sound, animation and interaction, and can be read in a non-linear fashion. The research undertaken as part of this study explored these texts to see if teaching methodologies and strategies relating to paper-
based texts could be applied to these texts, and to identify any methodology and strategies more appropriate for electronic texts.

In this study existing research and theories have been examined relating to technology and literacy pedagogy. Research and theories based on the use of technology (summarized by Krendl and Lieberman, 1988) were found to be less helpful in that most related to the use of instructional software - software with a definite instructional goal in mind or which examined the effect of replacing the teacher by the computer. Electronic storybooks provide literature in an alternate form to paper, not lessons. Theory and research relating to the use of literature in literacy teaching and learning provided the theoretical starting point for using electronic storybooks. Theories of pedagogy, in particular those on authentic pedagogy (Newmann, Marks and Gamoran, 1995) framed the ‘why’ and ‘how’.

This study represents a substantial and original contribution to knowledge in the area of using a particular type of non-instructional software, an electronic storybook, within classrooms. The teachers involved were asked to demonstrate a variety of ways in which electronic storybooks might be incorporated into teaching/learning programs. The perceived role for the computer would be to stimulate the learner’s interest initially and then fade into the background as the learner interacted with the software and participated actively in the learning experiences provided by their teacher. Ultimately the conclusions from the study will contribute to the development of guidelines for teachers in terms of pedagogy, organisation and management in their endeavours to use the electronic storybook software in their classrooms.
To provide a framework for the study the central question addressed by this research was: If electronic storybooks are to be useful in classroom, why (pedagogy), how (organisation), and in what way (management) could this goal be achieved? The teachers involved in the study engaged in action research to find answers to the following more specific questions.

If electronic storybooks are to be useful for these teachers,

- What pedagogy would be the basis for their work?
- What teaching strategies would be used?
- How would the learners be organised in the classroom and how would they interact with the electronic storybook?
- How would the learning environment be managed when it included the computer technology?

In seeking answers, this study identified ways in which electronic storybooks might be used to create technology-based activities that resulted in innovative, interesting and meaningful instruction in classrooms.
Chapter 2: Context

2.1 Introduction

The electronic storybook software used in this study was similar to paper-based literature used in classrooms in that it presented a story for the students to read, page by page, often accompanied by colourful illustrations. It appeared therefore that electronic storybooks might be used in classrooms in the same ways as other literature. Teachers who were already familiar with using literature might be able to use their existing teaching and learning strategies with electronic storybooks to develop students' literacy skills. The electronic storybooks, however, were different from paper-based texts due to the fact that they required computer technology to be accessed. Some computer technology existed in classrooms at the time of this study and teachers made use of it. However, electronic storybooks were different from many other software titles in that they did not provide a reference point for research, like encyclopaedias, nor did they provide instruction as a substitute for the teacher. This study takes place in classrooms where these similarities and differences are explored and examines pedagogy, organisation and management issues related to electronic storybook use. In this chapter a closer look at what makes up an electronic storybook is provided and the initial thinking behind the use of electronic storybooks in the study is outlined.

2.2 Identifying electronic storybooks

CD-ROM technology allows a large amount of information to be stored on one computer disk, particularly in comparison to that contained on a regular floppy disk. The information can be quickly accessed and is presented in the form of text, drawings, animations, pictures, sound,
and/or video. The first CD-ROMs controlled by computers appeared in the early 1990’s and given the immense popularity of computers with children, it was only a short while before software companies began using the multimedia capabilities of CDs to present children’s books in electronic form. These electronic storybooks were complete books made accessible through the use of technology. For an individual reader they provided help and support in the reading process as and when the reader needed it (Wild, 1995).

Electronic storybooks came with a range of features to assist readers. The text appeared on the screen corresponding to a page of the book. The text was highlighted as it was read aloud by a human voice recorded on the CD and portions of the text could be re-read following instruction from the reader. Individual words could be examined for meaning and/or pronunciation. Sound effects or music were incorporated into the reading or occurred as pages were turned. Static pictures appeared on all pages and some pages had ‘hot spots’ to give the reader labels or descriptions of the selected object. Animations were activated as part of the introduction to the story, before and after each page was turned, or by clicking on the pictures or on the text. Some stories were available in different languages that allowed the reader to see and hear the story presented in that language.

The most popular titles available at the time of this study were the Discis\(^1\) series and the Living Books\(^2\) series. While the Discis series were available to the teachers in this study, they all elected to use the Living Books series as these were more interactive. All Living

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\(^1\) Discis books are produced by Discis Knowledge Research Inc., 90 Sheppard Ave East, Suite 7, Toronto, Ontario, Canada M2N 3A1. They are distributed in Australia by Scholastic.

\(^2\) Living Books are produced by Broderbund Software, PO Box 6125, Novato Ca. 94948-6125
Book titles were provided in English and Spanish on a single disk with one title, *Just Grandma and Me*, available in Japanese as well. Copies of the software came with a paper version of the book for use by the reader and incorporating the paper version allowed for an expanded range of language activities to be included in the classroom learning programs.

### 2.3 Selection of electronic storybooks

While working as a computers in education consultant I was responsible for encouraging teachers to use computer technology in their classrooms and to identify effective ways to implement this technology in the classroom. Many teachers were reluctant to work with computers. For some the problem seemed to be based on their own apparent level of expertise and knowledge. Other teachers were willing to try but expressed dissatisfaction with the models of implementation available at the time, for example, taking the class to the computer room, having the computer do the teaching, using the computer to provide drill and practice on basic skills, or using the time on the computer as a reward for good behaviour or for those who have finished regular work quickly. Some tried the model advocated by the Project CHILD (Butzin, 1990) program, that is the use of learning stations to add variety to the learning within their classrooms. The issue for teachers, however, remained that of an inability to make the technology an integral part of the teaching and learning programs. In other words, they were not yet immersed in it and able to use it as part of their daily work practices. Sometimes a management issue arose relating to the computer hardware, for example, there were not enough computers, or access to the computer room was restricted. This issue needed to be pursued as there was a probability that with appropriate software and a different approach to
using computers, teachers could be willing and able to integrate this technology into their teaching and learning program.

The NSW Board of Studies\textsuperscript{3} in the mid 1990’s promoted the incorporation of technology into new curriculum therefore making certain assumptions about the use of technology in classrooms. In general terms, it was assumed all students would have access to computers in their classroom. Teachers felt pressured to use technology and often took the easiest and minimalist path to achieving this process. In classrooms students could be seen typing up their written work in order to publish it, practising their computer skills, or playing games as a reward when other work was completed. These approaches seemed to indicate to me that the technology was still regarded as separate from the real business of teaching and learning.

From my experience as a computers in education consultant, I believed that a change in pedagogy was needed and that the changes needed to be at the very base level. Teachers needed to experience the various ways computers could be used, as tool, teacher, resource, co-teacher, child-minder, reward etc., in order to find the concept/strategy most suitable to their teaching and learning program goals. Some motivation to achieve this goal was provided by the enthusiasm of the students who wanted to use the computers in a variety of ways. I chose to examine these issues through a study of how a particular style/type of software could be incorporated successfully into teaching and learning programs.

\textsuperscript{3} The Board of Studies is the organisation responsible for curriculum development and certification of student achievement in NSW.
Electronic storybooks were chosen for the following reasons. First, electronic storybooks were presented on CD-ROM and made use of the newest multimedia technology available at the time. Secondly, electronic storybooks did not fit any of the more common styles of software programs hence there was little guidance about their use and they, therefore, had the potential to encourage teachers to explore new pedagogical ideas. Thirdly, while there was little specific research available maybe a foundation for the use of electronic storybooks could be found in the existing theory and research concerning the use of literature (paper-based) in literacy learning. An obvious starting point therefore for teachers would be to examine whether their existing strategies involving paper-based literature could be successfully transferred when they used the electronic storybooks. If such strategies were successful they had the potential to provide a non-threatening starting point to encourage teachers to explore the use of technology further.

Electronic storybooks, however, did differ from paper-based text in a critical way as they are not composed solely of text and static illustration. The illustrations, whether still or animated, the sound, and the reading of the story play an important role in the reading and add to the notion of ‘text’ with which the reader must work (Swan and Symington, 1987). Hence a further reason for working with electronic storybooks was the opportunity that might be provided to examine electronic texts and to consider whether our notion of literacy might change as a result.

Electronic storybooks also, by their nature (as electronic texts including music and animations), challenged our concept of what is a storybook. As a result teachers questioned
whether the electronic storybooks had value beyond the immediate pleasure given and suggested that the storybooks should offer something more substantial to a reader. In addition, because of the dynamic nature of the illustrations in some electronic storybooks, teachers were concerned that with some titles the students regarded the reading of the text as something to be got past so that they could play with the illustrations. As a result of these concerns, in this study it was determined that the reader’s interaction with the text would be monitored both in terms of how often it occurred and the manner of the interaction.

The different views on the role of the visuals, particularly the animations, in electronic storybooks is exemplified by the fact that the two major producers of the electronic storybooks available at the time of this study took very different stances on the role of animation and pictures/graphics. The Discis series allowed extensive interaction with the text but only a limited interaction with the still pictures on each page. The Living Book series used a minimum level of text interaction but included animations at the beginning and end of every page and allowed extensive interactions with the graphics.

In conclusion, electronic storybooks were chosen as the software for this study because they were a different style of software particularly when compared to instructional software. Electronic storybooks could probably be used initially in the same way as paper-based literature providing a known pedagogy for teachers to work within. Electronic storybooks were sufficiently different from print versions, however, so that teachers might be encouraged to move, even just a little, from the known pedagogy to the less known. In turn, how they did this
and why, would inform wider discussion concerning the integration of technology into teaching/learning practices in classrooms.

As stated earlier, this study commenced at a time when CD-ROM technology was very new (1993) and concluded when the technology was commonplace (1996) even though this spanned only three years. In 1993, the discourse about literacy focused on the nature of reading and writing and only some interest was shown in viewing. By the time the study concluded the notion of literacy had expanded to include visual and electronic texts and the concept of multiple literacies. The study began when computers were used in classrooms as an exciting new technology for learning. By 1996, the role of the technology had evolved from that of a tutor or tool to being expected as an integral part of the teaching and learning in classrooms. As a result, each stage of this study has been informed by an expanding literature and research base, with many insights from other research only being available in the latter stages.
Chapter 3: Literature Review

3.1 Introduction

Teachers make decisions about what to teach, how to teach and when to teach it. Teachers will also be able to explain why they made those decisions. Teachers use their pedagogy to frame reasons for making certain choices, establishing the goals for learning and selecting the topic to be taught. Organisational issues will frame how they will teach it and management issues will impact on when and where teaching occurs. This study draws on all these aspects of the teaching process to focus on and understand what might happen when teachers introduce electronic storybooks into their teaching/learning programs. In considering how to construct a suitable learning experience for their students using electronic storybooks, teachers draw on two main sources. They use their knowledge and experience concerning the pedagogy, organisation and management of learning: 1) when computer technology is being used, and 2) when literature is being used in the classroom, to shape their understandings of using electronic storybooks.

3.2 Pedagogy, organisation and management in classrooms when using computer technology

3.2.1 Pedagogy

Within this study I have drawn on the definition used by Newmann, Marks and Gamoran (1995) in their work on authentic pedagogy. They described pedagogy as the combination of assessment and daily teaching practices used by a teacher. While both of these aspects are important this study looked most closely at the teaching practices used by teachers. Teachers draw on their pedagogy to provide the reasons they teach the way they do. They may focus on
creating goals for learning based on whether they consider the importance lies with the learner, the society within which the learner resides, or the body of knowledge considered worthwhile (Jacobsen, Eggen, Kauchak and Dulaney, 1981). The learning opportunities provided by the teacher might also be informed by the teacher’s view of what intelligence is and how this defines a learner’s ability to know and think. Originating with the concept of intelligence as a single entity, traditional approaches to teaching can be placed along a continuum referred to a being ‘from instruction to construction’ (Sandholtz, Ringstaff and Dwyer, 1997). In practice teachers will select their approach to meet the goals that have been set. Instruction was seen as appropriate to introduce skills or reinforce actions that can be replayed habitually. Knowledge construction was a preferred strategy to help learners internalise ideas, solve problems or synthesise knowledge. Gardner’s (1983) concept of multiple intelligences allowed teachers to explore how learning could occur in a linguistic, musical, spatial, logical-mathematical, bodily – kinaesthetic, inter-personal, and intra-personal sense. Butler (1984) and McCarthy (1990) were two educators who explored the ways in which multiple intelligences can inform teaching and learning practices. McCarthy’s 4MAT system, developed in the 1980’s, was adopted by many primary school teachers in NSW.

Computer software itself also reflects the pedagogy continuum. One major type of available software, the drill and practice type, is based on an instructional view of teaching developed from the work of Thorndike (1921), Skinner (1954), and Bloom, Madaus and Hastings (1981). It presented the content to be learned in a sequence of small steps each requiring a response from the learner. In this instance the role for the computer software was as a substitute for the teacher. Such a role did not encourage teachers to integrate the technology into their existing
teaching/learning programs because the instruction could be provided in any situation where a computer was available. Electronic storybooks did not fit into this type of software because they did not provide specific lessons nor were they presented as substitute teachers.

Authors such as Rushby (1979) and Wellington (1985) identified possible roles for the computer in classrooms. They organised these roles into four paradigms: the instruction paradigm, where the computer becomes a tutor of unlimited patience, for example, the drill and practice software; the revelatory paradigm, where the software progressively reveals the subject matter and underlying theory, for example, simulations or model building software; the conjectural paradigm, where the computer assists students in the manipulation and testing of ideas and hypotheses, for example, in artificial intelligence software; and the emancipatory paradigm, where the use of the computer reduces the workload for students, for example, word processing or Internet search engine software. Electronic storybook software did not fit any of these paradigms easily, however, within this classification electronic storybook could be described as literature (in print or electronic form) that assisted students to explore and test ideas and concepts that put it clearly within the conjectural paradigm. Electronic storybooks were unlikely to reduce the physical workload of students but they could provide stimulus and a model for the student’s own writing. Hence they contributed to the emancipatory paradigm.

Electronic storybooks therefore did not match the type of software described in the 1980’s and earlier. The software of the 1990’s involved digital instead of electronic technology. Barker and Tucker (1990) and Derewianka (1993) provided a more accurate description of electronic storybooks by labelling it “multimedia”. This multimedia software was designed to
systematically integrate a variety of modes of language in a sustained, closely integrated, complementary way. Electronic storybooks integrate sound, text, pictures, and animations in order to present a narrative.

As well as the beliefs behind the construction of the software, two other factors emerged to influence how teachers might choose to construct the learning opportunities in their classroom. First, in the late 1980's Gagne (1987) developed the conditions of learning model which acknowledged that learning was not a single uniform concept and suggested that teachers would have to adopt different approaches according to different learning goals. The second factor was highlighted by Brown, Collins and Duguid (1989) when they argued that learning was not an independent activity, but one which was affected by the context and culture of the environment in which it was learned. They argued that learners came to their lessons with their own ideas about the world in which they lived. If teachers allowed students to use their own ideas and existing knowledge to complete the learning activities then a radical change in the teacher's role in the learning process might occur. In addition, within the constructivist approach (Stern, 1992), the teacher's role became one of constructing learning environments that promoted problem solving, co-operation, communication, critical thinking and learning how to learn. Computer software developed in line with this approach would be structured to enable easy comprehension by the students as well as encouraging discovery, extrapolation and generalisation (Sims, 1996). Constructivist themes of the individual being immersed in a learning environment and gaining a level of personal control sufficient to deal with the culture of that environment were seen in microworlds, simulations and games where students interacted with both the software and their teachers to construct knowledge and receive
feedback. A similar approach might be possible with electronic storybooks if teachers allowed students to become immersed in the story and if the software supported these themes.

Overall, educational computing is a field in which many disciplines are supported and diverse perspectives on teaching and learning are reflected. Hannafin (1997), Winn and Joughlin (1996) and Ring (1991) examined the learning environment when it included technology and provided a range of models within which we might examine what goes on in classrooms. Hannafin saw the diverse perspectives as a product of the way teachers’ basic theoretical foundations, assumptions, and methods of teaching interact in practice. Different assumptions about learning and learners, both explicit and tacit, corresponded to a unique intersection of the theoretical foundations and gave rise to strategies and methods likely to be appropriate in a given situation. As the assumptions varied, the features and methods of the learning environment also changed. This work highlighted the need to identify the particular assumptions each teacher held so that a clear understanding of the unique learning environment of that classroom could emerge.

Winn and Joughlin (1996) provided a model that highlighted the extremes of approaches. One axis contrasted deep and surface approaches to learning. The other axis contrasted expository materials and high teacher control with exploratory materials and high learner control. They argued that computer based materials, which had belonged in the area of expository material, should be developed and used in such a manner so that the learner was in control. This model highlighted the need to identify the type of material being used, who was in control of the learning, and whether deep learning could occur in that classroom.
Ring (1991) presented a model in which four factors interacted: learners, curriculum materials, teachers and the computer environment. He highlighted the need for additional factors to be examined when the computer environment was added. The computer environment itself had three components – the human machine interface, management and recording functions, and learner interaction with the software content. The three models (from Ring, Winn and Joughlin and Hannafin) demonstrated a range of ways of thinking about this topic without demonstrating any one model to be the best one to use.

The introduction of computer technology into classrooms did not necessarily mean that there would be any change in pedagogy, organisation and management. Computers had been used in NSW schools since the mid 1980’s yet many classrooms did not make full use of the technology. Surveys in the United States of America in the 1980’s identified some areas of impact. A survey of 8,000 schools, reported by Lillie, Hannum and Stuck (1989) concluded that computers impacted on instruction in four main ways: increased student motivation; increased student cooperation and independence; increased opportunity for low ability students to master basic skills; and increased learning opportunities for high ability students. They found little support for the concept that computers would help individualize instruction. In fact the only change in classroom teaching practice identified was that the level of collaboration between students increased. The 1989 IEA\(^4\) Computers in Education survey tracked computer use over the 1980’s in the United States and, when analysed (Becker 1991), also showed no clear benefits for learners in classrooms. Computer acquisition in schools was increasing in

\(^4\) International Association for the Evaluation of Educational Achievement
dollar terms, but only a minority of teachers and students could be said to be major computer users. There was a big demand for old hardware that was limited in its ability to handle the newer software. Word processing was the major focus in most classrooms yet no evidence could be found of improvement in the quality of expressed thought as a result.

In the Australian context, Sherwood and Buchanan (1993) conducted a national survey of Australian schools to determine teacher practice with computer technology. They found that the classroom had become more student centred as computers were introduced. Teachers expected that students could interact with more complex material using computers and believed that the computer enabled them to meet the needs of individual students. The impact of the computer on teaching methods and styles was positive overall, however, there was negative impact for teachers who had 9-10 years of teaching with computers. In seeking to explain this phenomenon, Sherwood and Buchanan posed the question as to whether this was the point at which teacher enthusiasm ran out (particularly regarding incidental/occasional use of software) and real organisational change was required. An alternate explanation could be that this was the point at which teacher expertise was such that they sought to use software as an integral part of their teaching/learning program rather than for its own sake and found little suitable software to use. Whichever approach was used the fundamental question remained - How can teachers be encouraged to make changes to teaching/learning practices as they incorporate technology into their classrooms?

How to effect such a change in education generally was an ongoing subject for discussion. Winn and Joughlin (1996) suggested that it would lie in moving teaching/learning practices
towards learner control, exploratory material and deep learning. Outcomes based education (Spady, 1992; Brandt, 1993) focused concern on what students should know and be able to do at the conclusion of their education in school. In the US, research considering how to restructure schools to improve learning outcomes produced the concept of authentic pedagogy (Newmann, Marks and Gamoran, 1995) as a way of improving learning. They proposed that students would reach authentic achievement when the learning:

1) involved construction of knowledge not just reproducing meaning or knowledge created by others;

2) was a disciplined inquiry based on in-depth understanding of problems or issues in a particular field of knowledge; and

3) had value beyond the school.

In looking closely at classroom practice Newmann and Wehlage (1993) encouraged classroom instruction which met five criteria: higher order thinking; substantive conversation; deep knowledge; connectedness to the work outside the classroom; and social support for student achievement. The framework developed by these researchers might provide guidance for teachers to reflect on their teaching, generate questions and clarify goals when considering use of computer technology.

Drawing on the authentic pedagogy concepts, researchers in Queensland (Haynes, Lingard and Mills, 2002) suggested that change was needed in pedagogy, curriculum and assessment. A project involving implementing such changes is currently underway with productive pedagogy, new basics curriculum and rich tasks used in some Queensland primary and secondary schools. The productive pedagogy model (outlined in Khoo, 2001) identified 20 factors within NSW
and Queensland classrooms that might be changed to improve learning. These are grouped into four dimensions: intellectual quality, relevance, supportive classroom environment, and recognition of difference. When they analysed classroom observations the researchers have found that Queensland and NSW classrooms scored highly on the supportive classroom environment dimension. Changing strategies in the other three areas, particularly in the factors identified in the productive pedagogy framework, resulted in improved outcomes for students when measured by standardised tests or classroom assessment (Khoo, 2001).

These four dimensions of productive pedagogy provide a framework for examining what happens when teachers use computer technology in their classrooms. While they were designed without a specific focus on technology, the factors they encompass are relevant for student learning that uses technology. This productive pedagogy framework supports the research of Sewell (1990) and Callen (1991) who identified areas that would change with the introduction of technology. Sewell focused on changes in the social context within which the learning occurs, while Callen advocated the implementation of natural learning principles. Like Callen, Bigum and Green (1993) believed that priority should be given to educational issues, rather than technological issues, when trying to identify what might change in classrooms. Overall this research provides two important findings for a study of the use of electronic storybooks in primary school classrooms. Firstly, it provides the means of identifying critical areas in the classroom, and secondly, it facilitates a systematic comparison of teacher and student behaviour in the classroom.
3.2.2 Organisation

As well as issues relating to pedagogy, what goes on in classrooms is also informed by the criteria for organising the learners themselves in order to maximise their learning. Teachers are required to recognise similarities and differences between learners in their classrooms. In addition, learners and teachers participate in different instructional modes during the learning process. For teachers to select the best instructional modes to meet learners’ individual needs, the work of Vygotsky (1978) was consulted as he focussed on the social world of the learner and the impact of culture on learning. He believed that the task of the teacher in the classroom was to ensure that instruction continually challenged learners to move beyond what they could do on their own. To achieve this goal he believed learners should be encouraged to interact socially with their teachers and peers as a means of developing their individual knowledge. They should also be encouraged to use language to organise their thinking and talk about what they are doing.

It was possible to develop teaching practices that reflect a belief in learners as individuals. In the work of Gardner (1983) and Butler (1984), for example, the concepts of multiple intelligences and different learning styles were identified and classroom learning situations organised to reflect and allow for different learning styles. In order to apply this combination of multiple intelligence and learning style concepts further, McCarthy (1990) developed the 4MAT system based on two premises. First, that people have major learning styles and hemispheric processing preferences, and secondly, that designing and using multiple instructional strategies in a systemic framework to teach to these preferences can improve teaching and learning. McCarthy’s model identified a natural learning progression: sense and
feel, experience, watch, reflect, think, develop theories, test theories, experiment, evaluate and synthesise learning. Teachers following this system were encouraged to plan teaching and learning experiences that cover all aspects of this learning progression within each unit of work.

In introducing computer software into teaching and learning programs designed to maximise learning, Souleles (1998) identified three factors: the level of interactivity provided between the learner and the software; the extent of learner control provided; and the effect on learners’ motivation to learn. Interactivity refers to ‘doing’ rather than ‘being’, involving action and reaction with another - whether it be a computer, a person, or the surrounding environment. Souleles considered interactivity in learning was a necessary and fundamental mechanism for knowledge acquisition and the development of cognitive and physical skills. Electronic storybooks are interactive because the reader is offered multiple choices or scenarios as the program unfolds and they can choose which sequence to explore. The software interacts with the reader by responding to their choices. Souleles argued that the use of interactive multimedia could facilitate student centred learning, for example, electronic storybooks facilitated student interaction, experimentation and co-operative learning. The use of electronic storybooks also facilitated storylines or thematic learning and supported the constructivist view of learning.

Other writers in the United States of America have endeavoured to identify different levels of interactivity (Rhodes and Azbell, 1985; Jonassen, 1988; Schwier and Misanchuk, 1993), however in relation to this study it is the work in Australia of Sims (1994, 1995, 1996) that
was the most extensive and relevant to this study. He identified eleven aspects to interactivity that should be taken into account in designing and evaluating software. Not all aspects were applicable to electronic storybooks although object interactivity, linear interactivity (only when the storybook was in the 'read to me' mode), hierarchical interactivity, support interactivity, and hyper-linked interactivity were relevant.

The level of interactivity is related to the level of learner control, which in turn impacts on how extensively the software can respond to individual needs and interests. In his research in the USA, Duchastel (1986) showed how learner control could impact on motivation to use software and concluded that successful commercial software often involved gaming or simulation to challenge the learner’s problem solving and decision making skills. Experiential learning work by Rogers (in Sims, 1996) in Australia also suggested that significant learning takes place when the subject matter was relevant to the personal interests of the student. He identified self-initiated learning as the most lasting and persuasive. This view was supported by Leyland (1996) in his work with computer based educational games. When control resided with the player/learner, they fully immersed themselves in the game narrative, made an investment of effort, and hence, provided the opportunity for deep learning to occur. Electronic books allow some learner control. The pace of the recorded reading cannot be altered but the reader can control the speed at which the pages are turned and can have words re-read if desired. On each page the reader determines the level of further interaction with the text or visuals.
With any particular piece of software, motivation to use a computer may be strongly related to a number of reasons. Sewell (1990) identified the desire of the user to control the computer; to respond to a perceived challenge from the computer; and/or to explore the complexity of the computer software. Motivation to use computers is sometimes connected to the perceived attractiveness of computers but Sewell cautioned that care is needed to compare computers with other motivational tools. He claimed that students often do not think that anything in classrooms needs to be interesting, so when comparing using a computer with other classroom activities a higher score will automatically be given to computers. Sewell argued that comparisons should be made with other ‘interesting and motivating’ factors from outside the classroom (for example, reading, watching TV, playing with friends) before the actual motivating qualities of computers are determined. It was also important to look beyond the novelty value of the software. Features such as the degree of challenge provided on a personal level and the uncertainty of outcomes, stimulation of curiosity or hypothesis testing should also be considered. Sewell suggested if the goals and challenges were removed the framework and reason for using the software might also be removed. The issue of motivation was relevant to this study because of the positive effect it may have on a student’s self esteem and attitude to learning (Alchin, 1993).

In addition to the above three factors (namely, interactivity, learner control and motivation) which are concerned with the learners’ relationship with the software, teachers also make use of grouping strategies to ensure maximum learning takes place. These groups can consist of one learner or the whole class, but Marsh (1996) identified that the formation of small groups within the class was usually based on various criteria such as reading level, friendship,
interests, or random selection. In this study it was expected that teachers would continue to
make use of grouping strategies particularly as computer resources are limited, and this
necessitated students taking turns to use the technology. The literature confirms the value of
children working together to increase and develop their learning potential (Zorfass, 1993;
Bruce, Michaels and Watson-Gegeo, 1985).

3.2.3 Management

While pedagogy and organisation are vital when developing and implementing classroom
practice, classroom management is also integral to ensuring that effective learning
opportunities are provided for all learners, in other words, to maximize on-task time. The
learning environment established by each teacher is a reflection of the choices already made
about what and how students will learn. The specific physical conditions and space allocations
within the classroom have important consequences for the attitudes, behaviour and even
achievements of learners (Marsh, 1996).

Norton and Wiburg (1998) suggest that one of the first educators to develop a pedagogy that
focused on the learning environment as an instructional strategy was Maria Montessori
(Montessori, 1914). She showed in her research that learners who were sufficiently supported
by a well-organised and developmentally appropriate environment became self-motivated
learners. The learning environment was not a passive component of the teaching/learning
process. An empty classroom would yield data about what is considered important through
answering questions such as: Is there evidence of student centred activity? Where are the

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computers located? Is the work of the learners displayed in the room? What cultures do the images in the room reflect?

Decisions about management of the learning environment also impact upon the student teacher relationship. Manke (outlined in Norton and Wiburg, 1998) conducted an in-depth study of three classrooms to look at the relationship between organisation of space and time and the student-teacher power relationship. Three findings were significant for this study. First, the culture in the classroom was deeply influenced by the teacher’s decisions about time and space as learner behaviour varied according to the different settings. Secondly, learners pushed the teacher’s rules to the limit in order to meet their own needs for power and control over their own learning. Thirdly, the teachers’ choices were deeply embedded in their beliefs about how students learn best. These conclusions expanded previous research by Becker (1992) that highlighted the importance of the teacher’s role in the classroom and concluded that a critical ingredient for successful student outcomes was the integration of teacher-led classroom activities with computer based ones.

The management of the learning environment also included the way the teachers organised the physical layout of the room. Marsh (1996) found that teachers generally organised their classrooms on the basis of territory, usually with a teacher focus, or function, whereas the learning resources were organised to be learner centred. The individual learners occupied a physical position in the learning environment, be it at an individual desk, in front of the computer, on the floor, or in a group. The teacher needed to ensure that the physical environment chosen for the classroom facilitated the desired learning behaviours. Group work
using a computer simulation program, for example, is not facilitated adequately if all the learners within the group cannot easily see the screen and/or access the keyboard or mouse when desired. The teacher must also take into account the changeover time between activities in order to minimize disruption, off-task time and relocation of furniture and equipment.

Another major factor in successful classroom management is establishing a classroom climate conducive to learning. Charles (1989) emphasised that a classroom climate characterised by positive communication, warmth and support was most likely to enable productive and enjoyable learning activities to occur. The establishment of rules, routines, verbal and non-verbal communication channels are also important factors in establishing positive classroom climate. If this positive climate was established then the teacher could focus less on the discipline aspect of classroom management. Ideally, learners would maintain self discipline and this in turn would be supported by teachers who planned for diversity, variety and versatility in their lessons.

The integral role of the teacher in the successful implementation of technology was also emphasised by Newhouse (1993) when he defined the success of an instructional choice as one that was perceived by the teachers as contributing successfully to the delivery of the intended curriculum. This definition of success was a suitable one for this study as it encouraged a focus on the learning that occurred not the method of instruction. It also allowed teachers to employ different teaching approaches and assessment strategies in each unit of work and yet still have a common measure for success of the unit.
This point was examined further by the US Education Development Centre and reported by Zorfass (1993) who found that technology introduction was most successful when teachers brought the technology into curriculum contexts where:

a) students were actively engaged in learning;

b) students were pursuing authentic tasks in which they were interested; and

c) teachers facilitated the learning process by guiding and coaching their students.

The teachers themselves needed opportunities to communicate, collaborate and reflect access to ongoing technical assistance and administrators who supported the teachers' efforts to change. Zorfass concluded that teachers would be disappointed if they expected the technological application itself to produce magnificent changes, rather the changes only occurred when teachers had re-evaluated, renewed and revitalised their curriculum to include the technology. This finding reinforced once again the importance of the contribution of the teacher and the need to re-examine pedagogy, organisation and management practices to ensure learning occurred successfully.

### 3.3 Pedagogy, organisation and management in classrooms when using literature

The second body of knowledge the teachers have to draw on concerned the use of literature in teaching and learning. Two broad areas of use are identified: firstly, using literature as a part of a literacy learning program, and secondly, using literature as a stimulus for learning across all areas. A foundation for the use of electronic storybooks might be found in the existing theory and research concerning the use of literature (print-based) in literacy learning. Of most relevance to this study were issues relating to pedagogy and organisation.
3.3.1 Pedagogy

In terms of literacy learning, teachers require literature to have a role in both reading and writing, which was reflected in the range of views about how teachers could use literature in their literacy programs. Much of the discussion in the literature was concerned with how you could use literature in a classroom and the responses students made to such use. The main pedagogy that has emerged was based on the immersion in literature approach of Graves (1983) and Cambourne (1984). This pedagogy focussed on moving away from reading schemes and set texts, to individual selection of ‘real’ books of high literary quality. Cairney (1988), for example, saw literature as the heart and soul of the language curriculum and like Snowball (1985), he highlighted the difference between ‘books’ and ‘readers’ where readers were specially constructed texts included as part of a reading scheme. Cairney, in advocating a transactional view of reading, suggested that if we were to look into literature-based whole language classrooms (as described in Weaver 1994), we would see teachers helping learners create more elaborate texts as they read, supporting readers as they make meaning, inviting different responses to texts, and encouraging readers to make links between what they already know and what they are experiencing through the new text. They would avoid isolated skill lessons. If teachers could use literature in their classrooms in this way then it might be reasonable to expect that electronic storybooks could be used in the same way.

Teachers might choose to use literature because it provided the linguistic and literary models upon which children could build their own constructs as to how stories work, both in reading and writing. Zahnleiter (1985) concluded from her work in Australia, that this imaginative stimulus resulted in increased oral and written vocabulary, motivation to read
and reading fluency. Children needed to experience the real world, but they also needed to experience other worlds vicariously and literature helped them do this. Reading a good book was definitely enjoyable and developed imagination and new perspectives on behaviour (Hanzl, 1988).

Winch (1988) concluded from his research that it was important that good literary models were made available to children and that such material should contain spoken text repetitions and allow the child to connect the oral and written text. Electronic storybooks make this connection through the highlighting of the text as it is read aloud. Winch also indicated that the artwork in books had a role to fulfil in illustrating the story, complementing and adding to the force of the action. In addition he claimed that language development was enhanced by literature because children learned from example and exposure to quality. Both Winch and Nicoll (1988), however, claim that the most important factor in learning to read was that it should be pleasurable and that literature could contribute to that pleasure.

3.3.2 Organisation

Just as the response and interaction of the student to the computer software is important, the student's responses to and interaction with literature is an important aspect of teaching and learning. Fagan and Hayden (1986) explored any concept development that might occur during a shared reading experience. They concluded that this experience provided an excellent opportunity for learning provided sufficient interaction (student-teacher and student-student) was allowed to take place in the classroom. Conferences between students and teachers in a
literature based program were of many types including those about content, literary analysis and personal response (Hill, 1986). Using action research, Kerekes and Burchett (1986) discovered that children were reading more books, discussing books at home more and reading orally at a better standard as a result of the introduction of a literature-based reading program in Year 4 and 5 classrooms.

With electronic storybooks, students are able to read along with the recorded voice and listen to the text being reread to them as many times as they wish. Larking (1988) examined the research about the value of such a repeated reading technique and found that the technique made oral reading a non-threatening activity, allowed the reader to make oral miscues without embarrassment or interruption to the flow of the story, and was effective in teaching vocabulary. His observations of classrooms showed that students gave their total attention to the activity, found enjoyment in the reading, and quickly gained an understanding of the story.

Within literature-based classrooms, the response of the reader to the book was important as it provided the teacher with information concerning literacy achievement. Teachers were advised to look for responses beyond the literal, and here the work of Bunbury (1985), Zahnleiter (1985) and Austin (1999) were relevant to this study. Bunbury (1985), using Piaget’s levels, concluded that it was possible to isolate different levels of response according to different stages of cognitive development. She recommended that teachers should accept divergent responses from students in their class and not try to bring everyone down to a standard literal response to literal questions. Zahnleiter (1985) also identified three types of responses which go beyond the literal, namely: a psychological response
which is seen when the reader identifies closely with a character from the book; a literary response which is seen when readers give evidence of recognising literary form by reproducing them in their writing; and a linguistic response which is seen when readers incorporate language patterns encountered in stories in their own speech and recognise language can be used for emotive effort. The teacher's task was to create a learning environment that was conducive to the development of these varying responses.

Some writers have looked beyond the response the reader might make and identified a range of positions that might be assumed by the reader in the course of literature study in a classroom - positions which vary according to the particular view of the text that the reader takes up and that the teacher espouses or encourages. Austin (1999) identified three reading positions that might be assumed in a Year 6 classroom. The first of these was called the realistic narrative position where the reader reads from the point of view of common sense and real knowledge resources. That is, characters and events are analysed according to whether they are real and possible. The second position is the anthropomorphic narrative position that applies our human feelings and attitudes to characters in the text (even if the characters are not human) and hence makes psychological and affective interrogation of the text possible. The third position is that of representational tale and focuses on what characters and events in that text stand for. In this position, the reader interrogates the text using allegory, parable and symbol, while looking for the greater moral truth.

The variety of responses to text and the positions the reader can occupy which are acceptable within a literature based classroom generated a range of reasons for using
literature in any teaching/learning program. Such reasons have been provided by a number of writers such as Hanzl (1988), Kerekes and Burchett (1986), Reid (1984) and Nicoll (1988). Nicoll and Roberts (1994), however, in summarizing their own research with NSW primary school teachers provided some insights that formed a powerful base for the development of the units of work used in this study.

3.3.3 Management

The use of literature can facilitate the creation of a positive learning environment. Nicoll and Roberts (1994) concluded that teachers choose to include literature in their classroom programs for a number of reasons including any or all of the following. Teachers might use literature because they wished their students to develop a love of reading through stories and poems that entertain, tell us truths about ourselves, and nourish our spirit and imagination. Using literature in classrooms reflected the power of narrative (storying) in our lives. This experience did not mean that factual reading and writing would be devalued, but rather that learners would be encouraged to make sense of their experiences through reading and writing narrative. Teachers would assist students to go beyond recognising words in print to constructing meanings from text. Through the wide use of literature, learners would be encouraged to interact with a variety of texts and the meanings therein. Individual learners would discover new purposes for using language, develop vocabulary and extend the use of syntax through their exposure to the story and poetry of good authors and poets. Thus, literature served as a model for the student’s writing. As a result of these uses over a period of time and with wide reading of literature, students will begin to incorporate into their own writing various aspects of written language that they have picked up from their reading.
Deconstruction of the text allowed for development of scaffolds that assisted writers as they sought to model a particular genre (Derewianka, 1993).

In addition, Nicoll and Roberts (1994) proposed that teachers might use literature to examine language as verbal art, that is, to reread and reflect on the language of the text so that they can detect the subtle patterning of language the author has used to achieve a certain effect. In a similar way, teachers might assist learners to explore the use of artistic media, for example, illustrations, to add to or replace text in the narrative. In a non-threatening way, literature can help learners to explore people and their relationships with others, with their physical surroundings and with their society and culture. Literature can help students investigate different motives and decisions and the factors that impact on them. It can also challenge the learner’s existing values, particularly when class discussions are held and different texts addressing the same issue are compared. In a similar fashion literature can aid the learning of other topics/subjects through the provision of a different perspective.

While the writings about the use of paper-based literature gave insights into how the learning environment might incorporate literature, electronic storybooks of the type used in this study are not composed solely of text. The illustrations, whether still or animated, play an important role. Within the range of print-based literature, electronic storybooks have similarities in style to picture books. As Scott-Mitchell (1988) defined it:

*a picture book is a work of fiction in which text and pictures are at least of equal importance, the pictures being an integral part of each page opening* (Scott-Mitchell 1988 p. 75).
When examining picture books and electronic storybooks it was vital that the interaction of the text and pictures was recognised. Any well-constructed picture book (print or electronic) contains more than any one reader can detect because meaning may come from the imagination of the reader, the author and the artist and exists on many levels. The text and pictures work independently and together. Only part of any story is illustrated by the artist. In electronic storybooks only some of the text is seen on the screen, as some text is presented orally by the characters themselves. The reader’s desire to complete the story is what activates the imagination and the desire to read further.

The role of the visuals accompanying the text was critical to this study. Swan and Symington (1987) found that independent readers saw the text as distinct from the illustrations. For them, the illustrations did not help with reading. Dependent readers saw a closer relationship - they saw the pictures as being there to help them read the story. Beginning readers saw pictures as the primary source of information about the story - few mentioned the text. Swan and Symington recommended that teachers and parents increase the amount of dialogue with students about the functions of text and illustrations in reading in order to ensure learners were gaining understanding.

Research has been conducted to examine the practice of viewing texts and the role film/video may have in constructing meaning. Reid (1984) examined how a reader’s assumptions about character, plot and so on were challenged more effectively when the screen version was placed beside the printed page. Visuals and sound media contributed to meaning in addition to the text and needed to be examined in their own right. Traves and
Hancock (1996) stressed the importance of these factors when viewing text and explained that when a comparison was made of print and film even very young children were very perceptive of the differences. They also suggested that students should be encouraged to see the value and question the use of visuals in texts and books.

Just as the wealth of writing and research supported the use of literature in classrooms, the literature relating to the use of technology highlighted many factors and issues that needed to be addressed. What still remained to be seen was if other researchers had worked to combine technology and literature in classrooms. Examination of the work of researchers who have dealt with this issue in general, and those who have focused specifically on electronic storybooks is provided in the next section.

3.4 Using electronic storybooks or similar software in teaching/learning

The issues addressed by the literature relate primarily to pedagogy and organisation and reflect the strong interrelationship behind the choices teachers make concerning which software is to be used and the way in which the learners will make use of it. The initial work in this area was done using videodisk technology but CD-ROMs quickly replaced this technology in home computers and in schools because of lower cost and ease of use. The narratives of electronic storybooks have not been the only text to be placed on this new media as encyclopaedias and other reference material have also appeared on CD. This study, however, was concerned only with the narrative texts presented via CD-ROM technology. In that context a look at the work done with videodisk was still relevant as the strategies developed there have been applied to the use of CD-ROM programs.
The *Doomsday Interactive Video Disk* was one of the first examples of interactive video that presented an information source for students to access. It was criticised by Freeman (1990) because the students could not create and test their own models of information. Also the high level of interactivity was with the interface not the information. Freeman offered the following recommendations for better usage of the technology: there should be more case studies of how it can be used; the software should allow the users to manipulate the data, for example, down-loading of text from the CD to a word processor should be possible; and simple methods of interrogation and presentation should be adopted for visual information, for example, hot spots. It is worth noting that the encyclopaedia and reference material CD-ROMs that were released in the 1990s incorporated all these features in some way.

The work of Chomsky (Nix and Spiro, 1990) was one of the first attempts to examine the use of electronic storybooks. As with Freeman, the technology accessed was the videodisk rather than the CD-ROM. Chomsky considered the role of the technology was to motivate independent reading and the function of the computer was to provide a link between the child and the book. Classroom activities included browsing through the text and illustrations, hearing the book read aloud while following the text, finding out about characters and plot, and being introduced to difficult vocabulary. Chomsky insisted that teachers should view the time spent on the computer as contributing to literacy learning.

Chomsky's study involved the use of a computer driven videodisk to provide an introduction to a book. She saw five main reasons for developing and using this technology: to provide an introduction to the text; to make the book easier to read on one's own; to
practise listening-while-reading; to review a book one has read and liked; and for
enjoyment. These reasons could also apply to using electronic storybooks. While Chomsky
did not provide evidence of any link to increased motivation to read printed books, her
observations of student behaviour indicated possible behaviours to be observed in this study.
Her observations included that students liked to have a copy of the text available, that they
sometimes followed the text in the book rather than on the screen, and that students enjoyed
working in pairs discussing the story and pointing to the pictures.

A meta-analysis of the instructional applications of interactive video was conducted by
Oliver and Perzylo (1993) and yielded results consistent with earlier work (Nix and Spiro,
1990; Freeman, 1990), namely: that the teacher was important in the learning process; that
there was a favouring of group instruction; and that learner differences contributed
significantly to differences in the level of learning outcomes. Oliver and Perzylo then used
these results in an examination of the use of the interactive CD *Mammals*\(^5\) by students in a
school library. They created a hierarchy of level of interaction between the features of the
CD presentation that is shown diagrammatically in Figure 3.1.

Figure 3.1: Interaction levels of features of interactive video disk program

```
FEATURE:
  sound
  video
  photographs
  graphics (maps, charts)
  text
  hypertext information

Highest interaction

Lowest interaction
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\(^5\) This is reference material not an electronic storybook.
As electronic storybooks have the similar features (excluding video) the student’s interaction with these features might be identified in a similar fashion during this study. In fact, as the electronic storybooks rely heavily on graphics (pictures and animations) as sources of interaction, I expected that particular feature to be ranked higher than sound. The use of hypertext would also be expected to be low in interaction because the text in electronic storybooks is a narrative and using hypertext in this context is often distracting to the story being read.

With the development of CD-ROM technology and the importance placed on reading and literacy in schools, book publishers also explored the concept of putting their books or reading schemes onto CD-ROM. Wragg (1994) described his work in developing the Nelson reading scheme *Flying Boot* which had CD-ROMs included and acknowledged that he faced two major conflicting demands: that he create decent stories; and that there be some degree of structure, both in terms of increasing complexity and control over vocabulary and phonics. Wragg admitted he could not meet the first demand:

*The problem is that if you let your imagination rip on absolutely belting stories, they are bound to be too complex for absolute beginners* (Wragg, 1994, p. 8).

His main purpose then became to teach the skills of reading, particularly phonic skills, using CD-ROM technology. In doing this he lost contact with one of the essential reasons for using literature, namely the value of the story itself. This approach is not the one taken with the electronic storybooks examined in this study (*Discis Books* and *Living Books*) that represent literature transferred to a non-paper medium. None included exercises or games to learn phonics. Nevertheless, by their inclusion of different amounts of animation and sound,
the software producers demonstrated that they held different approaches to reading and how to teach it.

Many authors who have written about electronic storybooks have not conducted any formal research in this area but their opinions and classroom experience were valued in the development of a framework for this study in that they added to the body of opinion about electronic storybooks accessible to the teachers in this study. These authors include Perry and Perry (1992), Parham (1993), Mike (1994), Swan and Meskill (1996), Glasgow (1996-7), Kahn (1997), van Loon (1997) and Hurley (1998).

Perry and Perry (1992) reviewed the introduction of Discis Books in an elementary classroom in the USA where their use was based on a desire to provide a rich reading experience for young children. The fact that students interacted with both the text and pictures and reread the text was seen as a strength. The inclusion of versions of the book in other languages and the availability of a print option to support off-computer activities were considered possible improvements that could be made. Perry and Perry (1992) were supportive of the use of electronic storybooks to assist at-risk students because:

*There is a distinct difference between students who want to read and those who do not. This difference often widens into those who can and those who cannot. Discis books are one way to capture students' interest in reading and help them to become independent readers who want to read.* (Perry and Perry, 1992, p. 45)

This idea is consistent with the stated aim for the electronic storybooks that was (according to the advertising from Discis) to capture student interest in reading and stimulate reading of
conventional books. While Perry and Perry indicated support for this claim only anecdotal evidence was given.

In 1993 Parham reviewed the different types of electronic storybooks available at that time and identified some advantages and faults. He examined three sets of books which were targeted specifically to schools: Bravo Books, Stories and More, and Dragon Tales; four stand-alone titles: Living Books, Discis Books, EBooks, and Annabel’s Dream of Ancient Egypt; and three storybook collections: Joanne’s Stories, Interactive Storytime Vo. 1 and 2, and Talking Classic Tales. Parham identified the advantages of using electronic storybooks. They offered new tools for exploring the sound of words and their graphical representation and endless repetitions of words and phrases were possible. They did not count repetitions or record decoding errors (though some newer titles do!) and provided a good model against which the student could evaluate his/her own reading and writing.

Parham, however, did identify some faults with electronic storybooks. First, the students were concentrating on the computer for an extended time, which raised some health issues. Second, the electronic storybooks, by their nature, presented an image that said the printed version was less interactive and exciting than the electronic one. Third, using the electronic book meant the students did not use as much of their own imagination when reading. The points raised here were valid concerns, however, the impact on literacy learning was not examined by Parham. More research would need to be done to determine whether such faults detract from the benefits to be gained. The fact, for example, that students were concentrating on the computer for a time was only to be expected in a classroom context
that includes technology and where time on-computer was often rationed. Any health risks associated with using computers (for example, eye strain) apply to all computer use and not specifically to electronic storybooks, and needed to be seen as a general classroom management issue.

In line with the whole language approach to literacy, Mike (1994) reviewed four CD-ROM reading programs: Stories and More II, WiggleWorks, CD’s Storytime and Bravo books. These programs were designed for the school market as part of the language arts curriculum. In offering 15-20 books, each program was created to engage the student in reading literature with as much interactive support as possible. He also presented a clear set of criteria for teachers to use when evaluating an electronic storybook for use in their classroom. He claimed it was not enough that the program have lots of interesting features, the critical issue was whether those features enhanced the quality of instruction and learning. With regard to the electronic storybooks used in this study, Mike mentioned both the Discis and Living Books series of electronic storybooks and placed them in a category he called “edutainment”, designed more for home reading rather than school reading. This categorization, however, did not preclude their use in schools. It was clear from Mike’s positive review that books were made even more fun when presented in an interactive environment. He identified, however, a critical issue relating to their use: that of the students having so much fun with the interactions that they will forget all about the reading. If this were so, then, in classrooms, students would be distracted from reading if there were lots of interesting features included in the software.
To contrast with Mike’s work, Swan and Meskill (1996) examined 45 hypermedia literature programs from the theoretical perspective of response-based literature teaching and learning. These programs were evaluated in terms of the stances students took when engaged in the reading process.

Stance 1: Being Out and Stepping In, which refers to readers using their background knowledge and initial reading of the text to be drawn into the text world.

Stance 2: Being In and Moving Through, where readers use text knowledge and background knowledge to develop meaning and ask questions about motivation, causality and implications.

Stance 3: Being In and Stepping Out, where readers use their text knowledge to reflect on personal knowledge.

Stance 4: Stepping Back and Objectifying the experience - here readers distance themselves from the text world, reflecting on and reacting to both the content and the experience.

Overall Swan and Meskill’s preliminary finding was that existing hypermedia applications were not response-based, however, hypermedia technology held promise as a tool for response-based literature teaching and learning. It did seem however that they were looking for a hypermedia program that would provide everything in one computer based package. There was no mention of the teacher working with the learner and the technology in any of these stances. The contrast was consistently between the ways the hypermedia program OR the teacher and paper-based texts interacted with the learner. This view narrowed the role of technology in teaching and learning and reflected the traditional concept that the technology
should do all the teaching. An alternate practical, achievable and educationally sound goal
would be to develop hypermedia programs that could be integrated into the teaching and
learning program and where each of the above stances could be achieved in the classroom.
This development would facilitate increased interaction between learner, teacher and software.

A growing body of literature has emerged whereby teachers talk about how they have used
electronic storybooks in their classrooms or have reviewed a new title for a publisher. Kahn
(1997) argued in favour of electronic storybooks because of the expert reading they provided
of the text. Hurley (1998), on the other hand, chose the Inside Stories series because of the
exercises provided on the CD as well as the story. Van Loon (1997) was impressed with the
teacher management aspect of the WiggleWorks program and the motivation it gave her
students. Dean (1998) emphasised the role of the animations and how they would make the
story come to life, thus encouraging an interest in and a love of reading.

By far the most extensive discussion of electronic storybook use in USA classrooms has been
provided by Glasgow (1996,1996/7,1997) in a series of articles for teachers wanting to use
electronic storybooks. The theoretical background used by Glasgow was that of whole
language.

In keeping with the whole-language philosophy, CD-ROM storybooks empower
children by providing them with the opportunity to work independently, explore,
discover, learn, and make choices about their reading material. They allow young
readers to construct meaning from text enlivened by animation, sound and graphics.
Children receive quick responses to their actions, and the responses do not require
high-level reading skills (Glasgow, 1996, p. 22).
She provided within these three articles extensive support for using electronic storybooks and poetry collections and her classroom activities provided suggestions for the teachers involved in this study. But, like other writers, Glasgow highlighted some concerns. First, would the students become so engrossed in the dramatic effects of the sounds, animations and graphics that they will lose contact with the story text? As indicated earlier, this issue was unresolved and yet of vital interest to researchers in this area because if the story is lost then there is reduced justification for using the electronic versions of stories as part of a teaching/learning program. Second, in some electronic storybooks there is no absolute correspondence between the text and what is heard because characters in the story continue talking. Glasgow felt this might confuse some young readers who might be involved in language experience lessons in which they match what they say and hear with what they write. On the other hand, it could enhance the context of the story for other students.

There has been some research conducted in the late 1990’s to address some of these unresolved issues and determine the worth of electronic storybooks. The work of Wild (1994 and 1995), Matthew (1997) and Fernandez (1999) was considered for this study. In classrooms in Western Australia, Wild (1994 and 1995) examined the use of two types of electronic storybooks (Discis and Living Books) and how they contributed to improvements in students’ reading. Wild conducted two parallel investigations: one involved 64 children over 8 weeks to target the wider use of electronic storybooks; the other targeted 4 students over 8 weeks. The research questions framed by Wild concerned identifying the reading strategies used by children, interactions with the electronic storybook, and any resulting change in attitude to reading. Within an effective reading program, Wild identified two ways in which electronic
storybooks would be useful. First, they would provide, in addition to paper-based books, a wide range of books that the students could read independently. Second, the reading of storybooks aloud was recognised as a critical component in literacy development and electronic versions of storybook would provide extended opportunities for this to happen without additional teacher time being required. Such classroom use of electronic storybooks would be easy to replicate in this study. Like Mike, however, Wild (1995, p.3) was critical of the *Living Books* series because they provided *multiple disparate images often only incidentally relevant to the text*. He felt such images detracted from comprehension of the story and interfered with the reading.

The effect the excitement of using technology had on research results was often raised in similar studies. Wild addressed that issue and monitored whether the initial enthusiasm shown by students for reading electronic storybooks actually led on to making reading more enjoyable. He referred to some of his earlier work in which students obviously preferred *Living Books* over paper-based versions but acknowledged that this work was done over three weeks and that no distinction was made between the enjoyment of the task (reading) and the enjoyment of the media used (computers). In his longer study this issue was addressed where it was found that students were increasingly motivated to read. Other preliminary findings of interest included the fact that able readers were initially motivated to read the electronic storybooks but over time that motivation decreased. In contrast, less able readers preferred the electronic storybook because of the support it gave while reluctant readers showed improved attitudes to reading of electronic storybooks but it took time to transfer this change of attitude to print books. There was also a beneficial effect over time on reading performance, as
indicated by larger vocabulary, greater understanding of word meaning and greater comprehension of story plot, character and events. Such conclusions demonstrate the breadth of possible impacts from the use of electronic storybooks.

Matthew (1997) used an experimental design to study the impact of electronic texts on reading comprehension of third grade students. Two methods were used to assess comprehension: retelling where students were told to write the story to share with a friend who had never read it; and open-ended questions of which four were textually explicit, four textually implicit and two scripturally implicit. Results showed that students who read the electronic storybooks had significantly higher mean comprehension scores than those who accessed only paper-based texts when measured by story retelling. The difference between the means scores was not significant when the open-ended questions were examined but the paper-based users’ mean scores were higher.

Of particular interest to this study was a related outcome commented on by Matthew (1997). She identified that to benefit from the reading of electronic text students needed to develop a ‘literacy’ to make use of the program’s facilities and options. But, interestingly, even when they knew how to access support, it was only the narration (that is, the rereading of text) that was used. Students only reluctantly used the hypertext feature of the Discis books and most commented that the word meanings so accessed were not useful. This feature highlighted a distinction between electronic storybooks and other electronic texts. I believe the prime focus in reading an electronic storybook was the story not the text and this focus resulted in the student readers concentrating on meaning rather than decoding and lead them to reject fancy
features (for example, hypertext, animations, sounds) that they perceived were not relevant to their pursuit of story.

In a specific situation where the teacher wanted to increase the experiences a student had with storybooks, Fernandez (1999) examined a single literacy event and compared outcomes when the students read a story with a human reader or with the computer. Using Discis and Living Books titles, students read one with a teacher and one on the computer. A variety of outcome measures were used including retelling, open-ended questions, pictorial multiple choice questions, and drawings. The results showed that there was very little difference between the student outcomes with a human reader and a computer based reading. In line with concerns expressed earlier, some students were observed clicking randomly on the screen and one even admitted to not remembering the story after using the electronic storybook. Despite this concern, the results in terms of literacy learning were essentially equal for both groups and so Fernandez indicated that she supported the inclusion of electronic storybooks in literacy programs.

A major validation study was conducted by the book publisher, Scholastic, when it was introducing its beginning literacy system WiggleWorks (Schultz, 1997). Unlike the Nelson program mentioned earlier, the WiggleWorks program used paper texts that were popular with students and a part of the literature based approach promoted by Scholastic. In addition, the CD-ROM technology was used to allow the normal readings found in electronic storybooks but it did not include hot spots or animations. The CD-ROM version did allow for students to explore their response to the reading activities by writing on-computer and using the text and
illustrations from the original story if they wished. Students could also record their own reading of the text and compare it to the recorded one.

Schultz (1997) reported the validation study involved 29 classrooms and was set up to allow comparison between classrooms not using *WiggleWorks* at all, those using only the paper-based version of *WiggleWorks* and those using the paper-based text and the CD-ROM. The measures to assess language arts outcomes were the Iowa Test of Basic Skills and students’ writing samples. The results were very positive in that first-graders using the program made significantly greater gains on standardised reading tests and writing samples than comparison students using a more traditional language arts curriculum. The best results were achieved in classrooms making use of the paper-based version and the CD-ROM. This program showed a positive development from the original electronic storybook format. It allowed students to actively merge their reading and writing learning and made use of the technology to do things that were not easy to do in a paper-based classroom, for example, modify the reading for students with disabilities, keep accurate records of time students spent doing each activity and allow students to modify the original text and illustrations.

In the future, as teachers become more confident in their use of electronic storybooks and the technology improves still further the following developments are expected:

1. Hypertext fiction books where the ‘reading’ of the book proceeds in a non-linear fashion according to which hypertext links are accessed by the reader (Sarno, 1994).
2. New portable technology developed (for example, rocketbook, softbook) which allows readers to download a book from the Internet and then take it away to read (Austin, 1999).
3. In classrooms, students composing their own electronic storybooks using software such as Hyperstudio and then sharing these books with other students and classes (Fredrickson, 1997).

Such possible new developments show that the importance of electronic storybooks, in whatever form they may take, to literacy learning in electronic age classrooms is not decreasing.

3.5 Conclusion

The research conducted so far concerning electronic storybooks has related to the software itself and comparisons with other ways of improving literacy using technology. None have addressed the issue of how teachers themselves might incorporate electronic storybooks into their classroom practices. In terms of the key research question for this study, some support is provided to show that aspects of literacy might be improved through the use of electronic storybooks. These aspects include oral reading, recall of story and comprehension. However, the organisation structures used in studies have focussed on groups of students being identified to use the electronic storybooks with the researcher in control of the learning content. At this point it is not known whether teachers themselves could successfully make use of electronic storybooks nor what does or should change in terms of pedagogy, organisation and management as a result. The central question of this study remains to be answered. For the first part “Would electronic storybooks be useful in a classroom?”, the literature review indicated a probable yes. For the second part “If so, why (pedagogy), how (organisation), and in what way (management)?” only limited information currently exists. This study has been designed to
provide some possible answers to this question, both for other teachers to use and to provide insight for further research.
Chapter 4: Methodology

With limited information currently available addressing how teachers might make use of electronic storybooks, the methodology of this study combined both qualitative and quantitative techniques. The issues identified by other researchers who had conducted research in classrooms, and particularly when those classrooms used technology, set the context for the selection of techniques. This chapter looks closely, in turn, at the preliminary studies, case studies and action research techniques used in this study.

4.1 Research in classrooms

Within this study a combination of approaches, qualitative and quantitative, was used in order to address the research questions and the paradoxes inherent in basing research within regular classrooms. Dyson and Genishi (1988) identified these paradoxes. First, classroom research provides a means of gaining an overview through the combination of a number of intimate looks at classroom life. It involves seeking knowledge of the ‘small picture’ things that go on in a classroom – for example, the organisation of the learners, their needs, the type of interactions between learners and between learners and the teachers, the content selected, and the teaching strategies used. At the same time the big picture view must be maintained – for example, What are the goals of this learning program? What is the teacher’s pedagogy?

Secondly, classroom-based research yields a holistic view, but the dynamics of the parts are still visible. Research presenting this holistic view often prefers a narrative form of presentation but this does not mean that very specific research questions cannot be addressed. Thirdly, each project is a unique whole yet at the same time a
part of the bigger picture that is governed by and contributes to theories about learning in classrooms. In this study each individual case study might be viewed as an example of the range of possible classroom learning situations. In addition, different situations have been examined to ensure that the diversity of learners and the instructional contexts within which they learn are reflected in the data collected.

Other questions critical to research conducted in classrooms have been posed by Levine (1990, p. 461) such as: What changes in the classroom? Is it permanent or illusory? How do we contextualise these changes to justify their export to additional classrooms? Levine advocated the use of naturalistic field based observational techniques. For example, he argued that pedagogically-sound classroom computer use depended on a teacher’s proactive, interactive and evaluative thinking. The research techniques used must be able to describe those teaching styles that contribute to the desired classroom outcomes without relying solely on student outcome measures.

Comber (1988) also supported the use of classroom-based research. She promoted the use of action research or fieldwork in the belief that the participants in educational research (in this case the teachers) should be able to fulfil their own purposes, ask their own questions and face their own challenges. She contended that the focus should be on educational problems posed by teachers rather than theoretical questions from researchers. The role for me as the researcher, then, was not to objectively interpret other teachers’ realities but to help them better understand what was occurring in their classrooms by sharing explicit processes and actual data to arrive at a negotiated interpretation.
Many researchers (Dyson and Genishi, 1988; Comber, 1988; Salomon, 1991; Rowe, 1991) have recognised the conflict that may arise between teacher and researcher when conducting research in classrooms. Kearney and Tashlik (1983) found that the use of whole class lessons and group work as key data collection sites presented many problems both theoretically and logistically. The demands of the researcher needed to be seen in the context of what teaching a class of 30 students actually involved. They concluded that research works best when both teacher and researcher are directly involved in asking and analysing the questions that concerned them. They acknowledged that such research may not result in static answers but rather the challenge of more questions to be answered.

Given these concerns about classroom research, a mix of quantitative and qualitative methodology was used within this study in line with the work of Abbott-Chapman (1993) who argued that there was a need within all research, and especially in education, for reliability, validity and generalisability. She suggested that the researcher should develop a balance of quantitative and qualitative approaches with as wide an array of analytical and conceptual tools as was feasible.

4.2 Research in classrooms using technology

Before selecting the relevant tools for this study it was necessary to examine classroom research involving the introduction and use of technology. This research had its own set of concerns and issues. It was very important that the teachers who were experimenting with the introduction of electronic books into their classrooms were supported in their search for the most suitable pedagogy and teaching strategies.
Owing to the dynamic nature of any class, it was necessary for the teacher to be able to change strategies or techniques quickly if those employed were not satisfactory or productive. While it was recognised that the introduction of any new approach/technique/resource could create some disruption, this disruption need not be unproductive and the class environment could remain positive and supportive.

Rowe (1991) proposed a transactional model as a basis for research in this area. She argued that many studies have considered the computer to be an independent variable when this was not so. Computers interact with the whole teaching/learning process. If the researcher is seeking to examine the effect of the use of computers on cognitive processing, for example, the researcher must focus on the dynamic interplay between the learning process, students, teachers and the learning context. It would be necessary to examine what teachers and students do with the computers in order to see the effect in education.

Salomon, Perkins and Globerson (1991) continued this line of thinking and argued that no computer technology in and of itself can be made to affect thinking. There is a need to consider both theoretically and practically the whole social and cultural milieu in which instruction takes place. Specifically there are two effects that should be considered. One must examine any change in performance observed when the technology was in use and one must seek to find any more lasting changes in cognitive capacities that occur as a consequence of interaction with the technology. Within this study I have focussed on the first of these two effects. I believe, however, that before the second effect can be examined, the use of electronic books, for example, must be
far more widespread than it was in 1995 at the time of this research. It should also be available to more students for longer periods within any one classroom situation.

Salomon et al (1991) claimed that no important impact can be expected when the same old activity was carried out with a technology that makes it a bit faster or easier. The activity itself had to change and this did not occur in a cultural vacuum. Maddox (1993) in fact identified three different stages in educational research relating to computers. Stage one was characterised by a belief that exposure to computers would be sufficient for change. There was a focus on computer literacy, the lack of equipment; and little experimental research conducted. The second stage was characterised by the belief that particular computer software would produce specific educational gains. The methodology used was usually experimental with control groups, and the research hypothesis usually followed the standard form of “If learners ... are taught ... they will improve more in ... than a control group who are taught traditionally.” The third stage looked at how learner characteristics and behaviours interacted with teaching strategies in order to achieve improvements in learning.

With the increasing use of computers in classrooms (Lillie, Hannum and Stuck, 1989; Becker, 1991; Sherwood and Buchanan, 1993), Reinking (1993) proposed that there was a need for research in two new areas. Reinking’s work provided a clear description of an investigative framework that was used in this study as all of the issues he identified were able to be examined within the context of the introduction of electronic storybooks in classrooms. The first area identified consisted of research to understand the dynamics of how computers can be used effectively in learning activities in classrooms by examining: how teachers were using creative technology
based activities as a foundation for innovative, interesting and meaningful instruction; how computer based activities came to be implemented successfully in classrooms; how individual computer applications affected students’ literacy; and what changes in the classroom environment occurred when computer based applications were introduced. The second area consisted of research to examine how computers were changing the nature of learning in a particular area such as literacy. In this study the major part of the data collected was in line with the first of these two areas.

4.3 Research techniques used in this study

To conduct this research using both qualitative and quantitative methodology I looked to identify the techniques available. Bogdan and Bilken (1992) grouped available techniques. Under qualitative methods they included observation, review of documents and artefacts, participant observation, and open-ended interviewing. Under quantitative methods they included experiment, survey research, structured interviewing, quasi experiments, and structured observation data sets. Levine (1990) made a closer analysis of qualitative models that involved observations. He included anecdotal reports, structured observations, case studies, multi-site case studies, ethnographic, and micro-ethnographic studies.

To answer the core question addressed by this study, ‘If electronic storybooks are to be useful in classrooms, why, how and in what way could this be achieved?’, four specific questions were formulated:

1. What pedagogy would form the basis of the teacher’s work?

2. What teaching strategies would be used?
3. How would the learners be organised in the classroom and interact with the software?

4. How would the learning environment be managed?

The techniques selected were the most appropriate to answer these four specific questions. Specifically, two techniques were used - case studies and action research by teachers. For this study the teachers were required to construct a unit of work and implement it in their classrooms. They had to review their own pedagogy, organisation strategies and management practices to facilitate the use of the electronic storybooks. This process mirrored that undertaken by the teachers in the Apple Classrooms of Tomorrow project (ACOT) reported by Sandholtz, Ringstaff and Dwyer (1997). The ACOT project developed a Unit of Practice (UOP) process as a way for teachers to consider the various components of a proposed learning activity as a coherent integrated whole. This UOP process required teachers to consider:

   a) standards – the objectives set for the learners;
   b) tasks – what the learners will do;
   c) interactions – who talks with whom and who initiates such interactions;
   d) tools – the materials, equipment and tools to be used by learners and teachers;
   e) situations – location and time frame; and
   f) assessment – the manner in which student work will be evaluated. (Sandholtz, Ringstaff and Dwyer, 1997, p. 123).

To support the teachers in this process I reviewed relevant literature and research relating to pedagogy, organisation and management.

In addition, the construction of the units of work used in the case studies was informed by two preliminary studies. To give voice to the learners’ point of view, structured interviews were conducted with a sample of students. A questionnaire was conducted
to survey other teachers’ opinions about using the software. The results of the preliminary studies assisted the teachers to construct the units of work. The teachers monitored and evaluated the implementation of the units using action research techniques, and the results for each classroom are reported as case studies.

4.3.1 Case Study research

The macro view of how teachers use electronic storybooks in teaching and learning is provided by the case study technique. According to Yin (1994)

A case study investigates a contemporary phenomenon within its real life context, especially when the boundaries between the phenomenon and context are not clearly evident. (Yin, 1994, p. 13)

This study makes use of case studies because they are reliable, hold attention and because the reader (in this case the teacher) can identify with the specifics of the study (Stake, 1978). Part of the purpose of this study was to add to the body of knowledge concerning teaching and learning. I believe the conclusions reached will be more readily accepted by the teaching profession if the conditions/situations from which the conclusions are drawn closely mirrors the teacher’s own reality. Stake refers to this as naturalistic generalisation, which is

arrived at by recognising the similarities of objects and issues in and out of context, and by sensing the natural co-variations of happenings. (Stake, 1978, p. 6)

Case studies can be single case or multiple case designs. Single cases are used to confirm or challenge a theory or to represent a unique or extreme case (Yin, 1994). Multiple case studies follow a replication, not sampling, logic in selecting the cases to be studied. In each case study facts are gathered and conclusions drawn (Tellis, 1997).

There is a range of types of case studies including snapshot, longitudinal, pre-post, patchwork and comparative (Jensen and Rodgers (2001, p. 237-239)). With the
exception of comparative case studies, all these types examine one research entity. In this study the research entity is, in general terms, the classroom where electronic storybooks are being introduced. Each case examined, however, is in a different classroom. This study therefore most closely conforms to the comparative type that uses a set of multiple case studies of multiple research entities in order to conduct cross unit comparisons.

This study also has some similarities to the multi-site case study approach identified by Levine (1990). This method had been used quite extensively in classroom computer program assessment efforts and had some advantages. It attempted to preserve the rich in-depth descriptions of the individual case study. At the same time it generated and tested more general social, structural and process variables as they made use of multiple sites as comparison groups. Levine indicated that in almost all cases, the analytical strategy of choice involved matrix logic whereby informationally rich data were reduced to essential features in a single chart organised by site. Multi-site case studies could be interpretive in nature as they focused on the idiosyncratic aspects of individual sites. It can also be used to find observationally based variables, which can be used in generating conclusions addressing concerns of generalisability and predicability. This study does not match the model identified by Levine because while the software type remained constant across all case studies, the way in which the software was used could be completely different. In contrast to electronic storybooks, instructional software (the main type examined by Levine) would be used in the same way in each classroom as the software itself was providing instruction to the students.
The case study technique is able to address research issues of reliability, validity and generalisability. According to Merriam (1991) to ensure internal validity, researchers use triangulation of multiple investigations, sources of data or methods, long term observations, and participatory modes of research. In addition to the above, to ensure reliability, the researcher must state the investigation position and create an audit trail through the study so that others can follow the logic. To ensure generalisability the researcher provides rich, thick descriptions of each case, establishes the category of each case, and conducts the research across sites and uses cross-site analysis.

Sources of data within case studies can include documents, archival records, interviews, direct observation, participant observation and physical artefacts (Tellis, 1997). Within this study a range of these sources has been used. Documents examined included school policies on assessment and NSW Department of Education and Training syllabus. Archival records included class lists and background information on students provided by the teacher, for example, ethnicity and socio-economic grouping. A range of interviews was conducted. Focus interviews were held with each teacher prior to and at the end of the implementation of the unit of work. Open-ended interviews were held with students during implementation and some teachers conducted more structured surveys of student opinion. Direct observations were conducted, at varying times, during the implementation of the unit by both the teacher and researcher. The researcher also acted as a participant observer at times in order to observe more closely student behaviour when using the computer and when completing the off-computer activities. Physical artefacts collected during each case study included the teaching program, work booklets and other resources created for student use, and work samples from students.
To analyse this collection of data a range of strategies is suggested by the literature. Myers (1997) suggested three modes of analysis: hermeneutics, semiotics, and approaches based on narrative and metaphor. Other techniques include pattern matching, explanation building, categorical aggregation, and time series analysis (Yin, 1994; Stake, 1995) Grounded theory is also suggested (Myers, 1997) as a possible strategy as it proposed that there should be a continuous interplay between data collection and analysis.

The choice of analysis method is informed by the methodology of the case study – exploratory, explanatory or descriptive (Tellis, 1997). This study fitted most closely to the exploratory case study in that it sought to identify what happened in classrooms when electronic storybooks were introduced. The three teachers involved were volunteers and hence were supportive of the exploratory methodology where the goal was to find out as much as possible within a short time frame (one unit of work). The case studies were analysed to find similarities and differences, following the pattern matching technique, and the researcher made use of the productive pedagogy framework (Hayes, Lingard & Mills, 2002).

4.3.2 Action research

This study also incorporates action research by the teacher in each case study in order to address the concerns mentioned earlier by Comber (1988) and Kearney and Tashlik (1985) in terms of the teacher being an active participant in the research process. It allowed teachers to respond immediately to any effect resulting from the computer interacting with the teaching/learning process, a concern expressed earlier by Rowe.
(1991) and Reinking (1993). While a number of views about what action research involves do exist (Myers, 1997; Schmuck, 1998), Bigum, Henry and Kemmis in 1989 provided a definition that matched most closely the context of this study namely the interaction between students, technology and teachers.

*Action research is a form of self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social and educational practices, as well as their understanding of these practices and the situations in which these practices are carried out. These participants can be teachers, students or principals and the process is most empowering when undertaken collaboratively, though it can be undertaken by individuals and sometimes in cooperation with outsiders.* (Bigum et al, 1989, p. 9)

The strengths of this approach lie in it involving a spiral of action – planning, acting, observing, reflecting, planning and so on. It can be collaborative as teachers work with other teachers and researchers theorising about their practices and pedagogy, about what they do, and coming to a better understanding of the implications of introducing certain techniques into their classrooms. Action research differs from other research in a number of ways. The people directly concerned with the social situation being researched carry out the research. The findings are immediately fed back into practice with the aim of bringing about change and to add to the body of knowledge about teaching and learning (Myers, 1997). Its highly pragmatic orientation recognises the trade off that must be made between giving teachers the central role in the research and the limitations of time and skill that they have. Also, ethical issues are raised through having teachers research their own practices and/or that of their colleagues. This requirement necessitated the development of an agreed set of principles and procedures before commencement of the research.

Schmuck (1998) in fact, goes further to identify two types of action research: proactive and responsive, which differ according to when the data collection and
analysis is commenced within the action research cycle. In this study the proactive action research cycle was followed as a new piece of software was introduced into the classroom and the teachers monitored and responded to the consequences of that event. The cycle can be represented as follows:

- Try new practice
- Incorporate hopes and concerns into the new practice
- Collect data regularly
- Check what the data means
- Reflect on alternate ways to behave
- Try new practice. Repeat process.

In this study action research provided the means to examine each classroom at a micro level, while the macro view is built up using the combination of the case studies. Both techniques were important to the success of the study.

4.4 Preliminary studies

It was evident that some introductory work needed to be done as no pool of expertise existed to support students and teachers using electronic storybooks. To inform the initial planning and reflecting stages of the teacher’s action research process, two small data gathering projects occurred using quantitative techniques. The questionnaire and structured interview technique were used to obtain standardised information from a sample of teachers and students.

4.4.1 Preliminary study No. 1

During 1994 a course was conducted to investigate electronic storybooks and their possible uses in education. Twelve teachers attended the course and spent five hours
(over two evenings) examining a variety of software titles and then brainstorming ideas about how they could be used in a classroom. It is important to note that these were educated guesses at how the software could be used not examples of how the software was being used. Only one of the teachers, a librarian, had used the software with students prior to the course and that was only as a “free choice” title on their computer system. The ideas these teachers proposed and the benefits they considered worthwhile for students formed the basis of a survey used in 1995. The survey (Appendix 1) was distributed to all primary schools within the Metropolitan North Region of the NSW Department of School Education at the end of term 1 1995 and was designed to gather teachers’ initial perceptions relating to how electronic storybooks could and should be used within existing teaching/learning programs. The teachers’ experiences in using the available electronic storybooks formed the basis of data collected though it was recognised that the experience would be quite limited. The respondents were teachers from primary schools who had used electronic storybooks in some way in their teaching/learning program.

A survey was designed with five parts and made use of a variety of questioning types. The alternatives used in parts three, four and five were based on the information brainstormed by the teachers who attended the course in 1994. In part one, the teachers were asked to list all the electronic storybook titles they had used (or with which they were familiar). Part two made use of a five point rating scale from no use to great use. The teachers were asked to rate how useful the electronic storybook software would be as a means to achieve certain educational goals, for example:

- stimulate reluctant readers
- help poor oral readers
- stimulate writing
keep a student busy
encourage the asking of “what if?” questions.

Part three made use of an open-ended question. Teachers were asked to describe how they had used, or were planning to use, electronic books in their classroom. In part four the same five point rating scale (from no use to great use) was used for teachers to rate certain features of the electronic book software. Comments were sought on features other than on the content (that is, the story) of the electronic book or the fact that the reader often had an American accent. The features chosen included: rereading of individual words and phrases; recording of reread words; interaction with text (for meaning and pronunciation); colour illustrations; and animations. In part five, teachers were asked to identify any classroom experiences that would allow poor/struggling/slow readers to benefit from the use of electronic storybooks.

The results from parts one, three and five were aggregated to provide a rich source of alternatives and possibilities for the case study teachers to use. The results from parts two and four were tallied and each feature/item placed in a rank order of importance. This process provided the case study teachers with a measure of other teachers’ opinion.

4.4.2 Preliminary study No. 2

The purpose of the second preliminary study was to identify the ways in which primary school aged students interacted with the electronic storybooks and to collect the students’ views on the software. Wherever possible the students’ views were sought on the same items as the teachers in the first preliminary study.
The three schools were selected to reflect a range of co-educational settings. One was located in the beach suburbs, one on the upper north shore and one in a semi-rural location. The students were selected by the Principal and staff of each school in order to provide a group of students who would be willing to talk with the researcher, that is, who were not shy. The students selected were within the recommended age group for the electronic storybooks being examined, which was from 7-12 years old. It was not essential that students be familiar with the software though comments from those who had used the software before (or at home) were noted. The students did not have to be computer literate.

The 11 students interviewed came from a variety of school years and a range of ages.

<table>
<thead>
<tr>
<th>School Year</th>
<th>No. Students</th>
<th>Age</th>
<th>No. Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2</td>
<td>1</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Year 3</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Year 4</td>
<td>4</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Year 5</td>
<td>2</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>1</td>
</tr>
</tbody>
</table>

The students’ class teacher was asked to give a rating of the students’ reading ability from poor to good. Seven students were rated as good readers and four as average readers for their age. No poor readers were included in the sample. This selection was to ensure that, as far as possible, the students would approach the reading task with a positive attitude and be able to concentrate on evaluating the software. It was also done because the majority of readers within the case study classrooms would be average or above-average readers. If the students in this preliminary study indicated no interest in the titles or demonstrated boredom with them, then conceivably electronic storybooks would have little applicability in the general classroom situation.
Each interview was conducted outside the normal classroom environment in a 1:1 situation because of the restricted numbers of CD-ROM machines currently in use and the need for careful observation and interview. The students were asked to help evaluate some new software available for use in schools by trying it out and participating in a structured interview. The questions and their order of asking were set prior to the interview. I had little need to rephrase any questions despite the range in age of the students.

The interview questions (Appendix 2) required students to give yes/no answers or to use a simple rating scale, and addressed the following areas:

- experience with computers
- experience with electronic books
- attitude to reading and writing
- features of electronic books that were important
- how they would like teachers to use electronic books in their classroom.

The first three areas were addressed prior to the students using the software and the latter areas at the end of the interview time. Before using the software on their own, the students were given a brief introduction to the software (and the computer if necessary) using the title *Scary Poems for Rotten Kids*, one of the *Discis* series. The students then selected two electronic storybooks to read, one from the *Living Books* series and one from the *Discis* series, and were asked to ‘read the book’ and explore the software as they did so. The students chose one from each series because of the different presentation styles adopted by the producers of the software. The popularity of either style would help teachers decide which series to use and the type of activities likely to be most relevant.
The total time with each student did not exceed 1 hour with each student given approximately 15 minutes of reading time on each storybook. As the students read the books they were observed in order to collect data in answer to the following questions.

- How did they approach the task?
- What did they do as they were reading?
- How much interaction with the text and illustrations was there?
- Did they need help to complete the task?
- Did they seek to involve the interviewer in the task?

The results from the initial parts of the interview were aggregated to provide a rich source of background data on the students. The case study teachers used these data to provide a comparison to their own classes. The observations of students were collated to identify similarities in behaviour and attitude when using electronic storybooks. These data provided the case study teachers with a measure of student opinion to inform their choices concerning suitable learning activities.

4.5 Case Studies

Volunteer teachers were sought to work with the electronic storybook software through a notice in the newsletter sent to all schools in the Metropolitan North Region by the computer education consultants. By the middle of 1995, three classroom teachers had volunteered. All were experienced teachers with a minimum of eight years teaching. Two held executive positions in their schools. All considered themselves confident computer users, in fact, all were current computer co-ordinators for their school. None, however, were happy with how they had incorporated computer use into teaching/learning processes within their classroom and looked upon this research as a means of exploring other possibilities. In that sense they were a very enthusiastic and innovative group.
The specific brief given to the teachers was that they were to construct a unit of work in the area of literacy or an integrated unit if that was how their classroom learning was usually organised. It was anticipated that initially this unit would mirror existing practice in the classroom. Nevertheless, the teachers could engage in new practices if they were felt to be more appropriate in this instance. An electronic storybook (or more than one if they wanted) was to form the focus of the unit. Using action research processes the teachers were to explore the use of the electronic storybook in their classrooms and identify any changes in pedagogy, organisation and management that were necessary to make the unit a success.

I conducted an initial interview with each teacher to clarify any issues. Each teacher then prepared the unit of work and liaised with me concerning its suitability. The times for the conduct of the unit of work were established once the school-based practicalities were in place. Wherever possible, I attended all lessons when the class was working on the unit of work. After the completion of the unit a follow-up interview was held with each teacher to reflect upon and evaluate the unit of work.¹ Relief time for the teachers to meet, to prepare the unit of work and to write a summative report was provided via my study support from the NSW Department of School Education. I believe this was a contributing factor to the teachers' enthusiastic participation in the study, and upon reflection of the amount of work involved, was a very necessary component.

¹ Sample summative report is included in Appendix 6.
4.6 Timeframe of the study

There were three distinct stages to the overall conduct of this study. First there was the reading and examination of existing literature concerning literacy and the use of technology in classrooms. This reading established the need to contribute research on the teachers’ view about introducing technology into classrooms and corresponded to the surge in interest in and production of electronic storybook software.

The second stage, during 1993-1996, was the conduct of the research with teachers in their classrooms. The preliminary studies and case studies were conducted during this time. The third stage, since 1996, involved continued reading of current literature to support the analysis of the case studies. Some published research used electronic storybooks and provided a contrast to this study as the studies did not focus on the teachers’ point of view. The published research, however, provided supporting data concerning the benefits to be gained through electronic storybook use. The analysis of the case studies was facilitated by the emergence of research studies in the area of pedagogy that provided a structure within which to analyse the data collected. By making use of this recent literature, this study maintained its relevance to teachers and classrooms of today.

4.7 Conclusion

The involvement of the teachers in this study was vital. Research techniques were selected that allowed the teachers to remain in control of what was going on in their classrooms and actively contribute to the research. Rich data is provided from each of the classroom settings and when these case studies are combined, a more complete picture of the diverse ways electronic storybooks could be incorporated into teaching
and learning was obtained. The lack of existing research meant the preliminary studies were essential to inform the teachers. The case studies would, in turn, inform other teachers as they sought to introduce electronic storybooks into their classroom.
Chapter 5: Preliminary studies

These preliminary studies were conducted to provide current information about possible electronic storybook use from the point of view of teachers and students. Study one made use of survey technique and study two used interview technique. In this chapter the results of each of these preliminary studies are presented and the implications for the case studies outlined. As some questions were common to both studies, in discussion some comparison was made between the teacher and student viewpoints.

5.1- Study 1 - teacher opinion

The purpose of the first of the preliminary studies at the beginning of 1995 was to identify teacher opinion about electronic storybooks. Only 25 surveys were completed and returned from a possible 190 schools. This low response possibly indicated the proportion of teachers without access to the software or who were unfamiliar with it and who would not have been able to respond to the survey. In almost all cases the respondents were the persons designated as the computer co-ordinator for the schools and hence all could be regarded as computer literate teachers. The response rate, however, was also a good indicator of the extent to which schools had computers with CD-ROM drives and software for them. 52% of schools responding indicated that they had 3 or fewer electronic book titles and very little other software was available on CD except encyclopaedias. Since 1995 the use of this technology in schools has increased dramatically and now almost every school would have many multimedia computers at its disposal. The computers provided through the Computers in Schools program of the NSW Department of Education and Training all contain CD-ROM drives as standard equipment.
5.1.1 Results

Table 5.1 shows the teachers identified 25 different titles of electronic book in use at the time of data collection. I had expected that the Discis and Living Books titles would appear frequently but was surprised by the number of titles from other producers. This response showed two things. First, that the CD producers saw a reason and need to put books on CD for children believing that the software would sell, at least to the home market. Secondly, teachers and librarians were buying the software to use in schools. Many of the titles were the first attempts by the publishers to transfer print versions of stories to CD and this resulted in a range of quality and interactivity being available.

<table>
<thead>
<tr>
<th>Title</th>
<th>No. of times mentioned</th>
<th>Title</th>
<th>No. of times mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Living Books series:</strong></td>
<td></td>
<td><strong>Others:</strong></td>
<td></td>
</tr>
<tr>
<td>Just Grandma and Me</td>
<td>21</td>
<td>Harry and the Haunted</td>
<td>3</td>
</tr>
<tr>
<td>Little Monster at School</td>
<td>5</td>
<td>House</td>
<td>3</td>
</tr>
<tr>
<td>Arthur’s Teacher Trouble</td>
<td>14</td>
<td>Aesop’s Fables</td>
<td>1</td>
</tr>
<tr>
<td>Tortoise and Hare</td>
<td>6</td>
<td>Shersten Naughty</td>
<td>1</td>
</tr>
<tr>
<td>Arthur’s Birthday</td>
<td>4</td>
<td>Stories</td>
<td></td>
</tr>
<tr>
<td>Ruff’s Bone</td>
<td>3</td>
<td>Sitting on the Farm</td>
<td>2</td>
</tr>
<tr>
<td>New Kid on the Block</td>
<td>5</td>
<td>The Cat Came Back</td>
<td>2</td>
</tr>
<tr>
<td><strong>Discis series:</strong></td>
<td></td>
<td>WiggleWorks (actually a series of books)</td>
<td>1</td>
</tr>
<tr>
<td>Cinderella</td>
<td>3</td>
<td>The Ugly Duckling</td>
<td>2</td>
</tr>
<tr>
<td>Peter Rabbit</td>
<td>2</td>
<td>Little Red Riding Hood</td>
<td>1</td>
</tr>
<tr>
<td>Thomas’ Snowsuit</td>
<td>1</td>
<td>Three Little Pigs</td>
<td>1</td>
</tr>
<tr>
<td>Moving Gives Me a Stomach Ache</td>
<td>1</td>
<td>Peter Pan</td>
<td>1</td>
</tr>
<tr>
<td>Paper Bag Princess</td>
<td>2</td>
<td>How the Leopard Got</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>His Spots</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Playtime in the Park</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The Pirate Who</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wouldn’t Work</td>
<td></td>
</tr>
</tbody>
</table>

The results of the survey showed that the most popular electronic books were the Living Books series with almost every respondent having seen or used Just Grandma and Me. This title, which was designed for the very young student, and Arthur’s Teacher Trouble, designed for older students, were the first of the Living Books to be released on the Australian market. From the survey there were 58 references to the
*Living Books* series compared with nine for the *Discis* series and only 18 references to other titles reflecting the immense immediate popularity of the *Living Books*.

At the time of data collection, the *Discis* series had been available in Australia for at least 12 months longer than the *Living Books*. However, as they concentrated on giving an interesting oral reading of the book and restricted interaction almost exclusively to the text to find word meanings and pronunciation, the *Discis* titles were not perceived by teachers or students to be as interesting or motivating. In addition, whereas the *Living Books* series are all modern texts, the *Discis* titles consisted mainly of traditional tales. The preference of teachers for modern texts is also reflected in the fact that while the *Discis* series has about 15 titles the more modern non-traditional tales are those mentioned in this listing, for example, *The Paper Bag Princess*.

Part two required the teachers to rate how useful electronic storybooks might be in achieving certain educational goals. This was a five point scale where 5 was ‘great use’ and 1 was ‘no use’. These goals were those suggested by the teachers at the earlier in-service course. The list of goals is given in Table 5.2 with the one considered to have the greatest use for electronic storybooks at the top.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Av. Rating Scale: 1-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encourage reluctant readers</td>
<td>4.32</td>
</tr>
<tr>
<td>Keep a student busy/occupied</td>
<td>4.29</td>
</tr>
<tr>
<td>Develop positive attitudes to reading</td>
<td>4.28</td>
</tr>
<tr>
<td>Encourage talk between students as they read</td>
<td>4.04</td>
</tr>
<tr>
<td>Help poor oral readers</td>
<td>3.80</td>
</tr>
<tr>
<td>Introduce the story to the whole class</td>
<td>3.68</td>
</tr>
<tr>
<td>Provide a model for creative writing activities</td>
<td>3.64</td>
</tr>
<tr>
<td>Encourage the asking of questions while reading</td>
<td>3.56</td>
</tr>
</tbody>
</table>

78
All the goals were rated above the mid-point of the five point scale indicating that teachers considered that electronic books could contribute in some way to all the goals listed.

All respondents were able to provide an answer in part three, which asked how they had used electronic storybooks so far. Table 5.3 gives the strategies actually used by teachers in order of popularity with the most popular listed first.

Table 5.3: Use of electronic storybooks by teachers

<table>
<thead>
<tr>
<th>Electronic storybooks have been used</th>
<th>Number of teachers who have used electronic storybooks this way</th>
</tr>
</thead>
<tbody>
<tr>
<td>• to stimulate story writing, including improving the sentences in the original story, sequencing of sentences from the original</td>
<td>7</td>
</tr>
<tr>
<td>• to motivate/stimulate students</td>
<td>6</td>
</tr>
<tr>
<td>• to facilitate discussion between students as they complete the reading/writing activities using the electronic book</td>
<td>5</td>
</tr>
<tr>
<td>• to introduce the story</td>
<td>5</td>
</tr>
<tr>
<td>• to practise computer skills, for example, using the mouse</td>
<td>5</td>
</tr>
<tr>
<td>• as one of a series of language related activities that the class worked on in rotation</td>
<td>4</td>
</tr>
<tr>
<td>• as part of an English unit of work involving both retelling and writing activities</td>
<td>4</td>
</tr>
<tr>
<td>• specifically to improve reading skills, especially oral reading and vocabulary development</td>
<td>4</td>
</tr>
<tr>
<td>• demonstrate and model multimedia</td>
<td>2</td>
</tr>
<tr>
<td>• as an alternative for ‘free choice’ activities</td>
<td>2</td>
</tr>
<tr>
<td>• to record student work for the teacher</td>
<td>1</td>
</tr>
<tr>
<td>• as a reward</td>
<td>1</td>
</tr>
</tbody>
</table>

Parts two and three of the survey were designed to be complementary in nature producing an insight into how teachers thought electronic books might be used to achieve certain educational goals and then showing how teachers were using them in their classroom. It was anticipated that the responses would be similar, but two interesting discrepancies emerged. Using electronic books as a model for writing activities had the second lowest rating in part two indicating that teachers did not think that electronic books would be useful in this area (compared with the other goals listed). Yet the teachers indicated that this was the most popular way they were using,
them. In contrast, electronic storybooks were seen (in part two) as being very useful to keep a student busy, but few teachers actually used them in that way in their classrooms. These results demonstrated that while a number of possible uses for the software could be identified, only some would be adopted by teachers in their teaching/learning programs. It also confirmed the importance of this preliminary study as a means of informing the teachers in the case studies.

The use of an electronic book to stimulate and motivate students was rated highly in both parts. The use of an electronic book to introduce a story and the use of the strategy of students working together and discussing their work were rated similarly in both parts. The importance of using an electronic book to develop computer skills and their use as one study in a rotation of language learning activities were strategies that only emerged from the open-ended question in part three and hence do not appear in the part two listing. Their popularity as strategies, however, supported their consideration as possible strategies in the case studies.

Part four of the survey looked at how useful the features of an electronic storybook would be in assisting literacy learning. This was a five-point scale where 5 was ‘great use’ and 1 was ‘no use’. The features are listed in Table 5.4 and the average rating given to each feature listed.
Table 5.4 Importance of storybook feature in assisting language learning.

<table>
<thead>
<tr>
<th>Feature of the storybook</th>
<th>Av. Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Illustrations are in colour</td>
<td>4.36</td>
</tr>
<tr>
<td>2. The reader can activate animations by clicking on the pictures or text</td>
<td>4.36</td>
</tr>
<tr>
<td>3. Sounds accompany the action of the story</td>
<td>4.36</td>
</tr>
<tr>
<td>4. The reader can reread individual words/paragraphs</td>
<td>4.20</td>
</tr>
<tr>
<td>5. Animations accompany the computer's reading of the story</td>
<td>4.16</td>
</tr>
<tr>
<td>6. Text is highlighted in meaningful phrases as it is read by the computer</td>
<td>4.16</td>
</tr>
<tr>
<td>7. There is a lively introduction to the story</td>
<td>4.08</td>
</tr>
<tr>
<td>8. The reader can interact with the text to gain:</td>
<td>4.00</td>
</tr>
<tr>
<td>meaning</td>
<td></td>
</tr>
<tr>
<td>9. The reader can interact with the text to gain:</td>
<td></td>
</tr>
<tr>
<td>pronunciation</td>
<td>3.90</td>
</tr>
<tr>
<td>10. There is a musical theme or song associated with the story reading</td>
<td>3.62</td>
</tr>
<tr>
<td>11. The software records which words are reread for later reference by the teacher/student</td>
<td>3.60</td>
</tr>
</tbody>
</table>

Once again, the survey showed a fairly uniform level of importance attached to each of the features mentioned with all the ratings above the mid-point. Only two features stood out as being less important than others namely: the ability of the software to record student (reader) rereadings; and the use of a musical theme. In answering this survey the teachers rated the reader's interaction with the animations accompanying the story more highly than interactions with the text. These results highlighted the contradictory belief underlying the production of electronic storybooks relating to the importance of interacting with the text in contrast to the excitement of interacting with animation and sound. These results also provided a reason for the apparent attractiveness and popularity of the Living Books series, as throughout this software series, the software producers valued increasing motivation and attracting readers more highly than interaction with the text. Such a view is consistent with the teachers ranking the development of reading skills at a lower level than other activities (particularly those relating to motivation) in parts two and three of this survey.
All respondents in part five indicated that electronic books could have a role in helping poor readers. Teachers suggested that electronic books could be used in the following ways and their suggestions are listed in Table 5.5.

Table 5.5: Ways electronic storybooks could be used to help poor readers

<table>
<thead>
<tr>
<th>Strategy to be used</th>
<th>Number of teachers who would use this strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. developing their oral reading skills, sight words, vocabulary development</td>
<td>4</td>
</tr>
<tr>
<td>2. linking pages of the story to their own writing</td>
<td>3</td>
</tr>
<tr>
<td>3. working with partner in language activities based on the electronic book</td>
<td>3</td>
</tr>
<tr>
<td>4. working at their own pace in reading</td>
<td>2</td>
</tr>
<tr>
<td>5. introducing the text/story to the reader</td>
<td>2</td>
</tr>
<tr>
<td>6. relating the print book to the electronic book</td>
<td>1</td>
</tr>
<tr>
<td>7. motivating the students - through the graphics, sound and animations.</td>
<td>1</td>
</tr>
</tbody>
</table>

These activities/experiences were similar in nature to the general classroom uses of electronic storybooks identified in part three with one notable exception. In this part, oral reading skill development was put forward as the most popular way electronic storybooks could help poor readers. Yet in part three only four teachers indicated that they would use electronic storybooks for oral reading development. This difference might be explained by the change in focus of the teachers’ responses in the two parts. Classroom activities (part three) should be suitable for the whole class group (with individuals catered for within that), whereas individual students’ needs would be the prime focus of assistance for poor readers (part five). It was a most challenging task to meet an individual student’s oral reading needs within class-based activities yet teachers here have indicated that by using electronic books they might be able do so.

5.1.2 Implications for this study

It was clear from the data derived from this preliminary study that electronic books have a place in the teaching/learning programs used by teachers in schools. From this survey teachers indicated a variety of ways in which electronic books can and have been used. They have also provided specific ideas on how to use electronic storybooks
with poorer readers. The case study teachers were advised of the importance of the animations within the electronic storybook and of the popularity of the *Living Books* titles. All the teachers in the case studies actually chose *Living Books* titles for their units of work. The teachers were also advised of the discrepancies between parts two and three of the survey which showed that how teachers identify electronic storybooks as useful may contrast with how they choose to use them. All case study teachers indicated a willingness to involve their learners in writing related activities but as a result of this survey, no case study teacher proposed to use electronic storybooks purely as a means of keeping the learners busy or for free time reading.

This preliminary study informed the case study teachers about the opinions and work of other teachers. Of equal importance, however, was the need for some background information relating to the views of the learners and how the learners actually interacted with the electronic storybook. These issues were examined in the second preliminary study.

5.2 Study 2 – Student opinion

The purpose of the second preliminary study was to gain information from students on their opinions about electronic storybooks and to observe how they interacted with the software. Wherever possible the students’ views were sought on the same items as the teachers in the first preliminary study. To provide these data, 11 students from three schools were interviewed.
5.2.1 Results

During the first part of the interview students were asked about their experience with computers, their knowledge of electronic storybooks and their attitudes to reading and writing. Students had varying experience with computers at that time of interview. Eight of the eleven had a computer at home, but only three had one in their classroom. Six of the students visited a computer room at their school as a class group. All liked to play games on the computer. When asked how they would describe their level of skill in using a computer, seven indicated they were pretty good, three indicated average and one indicated a poor level of skill. Much of their opinion of skill level, however, was incorporated in their level of confidence in using the computer, not in a demonstration of what they could do. All except one were enthusiastic in their attitude to using the computer. Previous experience with electronic storybooks was limited. Eight students indicated that they had seen this software before, however, not all had used it themselves. There were a number of advertisements about electronic storybooks on TV at this time that students mentioned they had seen.

Overall the students’ attitudes to reading and writing were positive. As readers, six students rated themselves as very good, three as good, and two as OK. They were less confident when it came to writing stories where only two rated themselves as very good, six as good, two as OK and one was not very good. All students except one indicated a liking for reading books. Eight preferred reading stories to poems if they were given a choice. Eight students indicated that they liked to write stories while the others only sometimes enjoyed it. When asked whether they preferred to read by themselves or with friends, nine indicated that they preferred reading by themselves.
The students were then asked to select two titles to read, one from each series so that they could see the different presentation styles used. Table 5.6 shows which electronic storybooks, from the selection available, were chosen by the students. The choice by the students was made on the storyline or familiarity with the book, not its reading level.

Table 5.6: Student selection of electronic storybook titles

<table>
<thead>
<tr>
<th>Book titles available</th>
<th>Recom. age (years)</th>
<th>No. students selecting this title</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Living Books</em> Series:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Tortoise and the Hare</td>
<td>3-8</td>
<td>4</td>
</tr>
<tr>
<td>Arthur's Teacher Trouble</td>
<td>6-10</td>
<td>4</td>
</tr>
<tr>
<td>New Kid on the Block</td>
<td>6-12</td>
<td>0</td>
</tr>
<tr>
<td>Arthur's Birthday</td>
<td>6-10</td>
<td>0</td>
</tr>
<tr>
<td>Just Grandma and Me</td>
<td>3-8</td>
<td>3</td>
</tr>
<tr>
<td><em>Discs</em> series:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper Bag Princess</td>
<td>5+</td>
<td>2</td>
</tr>
<tr>
<td>Moving Gives Me A Stomach Ache</td>
<td>5+</td>
<td>3</td>
</tr>
<tr>
<td>Tale of Peter Rabbit</td>
<td>4+</td>
<td>2</td>
</tr>
<tr>
<td>Cinderella</td>
<td>9+</td>
<td>0</td>
</tr>
<tr>
<td>A Long Hard Day at the Ranch</td>
<td>5+</td>
<td>2</td>
</tr>
<tr>
<td>Tale of Benjamin Bunny</td>
<td>5+</td>
<td>2</td>
</tr>
</tbody>
</table>

With the titles selected, the students read each of the electronic storybooks. It did not matter in which order this was done. My observations of the students during the reading time are presented in Table 5.7 and highlight the similarities and differences between reactions.
Table 5.7: Observations of students reading electronic storybooks

<table>
<thead>
<tr>
<th>Criteria</th>
<th>When reading the <em>Living Books</em> series</th>
<th>When reading the <em>Discis</em> Books</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach taken by students</td>
<td>all were positive, some were very</td>
<td>not negative or positive - it was</td>
</tr>
<tr>
<td></td>
<td>enthusiastic because they had seen</td>
<td>something they had been asked to</td>
</tr>
<tr>
<td></td>
<td>the TV ad.</td>
<td>do.</td>
</tr>
<tr>
<td>Actions while reading</td>
<td>animated, most were impatient to</td>
<td>all followed the text silently - just</td>
</tr>
<tr>
<td></td>
<td>get to click on the pictures, many</td>
<td>listened, once they discovered how</td>
</tr>
<tr>
<td></td>
<td>laughed at animations, some</td>
<td>to turn the reading off, they read</td>
</tr>
<tr>
<td></td>
<td>followed text and read with it, some</td>
<td>aloud themselves, some followed</td>
</tr>
<tr>
<td></td>
<td>bounced along to the music</td>
<td>the text with the mouse pointer</td>
</tr>
<tr>
<td>Interaction with text or visuals</td>
<td>all students showed lots of</td>
<td>most students did not interact with</td>
</tr>
<tr>
<td></td>
<td>interaction with the pictures, there</td>
<td>either text or visuals unless</td>
</tr>
<tr>
<td></td>
<td>was no text interaction, students</td>
<td>prompted, they were disappointed</td>
</tr>
<tr>
<td></td>
<td>often asked questions out loud like</td>
<td>with the picture interaction as they</td>
</tr>
<tr>
<td></td>
<td>“I wonder what will happen if...?”</td>
<td>only showed names/labels when</td>
</tr>
<tr>
<td></td>
<td>some repeatedly clicked on a</td>
<td>clicked</td>
</tr>
<tr>
<td></td>
<td>particular item to get the animations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>they liked best, some clicked on a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>few objects on each page and then</td>
<td></td>
</tr>
<tr>
<td></td>
<td>went on - others clicked on</td>
<td></td>
</tr>
<tr>
<td></td>
<td>everything until they were sure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nothing else would happen</td>
<td></td>
</tr>
<tr>
<td>Help to operate software</td>
<td>nil required</td>
<td>nil required, except for a student</td>
</tr>
<tr>
<td></td>
<td></td>
<td>wanting to confirm where to click</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to make the reading stop</td>
</tr>
<tr>
<td>Involvement with interviewer</td>
<td>made comments about the story as</td>
<td>commented about the music in</td>
</tr>
<tr>
<td></td>
<td>they went along, asked “Does</td>
<td>background to reading being a</td>
</tr>
<tr>
<td></td>
<td>anything else happen?”; shared</td>
<td>distraction</td>
</tr>
<tr>
<td></td>
<td>enjoyment</td>
<td></td>
</tr>
</tbody>
</table>

After the students had finished with both electronic storybooks they were asked to rate certain features of electronic books in a similar way to the teachers in Preliminary Study One. The question, however, was phrased in such a way as to ask students how important it would be to have this feature if they were creating their own electronic book. Sound, animation and an interesting introduction seem to be the prime features wanted though little difference in rating was seen except for a much lower rating for picture with the text. Table 5.8 lists the features in descending order.
Table 5.8: Rating given to electronic storybook features by students

<table>
<thead>
<tr>
<th>Feature of electronic storybook</th>
<th>Av. Rating Scale: 1-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. There are sound effects accompanying reading</td>
<td>4.64</td>
</tr>
<tr>
<td>2. Book has an exciting opening/introduction</td>
<td>4.55</td>
</tr>
<tr>
<td>3. There are animations while reading</td>
<td>4.55</td>
</tr>
<tr>
<td>4. The text is read aloud</td>
<td>4.36</td>
</tr>
<tr>
<td>5. It is possible to click on words to get their meaning or hear them be read again</td>
<td>4.36</td>
</tr>
<tr>
<td>6. It is possible to click on pictures/text to see extra animations</td>
<td>4.36</td>
</tr>
<tr>
<td>7. There are pictures with the text</td>
<td>3.55</td>
</tr>
</tbody>
</table>

The last question of the interview asked students to recommend some uses for electronic books in lessons, but this question proved to be exceedingly difficult for the students to answer. They seemed to have little knowledge of who made decisions about what went on in classrooms. Most responded with “I don’t know” and/or proceeded to tell me how the software could be improved for them to use. Their suggestions ranged from small improvements in sound and graphics through to major changes like incorporating writing activities or letting the reader change the story. They all agreed, however, that they would like to use the software in their classes.

5.2.2 Implications for this study:

The results from the second preliminary study showed similarity with those from the first study in that they support the idea that the sound and animations provide an attraction for the students. The students’ preference for the Living Books series was obvious in their enthusiasm, body language and level of talk, all of which increased with the reading of those titles. Their attitude to the Discis titles was perhaps epitomised by the girl who began plaiting her hair as she listened to the story - showing a low level of interaction with the task. The observed behaviour raised the interesting question once again of the importance of the text interaction by students and how their attention could or should be drawn to this interactivity.
In general, the students were interested in the story line of the *Living Books* and the action that happened within the story. No students showed any interest in the text of any story except to show impatience (because no animations occurred while the reading was going on) or to wish the reading could be turned off. It could be hypothesised that this phenomenon may be due to the fact that none of the students were poor readers and hence did not need help reading the text. To explore this concept further, during the case studies, the poorer readers were carefully observed to see what use they made of the text interaction possibilities.

An interesting difference was also highlighted between the importance the interviewed students attached to having text interaction (rereading, word meanings) available in the electronic book and the use they actually made of it while reading the book themselves. Many students commented that they considered the books would help younger, weaker readers and that those students would need the text interaction, that being the reason they rated it highly. Older, better readers (like themselves) would not need this interaction. The students rated the need for a good introduction to the book much more highly than the teachers did, though both rated sound, reading aloud and animations as important. The low rating for the *pictures with text* given by the students, can be explained, in part, by their association of pictures with an absence of animations (as were presented in the *Discis* titles). Pictures that did something (that is, animations) were seen as more relevant than pictures that were not animated.

The sample of students interviewed showed a range of abilities both in reading and computer use close to what one might expect to find in a regular classroom. The students showed that they were attracted to and interested in using electronic books as
a piece of software. Their interest was only sustained, however, if the books were interesting to use and provided something more than the traditional paper versions. The titles without animation or action of some kind held little interest. Many finished reading the book through once fairly quickly and wanted to move on to the next one. This reaction demonstrated that the software by itself would not sustain interest or be a worthwhile addition to teaching and learning activities unless it was integrated with related activities (probably both on and off computer). In other words there was little to be gained in setting a classroom activity that just involved the learner sitting and reading the electronic storybook as this activity would interest them for only a short time.

5.3 Conclusion

The conclusions drawn from both of the preliminary studies provided essential background information for the case study teachers when preparing their units of work. Given the limited range of titles available, teachers were likely to secure greater motivation and interest from using the Living Books series or similar titles rather than the Discis or similar ones, because students showed little interest in text on screen. The students liked to interact with the story line and practise their prediction skills using the animations in the story. Therefore activities incorporating these activities would be worthwhile. If the teachers wished to focus on the text of the story they would need to make a specific point of doing so in the on or off computer activities within the unit of work. There was a desire to share the reading when Living Books were used, which could help teachers work with scarce resources and encourage students to work in pairs. Both the teachers and students in the preliminary studies felt that the poorer readers in the class would benefit from the reread function of the
electronic book, particularly if a task relating to oral reading was incorporated into the unit of work. Such information contributed greatly to the selection of suitable teaching learning activities for each of the units of work in the case studies. It provided the teachers with a basis for decisions made and allowed them to avoid some possible pitfalls, for example, using the electronic storybook in a reading function only.
Chapter 6: Case Studies

Teachers wanting to try out a new strategy or resource in their teaching are often reassured and informed by the work of other teachers. These case studies provide rich data for other teachers thinking of introducing technology whether their prime area of concern is pedagogy, organisation or management. In each case study background information is provided to set the scene and details of the implementation of the unit of work are given combined with the reflections of the teacher and researcher.

6.1 Introduction

Using the results from the preliminary studies I explored, with the assistance of the three volunteer primary teachers, how electronic storybooks could be incorporated into a classroom based unit of work. A Year 2, Year 3 and a composite Year 3/4 classroom were studied. Two of the schools were based on the Central Coast and one in the northern suburbs of Sydney. Each of the teachers developed and taught a unit of work, which used electronic storybooks as stimulus material. During the implementation of the unit of work the teachers and I identified those factors that contributed to the success of the unit and, in particular, the implications for pedagogy, organisation and management. At the conclusion of the unit we reflected upon the recommendations we would give to other teachers concerning the use of electronic storybooks.

While the teachers approached this task in their own unique ways, all followed the basic action research format of: planning, implementing, observing, reflecting and then planning future action (Schmuck, 1998). In the planning stage the teachers took
into account the syllabus requirements of English K-6\(^2\) and the need to consider students' learning outcomes in their programming. Suggestions and ideas from the teachers' own experiences and professional reading about literacy learning provided guidance as to how literature, in this case in the form of an electronic storybook, could be used successfully. The teachers also used the information from the two preliminary studies to give them ideas about which activities might be useful and worthwhile. Their own experiences with computers and the class' access to the technology also influenced the implementation plans for the unit of work. All teachers had a preferred way of organizing their classroom and began their preparation of the unit of work in that way. Two teachers, however, moved away from their previous method, and took the opportunity to try out an alternate way of organizing their class work (one using a contract and the other a work booklet). The necessary resources (especially technology ones) were put in place and materials prepared prior to commencement.

Once developed, the units of work were implemented enthusiastically. The teachers provided students with an overview of the whole unit and provided an explanation for my presence in the classroom. Some teachers had to conform to a school-wide approach, for example, two teachers had an assessment policy set by the school, while in other areas the teachers were free to devise their own approaches. The teachers were interested in a range of outcomes including knowledge, skill and attitudes relating to the content of the book, literacy and classroom learning behaviour. All the units of work were designed and implemented in terms three and four of 1995. Each unit was planned for a five-week block of time with varying amounts of lesson time devoted to the unit each week. All the teachers initially expressed concern about the length of

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\(^2\) The English K-6 document is provided by the NSW Department of Education to detail the curriculum requirements for English in NSW primary schools.
time the unit of work would run, and the possibility that little change would be visible in student outcomes. Nevertheless, each unit of work was felt to contribute to the overall learning of the students during the year.

The teachers completed the observation stage of action research by collecting relevant data. All teachers used a form of portfolio to record student work. They also made their own notes and observations of student progress and behaviour as the unit progressed. I conducted open-ended interviews with students as they worked on the computer and made observations based on the data from the second preliminary study. Two of the teachers conducted surveys in class to gather student opinion on the work they were doing. As these teachers were part of this research project they were more acutely aware of the need to monitor not only what was going on in the classroom but to record and act on their reflections. To assist with that process, there were ongoing short monitoring sessions with each teacher during the implementation of the unit of work, to reflect on progress each lesson. An extended interview was held before and after the unit was conducted to specifically assist with the planning and reflecting stages of the action research cycle.

After the interview at the conclusion of the implementation the teachers reviewed the data collected and each teacher prepared a written report. This report included the goals for the unit, the program of work, evidence of achievement of goals and student progress. The report also contained advice for other teachers seeking to use electronic storybooks and what this teacher would change if they implemented such a unit of work again. These reports have been incorporated into chapters six and seven.
The aim for the teachers was to have a successful unit incorporating electronic storybooks. They defined that success in the context of the other units of work they had conducted and in terms of how this unit fitted in with the year-long program they were following. Advances in student learning were less finely defined and in most cases this was done in comparison with demonstrated competence in certain areas, for example, writing, during other units of work. The time available to me to work with these teachers was insufficient to monitor long-term application of the results of the unit of work. One teacher, however, was able to design and conduct a second unit of work with a different style of electronic storybook in order to carry her own investigations further.

In presenting each of these case studies a similar format has been used. Background information is provided in each case to set the classroom context. The second section looks closely at the implementation stage and the data collected by the teacher. Issues relating to pedagogy, organisation and management in each classroom are highlighted. The third section encompasses the reflecting stage of action research in which the teacher and I reviewed what had occurred, considered possible improvements, and identified some conclusions about working with electronic storybooks in classrooms.

6.2 Case Study - Eagle’s Nest Primary School

6.2.1 Background

Eagle’s Nest Primary School is sited on a hilltop surrounded by deep fertile valleys on the Central Coast of NSW. It sits in the “v” between two roads one of which has become a major arterial road for the Central Coast. Just as eagles often nest in precarious places, so also does this school. Accessing it, particularly at the start and
end of the day is fraught with danger. Students, parents, teachers, buses and cars all compete for the very limited off-road areas. After surviving this ‘peak hour’ experience once, I made sure I visited the school during the school day rather than at the beginning or the end of the day.

The school has well-established gardens including mature eucalypt trees. Classroom buildings are well-maintained wooden weatherboard, each with a wide veranda and painted the education department cream. Each block of rooms contains either two or four classrooms with hat racks and racks for bags outside each room. With an enrolment of approximately 350 students, there are two classes in most grades usually located within the same block. The school sign is located on the boundary next to the main entry path and by following it into the school I experienced some disappointment, as it led to a modern brick administrative building containing the school administration area, canteen and staff room. The contrast between this new block and the older classrooms is striking, and I wondered which would dominate – the busy, modern up-to-date aspect or the trees, buildings and friendliness of a past era? I need not have worried, as within the new building I experienced a culture of encouragement and cooperation. The weekly staff meetings I attended were characterised by lots of laughter and personal exchanges indicating camaraderie amongst the staff.

Out in the playground the students’ daily exercise routine, done to the sound of modern music, was led each time by a different staff member. Students concentrated carefully to make sure they were in time with the music. One teacher, Helen, had taught Year 2 for many years and obviously knew all the exercise routines! On my
first visit, I met her at the exercise area and walked with her class across the asphalt playground, between the buildings, under the eucalypt trees, up the wooden stairs and on to the veranda of her room. What a wonderful noise 30 pairs of feet can make on a timber floor. There was no opportunity for anyone to creep past the room without someone hearing you and so I never managed to arrive at the classroom unexpectedly no matter how quietly I walked.

The classroom is crowded but shows evidence of industry and application by the students. Posters, projects, banners and signs are attached to the walls and windows to showcase student effort in past activities. A series of string lines criss-cross the classroom with everyone’s most recent art-work pegged to them. Navigating the classroom became a challenging exercise as I quickly discovered the drawbacks of being considerably taller than either the students or the teacher. The desks are small and wooden and are arranged in groups of eight. The chairs are yellow and plastic. The teacher’s desk is near the blackboard at the front of the room close to the windows. It overflows with spare paper, pens, and other materials. Paper resources are rationed in the school so there was a large supply of used computer paper available at the front of the room as working/scrap paper for students. The floor is carpeted in a peaceful dark green with a space created near the blackboard for the students to sit comfortably on the floor. Students’ day-to-day work is stored under their tables while their bags are left on the shelves on the veranda.

The room seemed hardly big enough for the 18 girls and 12 boys who are members of this mixed ability class. Many of the students come from homes where a language other than English is spoken but very few were born outside Australia. Ten students
are experiencing difficulties with reading and require constant motivation to keep on
task. In contrast another ten students are excellent readers, good at expressing
themselves and always approach the class with enjoyment and enthusiasm.

It took a while to find the computers in the room. Eventually down the back under the
big windows I found two computers set up so that two students could sit at each one.
The school’s total computing resources are spread out with each classroom having its
own computer, but for this unit of work Helen had borrowed a computer from the
other Year 2 class thus reducing the available working space in her classroom. There
were lots of good-natured comments about whose turn it was and when to ‘turn the
page’ as work was completed at the computer. Keyboards were held on laps and the
mouse was used on the desk area immediately in front of the screen by whomever was
‘chief in charge’ for that time. A change of persons using the computer usually
resulted in a Year 2 version of musical chairs with the possibility of all the
surrounding students being disrupted. Even so, disruption was kept to a minimum.
Enticing students to use the computer, however, is never a problem as just over half of
them have a computer at home.

As the students enter the room to begin their lessons, work is retrieved from bags and
drawers, groups are identified and seats claimed. Greetings exchanged with Helen and
each other reflect the willingness of all the students to start work. Excitement greets
the news that computer work is to be included and delight is visible on the faces of the
students who have first turn. A small group of students join Helen for work at the front
of the room and the rest continue with their booklet work at their desks. For a short
while peace descends, then a voice asks, “Is it my turn on the computer yet?”
6.2.2 Implementation of the unit of work

In implementing the unit of work Helen addressed pedagogy, organisation and management issues in general terms and in relation to her class specifically.

Pedagogy issues

Helen’s beliefs about learning are reflected in her selection of a specific approach, the 4MAT approach to learning, to construct her unit of work (McCarthy, 1990). This approach was used across the school as a matter of policy following in-servicing of staff in the early 1990’s. The way in which Helen interpreted this approach aligned her towards the constructivist approach, described by Sandholtz, Ringstaff and Dwyer (1997). Her orientation to the constructivist approach was also seen in her undertaking of a variety of roles as the teacher and in her presentation of the unit of work in a way that accessed all the domains of learning: psychomotor, affective and cognitive. Helen chose to use the electronic storybook Ruff’s Bone from the Living Books series as the focus of an integrated unit. She based her teaching/learning activities across all the Key Learning Areas (KLAs) whenever possible and was able to include all areas in this unit. The theme of Pets was chosen because of the students’ interest and enthusiasm for anything related to animals. It was also a topic that ensured all students could participate in discussions.

The teaching/learning program, presented as a 4MAT diagram (Appendix 3), shows the planned structure of the unit of work and Helen’s role within it. The focus questions for the unit - which in this case were: What is a pet? What are their needs? - were in the centre. The four quadrants show, in turn, working out what the learners
already know about the focus questions, identifying what extra things need to be known and teaching them, practical applications of the learning and then reflecting upon and extending that learning. As the teacher, Helen’s role changed from motivator/witness to direct teacher to coach/facilitator then to evaluator/remediator.

From this plan for the unit the reality of selecting appropriate teaching strategies was undertaken. Helen specified and grouped the learning outcomes she considered relevant to this unit and the specific learning needs of her class.

The outcomes relating to technology use were:

- The teacher and students would use the computer productively
- Students would learn the mechanics of the CD program and the computer
- Students would be able to use the CD-ROM computer individually with confidence

The outcomes relating to literacy were:

- Students would approach reading lesson time with enthusiasm
- Students would improve comprehension - particularly recall of story and sequencing
- Students imagination would be inspired - orally, pictures, stories

Others outcomes addressed included:

- Students would have increased knowledge about PETS
- There would be motivation to complete “Pet Book” class activity

The outcomes relating to technology were included because the unit contained the electronic storybook and each student in the class would need to use the computer to access this technology. The outcomes relating to literacy reflect different concerns.
The first indicated that all learners in the class did not enthusiastically receive reading lessons, but that Helen believed that a positive attitude to reading was important. The second literacy outcome specified the literacy skill focus for the unit and the third outcome showed Helen was seeking to use the electronic storybook as a stimulus for learning in other areas.

Meeting the final outcome relating to the Pet workbook was, I believe, one of the challenges of the unit. The length of time each student could work quietly and independently of the teacher varied. Helen had been working on this issue all year. She reported that enormous improvements in the length of time the students could work independently had been made, but there were still a few students for whom this was a real issue as they were, at times, disrupting the learning of others. Helen was disappointed that she could not secure some parental help during this unit as the parents had been of considerable help with some students earlier in the year. For this unit, therefore, Helen decided to use a strategy whereby she prepared the core activities for this unit and presented them to the students as a book, the Pet workbook.

Helen had wanted to use this approach previously but had been restricted by the limited paper available to each class and she appreciated my offer to supply enough paper to create the books. The benefit of this approach was that it allowed her to provide a combination of types of activities, and extra work for the more capable students, within the one format. In addition, the students had a good overview of the unit and a definite indication of completion, allowing them to understand how their learning was progressing. This approach, however, meant that there was little if any opportunity to change the ideas once the unit had started. The activities included
within this book proved to be both relevant and suitable but broad enough to encompass potential changes as the unit progressed.

*Organisation issues*

Within this unit Helen adopted an informal approach making use of many of the features of open learning. She provided a variety of learning activities for students who could work individually, in pairs or in a larger group with her. There were many child-centred activities using a variety of materials both in class and for homework. Each day Helen incorporated a formal learning situation for groups on a rotation basis with the students sitting on the floor away from their desks.

Dividing the class into three reading ability groups was necessary to make the unit work successfully. These groups rotated around three activities each session. These activities included the on-computer activity, the Pet workbook activity and the teacher led activity. Pairs of students were able to explore the electronic book at other designated times throughout the day. Students understood each of the tasks they were to do as individuals and the work they were to complete on the computer in pairs. Signs of impatience were only visible when students were waiting for their turn on the computer. It seemed to them as if the group before them had had too much time on the computer!

This unit provided a time for individualised help with oral reading for the weaker readers allowing them to access the support of the electronic storybook without embarrassment. Many made use of this facility, not only during their reading of the electronic book, but particularly when they knew they had to read a page aloud.
Students could be heard comparing their pronunciation of a particular word with the computer version over and over until they were happy with it. The American accent in the electronic book was not a problem as the students did not mimic the accent in their own oral reading.

Management issues

The unit was designed to run for two 90 minute sessions each week over a period of five weeks. During each week there were two formally scheduled times for completing the unit (Monday and Friday). On other days, when time permitted, students could return to the computer and Pet workbook. This extra time on the computer was essential to ensure that all students had sufficient time with the electronic book.

The classroom climate was friendly and positive with students anxious to be on task. The students asked Helen for help when they needed it without hesitation and enthusiastically joined Helen at the front of the room to participate in the teacher led activities. These activities were very different to the ones in the Pet workbook and often required movement and conversation, much to the students’ delight.

Helen had well-established routines for her classroom. I often missed the signals that called a particular group of the students to the floor at the front to complete the activities with Helen. The movement of a group from their tables all at once told me that they were involved. The limited space in the room had also forced Helen to develop routines for packing things up at the end of lessons with the students seeming to know exactly which nook, cranny, shelf, cupboard or piece of floor was to hold the item they were responsible for putting away.
During the course of the unit of work I saw little need for corrective discipline measures. Helen engaged extensively in preventative discipline by ensuring class time was worthwhile and enjoyable, by having a variety of activities, and by monitoring carefully where each student and group of students were up to. She was unerring in her knowledge of how long a pair had been on the computer (often a cause for dispute) and which students were next. Helen made extensive use of eye contact, pauses in mid-sentence, non-verbal signals and speaking quietly to individual students as part of her supportive discipline strategies. She was often hidden from general sight in the classroom as she knelt down next to a student to talk to them eye to eye. This supposed ‘out of sight’ position in no way changed the ethos of the class as they were all actively engaged in their work and did not need the ‘eye’ of the teacher for good behaviour to be evident.

Helen managed the limited technology resources efficiently. The class only had one computer but it was possible to borrow another computer for the two 90 minute sessions from the other Year 2 class. By allowing students to work on the computer at other times during the week she ensured all students were able to access the computer for the necessary amount of time. The students made good use of the time to complete their tasks as the 20 minutes for each pair did not allow for any time wasting.

The movement of students from task to task and around the room had been identified as a problem earlier in the year and Helen used this unit to monitor everyone’s progress. The students demonstrated that they had learnt the basics of good classroom participation. They moved quickly and quietly to and from the computers (in as far as
musical chairs is ever quiet!), shared the mouse willingly (with one exception), and continued on with their off-computer activities with little prompting.

The students wanted to know what to do on the computer and when it would be their turn. They therefore listened carefully (and remembered) the written tasks. A couple of students who had difficulty with a sequence of instructions were happy to ask for assistance when needed in order to complete their work. Throughout the week tasks were completed in pairs successfully, with little help from the teacher.

6.2.3 Reflections on the unit of work

In line with the action research approach, time was taken to reflect on all aspects of the implementation of the unit of work and to consider recommendations for future action. In terms of the goals relating to using the electronic storybook technology, I surveyed the class concerning their views on the use of the electronic storybook and collected the following data. All students indicated they enjoyed working on the computer, however, only half said they enjoyed the story *Ruff’s Bone*. In fact, four nominated other animal stories they had enjoyed more and would have preferred to see as electronic storybooks. When asked if they would prefer to use the book in its original form or on the computer, 21 out of 30 favoured the computer-based book, seven definitely preferred the paper-based option and two said it did not matter. The only other electronic storybooks the students were familiar with were *The Tortoise and the Hare* (known by five students), *Just Grandma and Me* (known by two students) and *Arthur’s Teacher Trouble* (known by one student).
The second computer borrowed for the unit was an essential component. It would have been impossible for each student to have had enough turns on the computer otherwise and the unit would have gone on for far too long, risking a loss of interest and quality of work. Helen indicated that when there was only a limited number of computers in the room, their use had to be integrated with the work given in class for progressive learning to take place and for the computer based learning to be monitored by the teacher.

The students were able to handle the basic mechanics of the computer and as lessons continued they became more efficient and knowledgeable. During terms one and two very little computer work was done because the students had shown they were not co-operative about getting any tasks done successfully. At the beginning of term three, all the computers in the school were brought together for three weeks into a room set up as a computer laboratory. By accessing this room Helen was able to give all the students some lessons to cover the basic skills as a valuable prelude to this unit. As a follow up to this unit Helen felt confident other electronic storybooks could be added to the collection of books used in reading times. Helen and her class explored this option later in term 4 when they made use of the electronic storybook *The Paper Bag Princess* in novel study unit.

In terms of the goals relating to literacy, the students were keen and interested to complete the activities well. The motivation of the electronic storybook led the students (especially the boys) to work individually, in pairs and in groups more co-operatively than Helen had previously seen. On some occasions I sat with the students
at the computer and found this also had a beneficial effect on the quality of work done. It reinforced Helen’s expressed need to enlist parent helpers for the task in the future.

The students’ interest was definitely captured by the electronic book as they remembered accurately what had happened throughout the story. The poorer readers demonstrated their knowledge when, after one turn on the computer, they read the 12 sentences (on cards) created by Helen, sequenced the cards correctly first time without the aid of the book, and then read the sentences correctly orally. This recall was more accurate from using the CD version as Helen indicated with paper-based books in other units of work, it had taken more readings and a longer time to complete the activity. The speed of recollection of the story amazed both of us, as we had not expected the sequencing activity to be completed so fast or so accurately.

Towards the end of the unit, I asked each student to read their favourite page of the electronic book out aloud. When students could not read a word, or were unsure, they were happy to select the word and have the computer read it for them. Nine of the 30 students repeated the word after the computer and continued reading. This interaction was the only time, after the initial reading, that any students showed interest in the text of the story. The better readers often commented, in the same way as the students in preliminary study two, that they wished the electronic book had an option to turn off the reading so they could get on with interacting with it.

After having experienced working in a computer room prior to this unit, Helen felt that the use of a computer room at allocated times would have been worthwhile for the students as she could help and monitor their progress with the electronic storybook
better. The use of a computer in the classroom, however, was still able to improve the quality of the learning and stimulate the student’s desire to read. Helen observed that for the students identified as in need of help, reading had become a pleasurable activity rather than a continual struggle.

Another activity that centred in the visual arts area required the students to create a new page for the electronic book *Ruff’s Bone*. While using the computer the students discovered that “extra special” things happened if they managed to click on the bone belonging to Ruff (There were often up to 100 bones on a page). The bone was sometimes hidden and sometimes in plain sight, but clues were given if they followed the story. In creating their pages the students applied this knowledge rigorously and took exceptional pleasure if Helen or I could not find all the hidden bones on the pages displayed around the room. Some healthy competition was observed between students as they created and tested out their page.

In terms of the other goals, the students’ increased knowledge about pets was demonstrated in two ways. Firstly, it was demonstrated through the project set for homework that was completed by all the students. They were given a choice of topic and specific tasks to be completed within each topic, which allowed them to complete the work using their preferred learning style. The finished product varied from books to large posters. Many students took the opportunity to show family photographs, particularly if their pets were included. Some even took special photographs of their pets (especially their feet) for this project. Helen was particularly satisfied with the excellent completion rate (for some students this was one of the few pieces of homework completed that year) and the high level of involvement, creativity and work
that went into them. Secondly, the time for the unit was extended to ensure that all students had the opportunity to complete the Pet Book. Helen also provided activities for students to synthesise their knowledge and apply it in new situations. As a final task for the unit, the students constructed a concept map to show their knowledge about animals in general and pets in particular.

In conducting this unit Helen was particularly interested in the reaction of her students to the use of the PET book and the activities she had devised. Table 6.1 presents Helen’s specific comments about and reflections on the students’ achievement on and attitude to the different activities in the PET workbook.

<table>
<thead>
<tr>
<th>Page</th>
<th>Comments by Helen on student work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions for discussion</td>
<td>Students were keen and interested. Those who had pets passed on their knowledge to those who did not. The teacher was happy with the conclusions the class arrived at.</td>
</tr>
<tr>
<td>Word snail</td>
<td>The whole class suggested words, which were written on cards and the students read and selected the ones they wanted, before copying them into their snail.</td>
</tr>
<tr>
<td>Senses</td>
<td>Some students had difficulty with this activity because the correlation between people and animals as living beings was not made. This concept will need further development.</td>
</tr>
<tr>
<td>Graph</td>
<td>This built on skills learnt earlier in Maths and was easily completed.</td>
</tr>
<tr>
<td>Map of pet shop</td>
<td>Some students made a small attempt but as it was the first mapping activity done, it needed more teacher direction.</td>
</tr>
<tr>
<td>Computer page (covering basic operating skills)</td>
<td>Students needed time on the computer to complete this and very few found the time during this unit to specifically work on this page. Many did it from memory demonstrating how quickly the students learnt to use the software.</td>
</tr>
<tr>
<td>Time line - showing how to look after a pet during one day</td>
<td>This was completed by students with minimal teacher direction. There has been a small amount of practice in Maths but the concept of 1/2 past was still to develop in some students.</td>
</tr>
<tr>
<td>Riddles</td>
<td>These were enjoyed and most were done correctly.</td>
</tr>
<tr>
<td>Poem</td>
<td>Students preferred to copy poems from the board rather than create their own.</td>
</tr>
</tbody>
</table>

Helen also conducted a survey of student attitudes to the activities provided in the stencil book to determine the most popular activities and those activities the majority of students enjoyed working on. The survey showed that students had a definite preference for the activities that required the use of imagination coupled with
knowledge, story writing, and creating riddles. While no one claimed the maths related pages as their favourite ones a large majority said they enjoyed doing them. While there were fewer who enjoyed the more language orientated pages there were at least some who nominated them as their favourite. No one liked or enjoyed the timeline page though it was completed with little teacher assistance.

The sustained effort the students showed through each of the 90-minute sessions surprised both Helen and myself. We believed the students stayed on task because of the management strategies Helen employed. At any one time students were either working on the computer or waiting for their computer turn and completing designated activities in their workbooks. Helen, at times, also took a small group away from their desks for oral activities and games. In all, the unit took six weeks to complete which was longer than planned, but the students remained keen and interested to the end.

Helen indicated that she would reuse the workbook strategy again based on her experiences in this unit. She, however, would not include activities that involved ‘first time’ learning for the students, but she would include more time for some teacher directed activities, perhaps by having everyone complete a certain page at the same time. The workbook proved to be a good vehicle to revise and reinforce knowledge and skills from other units of work.

Helen’s class took the opportunity during my last visit to make some suggestions to me as to how electronic storybooks could be improved. The suggestions the students made reflected a broad view of what an electronic storybook should do and the type of
responses they, as readers, should be able to engage in. As a group they felt that students should be able to:

- move characters around on the screen;
- add their own illustrations to a page of text;
- add chapters to continue the story, for example, to show Ruff searching for his bone in a car or motorbike;
- write their own story to go with the illustrations; and
- use the book to make their own movie.

Helen agreed to incorporate some of these activities into her next electronic storybook unit. The students were very pleased to be told that most of their suggestions have been incorporated into the electronic storybook series called *WiggleWorks* (which was released shortly after this unit was completed). They assured me they were looking forward to reading those stories and working with them in their class!

### 6.3 Case study – Parkland Primary School

#### 6.3.1 Background

Parkland Primary School is located away from main roads in the midst of well-established homes and gardens on the upper north shore of Sydney. The traffic noise from the nearby Pacific Highway fades into the silence the closer you get. The school seems to merge with its surroundings down the side of a hill. The school buildings are a mixture of brick and weatherboard with each building containing two classrooms and they are arranged in a staggered formation down the hillside almost like leaves on a bush. The grounds are grassed with occasional well-established trees. Concrete paths lead down to each building from the main concrete playground with an administration area at the top of the hill.
There is a flurry of activity in the school on the day I arrive for my first visit. It is Education Week Open Day, and parents and visitors are crowded into the main playground area to celebrate the students’ work. The main administrative area is busy with students and staff working cooperatively to ensure the celebrations go off without any problems. The students take pride in their school and welcome visitors. Two uniformed students, identifying me as a slightly bewildered visitor, quickly rescued me from the parental fray. During our subsequent conversation, I learnt of the special activities for the day as the students cheerfully escort me to the main office building. I accepted an invitation to join the audience for the speeches and presentations being made.

My interest in their school delights my proud student guides who proceed to ensure that I know ‘everything’ about their school. They tell me that the total enrolment of the school is approximately 375 students. Many of the students, however, leave the school after Year 2 or Year 4 to attend nearby private schools. In general, the students come from middle to upper class families with a very small percentage of non-English speaking background students. The parents are supportive and are actively involved in classroom activities in K-2 classes but are far less involved in the older students’ classrooms. The school has a very stable and traditional feel to it, reminding me of the primary school I attended as a child. The teaching staff is very experienced and staff changes are most often the result of retirements rather than transfers.

There are two classes to each grade and these are formed as parallel classes wherever possible. The Year 3 classroom to which I am taken, is on the right in a block of two
about half-way down the hill. Some of the class waited for us in the room and others joined us as they completed their contributions to the day’s activities. All the students have a clear idea of their role in the school’s activities and are aware of their responsibility to complete class activities as well. Interaction between the teacher, Nina, and her students is very positive. Nina’s lessons are organised to a well-established plan and she is definitely the person in charge. In turn, her students are confident and happy to work within that familiar plan.

The classroom is very tidy and spacious and it easily houses the 24 Year 3 students. There are bright colours everywhere, from the blue of the carpet, the red of the chairs, the multicoloured curtains to the displayed student work. Inside the doorway there is a large open space devoid of chairs or tables covering almost one quarter of the room. This space allows Nina to work with the whole class as she gives instructions or sit in a circle for class discussions. Each person’s turn to speak is determined by possession of the small beanbag or ball, which is thrown or rolled to the next person. This mix of traditional structures/rules and the ‘fun’ of passing the bean bag or ball is typical of this classroom. The blackboard is prepared daily with work for the class clearly listed in neat writing and clearly shows the time to be taken for each task.

Students complete their class work sitting at small tables arranged in different formations around the room. Students doing individual work often sit by themselves but then move to a new seat to participate in a group activity. The main priority is that work is completed in the most appropriate physical situation. The room contains only one computer that is set up at the centre back of the room with space for at least four students to sit around it comfortably. I was surprised that only one computer was
available and wondered what priority the use of technology would have amongst the range of learning activities available to the students in this class. The majority of the class are high achievers and three students with significant learning difficulties have been integrated into the class. This range of abilities results in a very challenging mix of learners and the opportunity to explore a wide variety of learning outcomes.

The class engaged in activities relating to music, art and craft extensively. The students always composed songs relating to the unit of work they were completing and took great pleasure in performing these for their visitors. Any visitor to the classroom was expected to participate in the learning activities including sitting in the circle for class discussions and catching and throwing the beanbag during a spelling game. On a later visit I was co-opted into being the judge of the models of birthday cakes the students had created – including the testing of the one set up to play “spin-the-bottle” in line with the illustration in the storybook.

6.3.2 Implementation of the unit of work

In implementing the unit of work Nina had to address pedagogy, organisation and management issues in general terms and in relation to her class specifically. Nina chose not to change the way she conducted her classroom, making only those changes necessary to include the electronic storybook.

Pedagogy issues

I found it difficult to clearly identify Nina’s beliefs about teaching as she seemed to have adopted parts of many different theories. Her work lies the closest to the ‘instruction’ view rather than the construction view (Sandholtz et al, 1997, p. 14)
when compared to the other case study teachers. Nina’s teaching demonstrates Gagne’s (1987) conditions of learning model in that his structure of instructional events (gain attention, state goals, stimulate recall, present in all modalities, provide meaningful frameworks, monitor and adjust, require application, closure) matched most closely how Nina constructed the parts of her teaching/learning program where she was the focus. While Nina recognized the need to promote problem solving, cooperation, communication and critical thinking, I did not, however, see support for students being in control of their own learning or that anyone other than Nina determined what work would go on in the learning environment.

Nina chose to introduce the electronic book unit to provide support for one of the previous unit’s themes, namely ‘friends’, and to lead into the final theme for the year of ‘celebrations’. This selection meant that the unit would not be a stand-alone presentation but would draw heavily on concepts and ideas already introduced. To cater for the high achievers the unit needed many different activities with some challenging options included. At the same time these activities had to be ones the students could sustain work on despite interruptions from outside the classroom and limited access to the computer. As with her other units of work Nina made sure that the students with learning difficulties were able to demonstrate their progress towards achieving the outcomes of the unit.

Nina used a whole language approach (Weaver, 1994) for teaching language and this could be seen in the range of language based activities planned for this unit. This wide range included read-a-long, silent and oral reading, discussions, writing, listening, spelling, and thinking skills. The language-based activities were supplemented by
music, art and craft activities related to the electronic book. The unit of work covered a number of KLAs in terms of the experiences undertaken by the students but it was primarily a focus on the novel, or electronic storybook, and literacy that formed its base. Significant time was spent reading and discussing the text with the strategies and skills work done in the context of the unit. There was an emphasis on individual growth as a reader and learner through an ongoing process of reflection and demonstration of learning.

In articulating her rationale for this unit of work, Nina indicated that in the previous unit of work the class had studied the novel “Melanie and the Midnight Animal” by Gillian Rubenstei. The themes of that novel were ‘fear’ and ‘friends’ but the reading level was quite challenging for most of the students so some less difficult books with similar themes were used to supplement the main novel. The themes were then further developed with extensive language work. To follow that novel study, Arthur’s Birthday electronic storybook was chosen as it had the ‘friends’ theme, allowing for more extensive work in that area, and it had the additional benefit of a ‘celebration’ theme that tied in with Christmas activities at the end of the year. Nina thus provided a strong connectedness between the units of work undertaken in the latter part of 1995.

In setting the goals for the unit Nina covered all three domains (psychomotor, affective, and cognitive). It was intended that the students would:

- maintain a high level of interest in the unit by using the electronic storybook;
- develop co-operative learning skills through group work experiences;
- use various thinking skills to participate in class discussions;
• continue to develop their literacy skills;
• appreciate the value of friends and of being a friend; and
• create a presentation related to the unit to demonstrate their skill in art, craft and design.

All except the first two of these goals related to consolidating work done in the previous unit. There were no specific goals related to computing skill as Nina considered her students to be competent users of the classroom computer.

Nina’s teaching program consisted of a series of learning activities (Appendix 4) that were to be completed by the class over four weeks, in order to provide a number of opportunities for the students to demonstrate achievement of the goals. Activities were completed as a class group, as individuals and as a member of a pair or group of four. A close look at the nature of the activities and their purpose revealed further insights into the pedagogy used. Of the 19 activities listed only five involved the students interacting directly with the electronic storybook. All 19 activities, however, were related directly to the narrative of the electronic storybook. Class discussions were ongoing and Nina was able to judge emerging student values through the comments they made. Cooperative work was only required in one activity. Art, craft and music skills were required for five activities. The type of activities illustrated Nina’s approach to using the computer. The electronic nature of the storybook had only a minor role in the unit of work, reflecting little change from previous class work with paper-based texts. There were only two activities in fact, that could not have been done with only the paper version of the text. Hence, Nina’s program of work, while it used the electronic storybook narrative, did not maintain a focus on the technology at all.
Organisation issues

Within this classroom the students spent some time each day learning as an individual, as part of a small group, and as a member of the class. Whole class activities were teacher directed and conducted in the open space at the front of the room. The activities included the introduction of the electronic storybook at the beginning of the unit, class discussions of issues such as “Should we have all girls’ or all boys’ parties?” or “What makes a good friend?”, the singing of Arthur’s birthday song, the presentation of literature talks on books that came in a series (as the Arthur books are a very large series), and the oral reading to the teacher from the book or computer.

Other activities, within the unit, were specifically designed to be done by the students working as part of a small randomly selected group of four students. The activities for each group to complete included the construction of a multiple choice quiz, a glossary of words from the storybook and the completion of a story map. The group activities related to the electronic book storyline and required the group to come to a consensus about the presentation and content of the final product for each activity. Behind this activity was Nina’s goal to develop skills in cooperative learning amongst her students. Sometimes signs of impatience were visible when some members of the group were not in class and the rest of the group had to wait for them to return before a consensus could be reached. Nina agreed this was a difficulty due more to the timing of the unit of work rather than the tasks themselves. Despite this difficulty, the students demonstrated some skills as cooperative learners but obviously a lot more work would need to be done.
The remaining activities were to be completed by the students as individuals or a pair reading the electronic storybook on computer. These activities included designing and making a birthday card and model cake, writing a report of the party from the point of view of the cake, writing a conversation among story characters, illustrating part of the story, and listing the interactive hot spots on each page and writing what happens when they are activated.

Nina did not actively distinguish between the students in the class except for the three with learning difficulties. For these students Nina either provided an alternative task or varied the assessment criteria if it was necessary. This unit provided a time for individualised help with oral reading as they could access the support of the electronic book without embarrassment. None of the other students used this support during the unit of work as the text was not difficult for them.

The students’ enthusiasm for completing the activities was visible each lesson. The activities allowed them to use a variety of materials both in class and in the work at home. The students were thus easily able to demonstrate their skill in craft-work and their knowledge of the storybook text. When using the computer the students showed little interest in just reading the storybook and an immense interest is the animations and puzzles it presented. One group of students spent longer than their allocated time looking for the hidden object on each page of the storybook. They often traded answers with other groups for the pages they had not solved themselves. None of the students showed any difficulty in using the computer, which validated Nina’s decision not to include any computer-operating goals in this program.
During the implementation of the unit of work, the students showed no problems in identifying the particular task they were completing or in presenting their final product for comment by the teacher or researcher. They demonstrated they were able to keep track of the work they had done and still had to do, both as an individual and group member. In doing so the students demonstrated some skill in managing their own learning.

*Management issues*

The classroom climate was very positive with students able to remain on task despite disruptions from other school activities. The students asked Nina for help when they needed it and often referred to her extensive notes on the blackboard for information and guidance.

Nina had well-established routines for the classroom. The students responded promptly when Nina called them to the floor at the front to receive instructions or participate in a whole class activity. The use of the ball or beanbag reinforced class rules concerning listening to others and taking your turn talking. Students informed Nina when they left or arrived in the room and, while they were responsible for completing their own work, there was no doubt Nina was the pivotal focus of activity in the room.

During the course of the unit of work I saw little need for corrective discipline measures. Nina engaged extensively in preventative discipline by ensuring class time was worthwhile and enjoyable by having a variety of activities, by remaining in control, and by having suitable alternatives when it looked like difficulties were
emerging. Nina made extensive use of eye contact, pauses in mid-sentence, non-verbal signals and speaking quietly to individual students as part of her supportive discipline strategies.

Nina managed the limited technology resource efficiently. By allocating each pair of students a specific time slot (20 minutes) each day all students were able to use the computer. The students made good use of the time to complete their tasks and the 20 minutes did not allow for time wasting. The way Nina had organised the unit of work, only one computer was allocated and only a few activities required the use of the technology, I felt confident, from my conversations with the students, that they would have appreciated a higher level of use of the technology.

During the implementation of the unit of work, the main data were collected from observations and student work samples. Students were observed as they participated in class discussions and completed the group work. I took particular note of how the students interacted with the software when using the storybook. At the conclusion of the unit, the students put on a special review of the work they had been doing to demonstrate how they had completed the activities within the unit. The class displayed the model cakes, created a story map, listened to the cake tell the story of the birthday party, played the quiz games and checked answers on the computer, played spelling spin-the-bottle, and sang the Arthur’s Birthday song they had created. The other teachers who visited the class on this day were impressed by the creative work done and the enthusiastic way in which the students talked about and explained what work they had done with the electronic storybook.
6.3.3 Reflections on the unit of work

Nina used the electronic book primarily as the stimulus for the various learning activities of this unit. Apart from the initial introduction of the book to the class Nina herself had little contact with the technology. The students picked up the storyline very quickly and rarely referred back to the text of the electronic storybook to complete their work. After the initial reading of the story the students enjoyed seeing what else the electronic storybook could do or used it to check ideas for their related work. They were particularly interested in the animations, hot spots and a hidden object on each page.

At the conclusion of the unit, Nina and I reflected on the level of achievement of the goals set. The first goal was that students would maintain a high level of interest in the unit by using the electronic book. We found that the students’ interest in the electronic storybook was still high at the end of the unit, due primarily, we believed, to the continual challenge of finding the hidden object and the pleasure gained from accessing the interactive spots and animations on each page of the electronic storybook. As the students often recited the book off by heart with excellent expression, Nina raised the issue of whether the text was really too easy for most of them.

The second goal was that the students would develop co-operative learning skills through group work experiences. During the course of the unit of work all groups were able to attempt at least two or three of the group activities but no group completed all of them. Some groups had trouble reaching a consensus about how the group would present its results. Upon reflection Nina agreed she should have monitored this
learning activity more closely in order to ensure each student had a turn of recording the group’s opinion, being in charge of the group folder, and helping the group reach consensus. In reality I felt that the collaborative group methodology was not explicitly put in place and that what was seen during the unit was really a reflection of the skills the students already had.

Within the context of a whole class group discussion, some students in the class were quite proficient in stating their opinions. Others, however, remained interested only in their own ideas and needed direction from Nina to assist the development of their listening skills. As a strategy, Nina often engaged these students in answering the questions of other students. Co-operative skills in discussions were developing well in some students and for this class group it appeared to be better in boys than in girls. The electronic storybook theme often provided the topic or issue for discussion, but neither the electronic storybook itself nor the technology it used were chosen as topics.

The third goal required the students to continue to develop their literacy skills. Nina used the unit of work to provide an opportunity for the three students with learning difficulties to experience success with reading in the classroom in front of their peers. One student was particularly enthused with the use of a tape recorder to help her with the presentation of her story. Another enjoyed reading the book on and off screen and the third student appreciated interacting with her peers on the same level. Reading from the book did not extend the reading skills of the remainder of the class whether on-computer or from the hard copy book. Nina felt this might have been different if the text of the electronic book had been more of a focus for the unit of work. Nina, however, had not made the text a focus because she felt it was too easy. Instead she
focussed on the storyline and ideas the electronic storybook presented. The students were thus motivated to engage in related language activities, particularly writing. Nina thought this was excellent, except that the students were still writing “AURTHER” and other variations for Arthur at the end of the unit, much to her disgust.

The fourth goal required students to appreciate the value of friends and of being a friend. During the class discussions the word, “co-operation”, came up a lot, which was something Nina aimed for continually. The non-gender specific aspect of friendship was brought forward and promoted strongly by Nina, but she considered it only given lip service by most students. The students shared boy/girl turns very well and only one student was identified who still felt the need to tell tales about others. Overall, Nina felt the major novel study of the previous unit met this goal more fully that the electronic storybook unit. This conclusion was to be expected because the issue of friendship was only addressed in the class discussion activity. All of the other activities had a celebration focus, though that included celebrations with friends.

The last goal required the students to use art, craft and design skills in a presentation. Students completed all of the presentations enthusiastically and to a high standard. It was obvious the class was used to presenting their work in a variety of forms. For example, the cake making out of cardboard was done at home and construction techniques were varied and impressive. One cake had a battery operated game of spin-the-bottle on top of it using the story line from Arthur’s Birthday. Also, the students readily adopted the art style of the illustrator of the electronic book and attempted reproductions of it when they made a decorated cover for a box of tissues as part of their Christmas activities in the following unit.
Nina expressed concern a number of times about the reading level of the text of the electronic storybook because she had been working with more sophisticated texts in previous units and the students demonstrated good oral reading of the text almost immediately. As a result, Nina allowed the unit of work to focus on other language activities, for example, writing reports and conversations, art and craft activities, and the discussion of issues. As the unit progressed the physical presence of the electronic book faded into the background of the learning environment.

I wondered why, despite her stated enthusiasm for technology, Nina had not moved very far from her established teaching/learning practices. She had made use of the technology and the electronic storybook but only to a minimal extent. I asked what changes Nina would make if she had the use of a computer room or more computers in her classroom. She had no ready answer to this question indicating to even think about it was moving outside her comfort zone as a teacher. This admission placed Nina, as a teacher, in the initial stage of adopting technology into her classroom learning program, even though, she had been working with a computer in her classroom for many years.

On reflection, over the range of activities Nina provided in her unit of work, she suggested that the best teaching/learning activities would be the following:

- reading in pairs at the computer, taking turns to read and listen
- writing quiz pages for the hot spots
- compiling a glossary for the book
- art activities
- character studies as these are shown up so much better than in the paper version
- story maps.
While all these activities were included in Nina’s unit of work, only two provided a specific connection to the electronic storybook. First, the hot spots do not occur in paper versions of the text. Secondly, character studies can be done from the paper version, but the inclusion of animation, sound and expressive reading in the electronic version adds to the depth of interpretation.

There is no doubt that the students enjoyed the electronic storybook but Nina felt it was the surprise and fun of the interactive hot spots that maintained their interest. Nina indicated a preference for using non-fiction electronic books, encyclopaedias, simulations or adventure games in the future, as a support to the main novel study rather than another fiction book.

6.4 Case study – Wilderness Valley Primary School

6.4.1 Background

Wilderness Valley Primary School on the Central Coast sits in the centre of a wide valley, originally developed as housing estates but which now includes a large proportion of public housing and three caravan parks. Many families do not stay long in the valley and the area looks in need of the tender loving care that results from identity and pride of ownership.

The school buildings are single storey grey brick buildings with the main building (housing the administration as well as some teaching areas) being multi-storeyed. The school is set in grounds cleared of most trees with a major sporting field area and a small group of shops across the road. The grey bareness of the area has me seeking possible signs of enthusiasm and spirit not visible from the outside. Even though the
school has a population of approximately 430 students, no students are evident from the roadway. Some muffled sounds of habitation are heard as I open the heavy glass doors into the foyer of the school.

The office staff are cheerful and welcoming as they show me through the door to the staff common room. Other teachers enter via a second door, the opening of which increases the possibility of inhabitants markedly. Unable to resist the temptation, I step through that doorway, almost like Alice in Wonderland, and immediately find myself in a concrete cavern, deafened by the noise of hundreds of children at play. The sound echoes round and round. Not even the bright colours on the wall deaden it. I choose to return to the relative peace of the staff common room for a few minutes and wait for the teacher.

Bob, the executive teacher and the teacher I am to work with, is in charge of the assemblies, so as the bell rings we again enter the cavern. This time there is some order as students listen to the sports announcements and receive their instructions from Bob to leave the area with their teacher. Bob’s class waits impatiently to receive the go-ahead to proceed to the classroom. Up stairs we go, then more stairs and around corners and then more corners, accompanied by the echoing sound of chatter and noisy feet until we reach the room. There is no stopping at the doorway for this group, they just go straight in.

The room is carpeted and the solid bright colours of the cavern are repeated on walls and trimmings. There is, however, no escaping the feeling of being in a solid concrete building with its echoing noise. Being multi-storied means there is an increase in noise
from students as they negotiate the stairs. The classroom itself is crowded with
furniture. Special purpose areas are created by careful placement of cupboards and
desks. The desks are small and are arranged in rows at the front and in groups
elsewhere in the room. The chairs are plastic and of no uniform colour. The teacher’s
desk is at the front of the room close to the windows. Student work is stored in storage
units at the side of the room or in the cupboards but very little work is on display. I
start asking myself what sort of experience will this be?

Bob’s class, selected by the principal, is the only composite class in the school. It
comprises 14 students from Year 3 and 14 from Year 4. Year 3 has five boys and nine
girls while Year 4 has five girls and nine boys. Most of the students are working at an
average or above-average level in English, however, there are six students whose
English ability level is described by Bob as very low. Until the range of ages and
abilities of the students was identified to me it was difficult to see any logic behind the
physical layout of the room. By seating the students in different areas of the room,
Bob has endeavoured to have the physical layout of the room facilitate the flexible
grouping for teaching that he requires.

Four computers are set up around the room allowing two or three students to sit at
each of them. If a fourth student is involved they usually stand behind the others. On
arrival in the room the students excitedly claim their turn on the computers and
compete for the teacher’s attention and assistance. Bob seems to buzz like a worker
bee around the room in an endeavour to ensure all the students work as productively as
possible. The noise level rises and I begin to wonder if “quiet” is a state achieved only
rarely in this room. While there was active competition for the teacher’s attention, the
students showed an independence in their work habits which in turn reflected their acceptance of the extraordinary conditions of learning in this composite class.

6.4.2 Implementation of the unit of work

In implementing the unit of work Bob had to address pedagogy, organisation and management issues in general terms and in relation to his composite class. Bob chose to change the way he conducted his classroom in order to explore a learning strategy (a contract) that he was interested in using with his class.

Pedagogy issues

Bob’s construction of the unit of work with an English focus, on the theme of “Growing Up”, embraced the principles of outcomes based education (Brandt, 1993). He focussed the construction of the unit on the outcomes he wanted his students to demonstrate at the end of the unit. He gave them many opportunities to develop, practise and demonstrate the outcomes. He had high expectations concerning his students’ performance. To meet the diverse needs of his students and to allow them to manage their own learning, Bob chose to introduce a work contract. This contract told the students what they would have to do and by when, allowing them the choice of the order in which to do the activities and the time to devote to each. Bob explained that he had often wanted to explore this style of teaching and used the creation of this unit of work to trial his ideas.

The unit included activities that had to be completed using the electronic book on the computer and activities that were related to the electronic book but which did not require the use of the computer for them to be completed. The three electronic book
titles (Arthur's Teacher Trouble, Arthur's Birthday and Berenstein Bears Get in a Fight) were chosen because they each depicted incidents that the students may encounter while they are growing up. More than one title was used in order to increase the variety of reading matter for the students. The following level 2 outcomes (from the English K-6 syllabus) were the focus of the Unit.

- Considers how own speaking and listening is adjusted in different situations.
- Recognises that different kinds of spoken texts have different organisational patterns.
- Experiments with different linguistic structures and features for expressing and interpreting spoken ideas and information.
- Engages with events, incidents and characters in literacy (including media) texts.
- Constructs and retells meanings from short written texts with familiar topics and vocabulary, predictable text structures and frequent illustrations.
- Recognises some of the purpose and advantages of writing.
- Writes brief imaginative and factual texts, which include some related ideas about familiar topics.
- Writes using letters of consistent size and slope in NSW Foundation Style.
- Uses talk to plan and review own writing.
- Usually attempts to spell words by drawing on knowledge of sound/symbol relationship and of standard letter patterns.
- Uses some basic linguistic structures and features of written language so writing can be readily interpreted by others.

In reporting a student’s progress towards meeting these outcomes each teacher at Wilderness Valley Primary School listed the relevant class based activities which acted as pointers to these outcomes. As this was school policy, Bob was required to construct his unit of work to meet this external demand. Each contract sheet (Appendix 5) provided both on-computer and off-computer activities and created material for students to include in their portfolios of work. It was these portfolios that provided evidence of how well the students were meeting the outcomes of the unit of work.
Bob used a wide range of learning activities in line with the whole language approach. He ensured that the learning experiences were related to the specifics of the context (that is, the electronic storybook) that was being used. There was plenty of opportunity for the students to reflect upon their learning and to apply it to their own situation or give a considered opinion.

Student interaction with the software was highly visible and audible during each lesson as 12 students listened, read and discussed the activities they were doing. Their motivation to participate in the unit of work was high and there was reluctance to stop work when the bell for lunch sounded. At no time did I see the computers unused. It was more usual to see students returning to the computer to peer over the top of the seated students, to listen and watch again to pick up some forgotten information they needed to complete their off-computer activities.

Organisation issues

Within this unit Bob adopted an informal approach using the structure of a contract to tie together many of the features of open learning. The contract had to be completed and handed in at the end of the five-week period. Most of the activities that the students had to complete did not involve any formal teacher directed lessons as all instructions were given in the outlines. Students, however, who were experiencing problems completing an activity were treated individually or in a small group situation on a needs basis.

For the purposes of this unit it was possible to borrow additional computers so that four computers were available to the class. The electronic book Arthur’s Teacher
Trouble was used on two of the machines. Arthur's Birthday and The Berenstein Bears Get in a Fight were used on one machine each. The class was divided into four main groups, one for each computer, and these groups were then split into three subgroups. By using subgroups the maximum number of students at each computer was three. The main groups rotated computers every six days so that all students experienced each electronic book title. As this grouping was purely to facilitate the students’ access to the computers and electronic books, there were no activities that the students needed to complete as a group.

Students understood each of the tasks they were to do and presented no difficulty in identifying the task they were completing or in presenting their final product for comment. Signs of impatience were visible, however, when some students had to wait for assistance or comment from Bob. Many left an activity incomplete and began another during their waiting time. At the conclusion of the unit it was clear very few of the students had finished all the activities that were set for them. In hindsight, the number of tasks was too large for the five week period and Bob reflected that

While the idea of a contract was a valid one I think it would have been more appropriate for each electronic book to have its own sheet rather than having all activities presented together. The students were not capable of visualising the amount of work that needed to be done in the time frame given.

The students were allowed to commence with any activity they wished - though some on-computer ones had to be done before an off-computer one. Bob realized pretty quickly that students should have been directed to the activities in a particular order with the easier and shorter tasks to be done first. He would then have had a more accurate gauge of student performance and avoided the situation where one student only completed two of the longer activities in the five weeks.
As well as looking at the English outcomes Bob was interested in how well the students utilised their time. This unit of work was the first instance on which the students had experienced a contract system and their ability to work independently was sorely tested. The rush of work to be completed in the last few lessons indicated that, like most people, students in 3/4G did not plan their time well! Bob reflected that perhaps this frenzy of activity could have been overcome by staggering the collecting and marking of the work throughout the unit rather than only collecting work at the end and by more closely monitoring student progress.

*Management issues*

Bob worked hard to ensure the learning environment he provided promoted problem solving, developed cooperation, communication and critical thinking, and that challenged students to think about how they learn best. Lessons for the unit were broken into on-computer and off-computer activities. During each lesson, which was approximately 75 minutes long, each subgroup had 25 minutes on-computer time and 50 minutes to complete their off-computer activities. As a result the classroom climate was a very positive one with students primarily on task.

Communication within the classroom was often conducted at multiple levels at the one time. There were students communicating within their group, to others doing the same activity, and to the teacher for help or comment. Most communication was verbal so the busy look of the room was accompanied by a constant busy noise. During the conduct of this unit I never witnessed the class in the traditional mode of silent students all paying attention to the teacher at the same time. Neither the students nor
Bob seemed concerned about the lack of a traditional teaching strategy; they just got on with the learning.

The number of computers going at once, particularly with electronic storybooks being used, also contributed to the high noise level in the classroom. The level was particularly noticeable when the students who were trying to listen to the video clip had great difficulty hearing it. In addition, students doing the off-computer activities were also sometimes distracted by the sounds from the storybooks. Bob has decided, in future, to include headphones as part of the technology required for electronic storybook use.

Bob had established routines for the using of the computers and the students coped very well with the group/subgroup structure of the class. Verbal interaction continued well after the students had moved away from the computer. Owing to group work done earlier in the year the students were able to demonstrate excellence in their management of the computer resources and in taking turns at using the computer.

During the course of the unit of work I saw little need for corrective discipline measures. Bob engaged extensively in preventative discipline by ensuring class time was worthwhile and enjoyable, by having a variety of activities with adequate resources, and by remaining in control and having suitable alternatives when it looked like difficulties were emerging. Bob made extensive use of eye contact, verbal signals and speaking to individual students as part of his supportive discipline strategies.
6.4.3 Reflections on the unit of work

Assessment of student progress was on an individual basis with each student collecting a portfolio of work during the unit and matching these against the outcomes sheet for the unit. Bob assessed the students on the work completed during the unit and there was also a comment on application and progress during the unit. In providing reports on this unit of work, he often had to indicate that the grade given was for work that was unfinished. The number of unfinished pieces presented by some students was data Bob used in evaluating the use of the contract system and it reflected, in part, the range of strategies students used to meet the five week deadline.

Bob selected four students, two from Year 3 and two from Year 4, for interview with four of the work samples each, to examine what the students thought of this unit of work. He combined their viewpoints with his observations of the students during the progress of the unit. Bob was impressed by the standard of the work that the students submitted. All the students said they enjoyed the unit and could not wait to get involved in the computer-based activities. Computer literacy and competence increased during this five-week period and the use of an interactive program increased the students' enthusiasm for work.

None of the activities were too hard for the students but differences in ability to deal with a task became evident. Most students showed an improvement in the quality of their work when it was compared to work samples from earlier units. All students found the volume of work too much. If he was to do the unit again Bob indicated that he would allow time for some teacher modelling of activities particularly for the less able students. He suggested that an improvement might be to group the students
according to ability and to provide a more diverse range of activities to cater for each of these groups rather than provide one set of activities for all students. Cross-ability groups, however, would offer continued support for the low achievers and would allow him to continue teaching in the manner he demonstrated throughout this study.

Student responses to particular activities varied. The development of their own crossword was a very time consuming and challenging task for most students and took far too long. The students enjoyed creating an *Arthur Doll* using the stencil figure, paper clips and paddle pop sticks provided. Both boys and girls were able to identify with the character and perform the speech they had written. Students were able to identify with other characters as well and predict what they would be doing in 10 years time (though 20 years ahead was unrealistic to many). In trying to decide who caused the fight between the two *Berenstein Bears* most students identified something wrong that each one did and then concluded that they were both at fault. As the two electronic books about Arthur contain the same characters the students were given a good background to write their own adventure stories for Arthur keeping the characters true to form. The books produced were A5 size, with lots of illustrations and so were very colourful. They were not produced, interestingly enough, on-computer due to the lack of extra computers for this purpose.

The electronic storybooks were an excellent starting point for the unit as they generated a lot of enthusiasm from the students. They stimulated the students’ creativity and generated a greater range of responses to the off-computer activities than Bob imagined he could have done. Student requests for more electronic books continued to the end of the year.
The simple layout, brightly coloured pages and interactive nature of the storybooks meant that the students could become involved in learning without ongoing teacher assistance. Bob was free to concentrate on the students having problems or on modelling work for other students. The interactive nature of the programs catered well for a range of learning styles and allowed each student to listen, explore and respond to the narrative of the electronic storybook in a unique way. Upon reflection, Bob believed that involving the paper-based versions of the texts as part of the program would have widened the options further as the students could then have made a comparison between the printed and multimedia texts.

Bob considered that the level of language used in the programs was far below the reading level of most of the students in Year 3 and Year 4. As a result students showed little interest in interacting with the text of the story unless specifically directed to by the teacher. Bob was therefore critical of the electronic storybooks being used solely as a reading program. He felt they did not generate a lot of reading and yet students could read the text they contained quite fluently as a result of using them. Bob related his experiences prior to commencing the unit with his class. He stated that:

*Before the project started I took a computer and the electronic books home during the holidays to familiarise myself with the programs and their content. My two year old son decided that Dad had brought the programs home for him to use and by the end of the two week holiday period could practically recite all the stories word for word despite being a non-reader. He would spend hours on the computer to find all the interactive elements, music or just to listen to the stories.*

Bob did not allow this ease of reading of the text to prevent him from making use of the electronic storybooks. He made sure that the learning activities he designed and selected for this unit of work made use of the electronic storybook, allowed the
students to demonstrate their achievement of the outcomes in a variety of ways, and provided the whole class with the opportunity to deepen their understanding of issues that arise when growing up.

6.5 Conclusion

Each of these three case studies reflects the individuality of the teachers involved and their level of expertise and confidence when working with technology. Different pedagogy has been involved and the management and organisation issues faced have varied with the individual school setting. The three teachers felt that they had produced successful units of work, in that some learning outcomes were achieved and the unit merged easily with the rest of the year’s work. The specific similarities and differences of these studies provided the focus for the analysis presented in the next chapter.
Chapter 7: Results and findings across all case studies

7.1 Introduction

The three case studies included here demonstrate a variety of approaches to using electronic storybooks in classrooms. Within this chapter I have looked at where the approaches taken by the case study teachers differed and where they were the same. In order to examine these case studies within the context of a modern framework for teaching reform, I have prepared the matrix (shown in Tables 7.1, 7.2 and 7.3) to include the 20 individual factors that form the four dimensions of the Productive Pedagogy framework (intellectual quality, relevance, supportive classroom environment and recognition of difference). These factors overlap the pedagogy, organisation and management categories used in this study and are shown in the tables by shading. The factors related to the learners in the classroom, for example, have been considered as part of organisation whereas they are part of the supportive classroom environment dimension in the Productive Pedagogy framework.

7.2 Pedagogy

Within this study, pedagogy refers to the usual teaching practices and assessment used by the teacher (Newmann et al., 1995). It encompasses the basic philosophical approach taken by the teacher to teaching, assessment and, for this study, to computers in classrooms. It includes 15 of the Productive Pedagogy factors.

Reviewing the philosophy behind their approach to teaching it is clear to see that Bob (Wilderness Valley PS) and Helen (Eagle’s Nest PS) favoured a specific approach. Bob based his work on the principles of outcomes-based education (Brandt, 1993). Helen based her work on 4MAT approach (McCarthy, 1990) that had combined the
work of the multiple intelligence and learning style theorists. Nina (Parkland PS), on the other hand, seemed happy to make use of any strategies and ideas as long as they worked for her. These teachers are also placed at different points in the instruction to construction continuum (Sandholtz et al., 1997, p.14). All have moved away from the purely instructional approach, with Bob and Helen closest to the constructivist approach. Nina demonstrated her more instructional approach as she was not prepared to relinquish her control over the learning in the classroom to her students in any major way during the case study. The students’ independence in working was only in when to do the work, whereas the how, why and where were still determined by Nina.

The teachers also differed in whether they introduced a new teaching strategy for the unit of work with the electronic storybook. Nina made little change to her overall teaching strategy during the case study. Her classroom and the way learning occurred within it were essentially the same as they had been all year. In contrast, both Helen and Bob took the opportunity to try out a new learning strategy. Bob chose the strategy of a learning contract and Helen the strategy of a workbook. For the specific learning activities within each unit, the three teachers used many strategies that had been successful with non-electronic literature.

Fundamentally, each teacher’s rationale for creating their unit of work was to explore the use of electronic storybooks. Bob and Nina chose to do this through a unit that was focused on the English KLA, though Nina based many of her activities in the Creative and Performing Arts KLA. This decision meant that language and literacy activities were dominant in the unit of work. Helen, in contrast, created a unit what was cross curricula with all KLAs represented within it. These choices did not represent any
departure from the teachers' usual accepted practices. All teachers showed that they were able to incorporate an electronic storybook in their existing teaching/learning practices.

In selecting the learning outcomes for the unit the three teachers identified outcomes in three broad areas: technology use, language or literacy, and learner behaviour, however, the focus on each area differed. Helen’s unit had specific outcomes relating to the use of the technology, as her students were not very experienced in using computers. Her literacy outcomes covered comprehension and motivation and, combined with her other outcomes relating to knowledge of pets and completion of the workbook, demonstrated the high importance Helen attached to her students being motivated to read. Nina and Bob both considered their students to be competent computer users and so placed only a minor focus on the use of technology. Both these teachers sought to increase interest and motivation of students through the use of electronic storybooks. Nina also focussed on learners developing co-operative learning and thinking skills and sought to have students demonstrate this through their creative skills. The prime focus of Bob’s unit was on selected language outcomes from the English K-6 syllabus.

These differences in outcomes were also created by the individual school contexts within which the teachers were working, with Nina having the greatest freedom to select her own approach. Helen and Bob had constraints placed upon them by school policy. Helen was required to construct her unit using the 4MAT approach, but it was her choice to incorporate the full range of KLAs within it. Bob’s school separated the
KLAs and required each teacher to construct units of work addressing the relevant K-6 syllabus outcomes.

Higher order thinking, deep knowledge and deep understanding are three factors within the intellectual quality dimension of Productive Pedagogy that the researchers (Hayes et.al., 2002) have found teachers in NSW and Queensland need to develop more fully in their lessons. In each of the case studies examined in this study, this finding holds true. A small proportion of the activities required higher order thinking skills. All three teachers, for example, required their students to re-examine the text from a different point of view. Higher order thinking was seen also in Nina’s discussions of “what makes a good friend?” and in Bob’s asking “who was right and why?” in the Berenstein Bears storybook activities. Deep knowledge refers to the covering of content, issues and ideas in depth and, to a certain extent, Bob and Helen both endeavoured to do this through the selected focus of their units: Bob’s on growing up issues and Helen’s on pets. They maintained that focus throughout the unit and hence there was some opportunity for students to demonstrate deep understanding of the issues through their writing and talking. Nina also presented her unit as one with a theme, friends, but many of the issues and ideas had already been addressed in the previous unit. She also included a celebrations theme in many of the activities but this served to reinforce the concept that the unit was one designed to link the one before it to the one next rather than one that sought the development of deep knowledge and deep understanding of either theme.

Each teacher provided opportunities, both in work and in oral responses, for the students to provide evidence of their understanding of the concepts and ideas that
formed the focus of each unit. All three teachers used student work samples as a source of evidence of understanding and for assessment of student progress. Other work was also submitted. In Helen’s class, students submitted their completed PET workbook and their homework project. Bob’s class organised all their work into a portfolio to match the reporting sheet to be sent to their parents. In both of these case studies the principal person to assess the students’ understanding was the teacher and the work was given directly to the teacher for that purpose. In contrast, Nina’s students were assessed through a major class presentation to other teachers. This presentation provided students with an opportunity to display their work and to see, and comment on, the work of others. All teachers therefore had a measure of the learning of each of their students. Nina’s data, however, was enriched by the inclusion of reactions and comments by others. In examining the standard of work produced by the students, it was obvious that more explicit criteria, concerning assessment, should have been given to the students. All the teachers were pleased with the work done but disappointed with the wide range in the quality. Helen’s students, in particular, often asked for clearer directions in order to complete the homework task satisfactorily.

Through the use of a variety of language activities and the electronic storybook teachers were able to bring focus to questions about text meaning. Students who used electronic storybooks easily picked up the story line of the narrative and expected that the voice, illustrations, music and animations included in the storybook were there to also add meaning. Finding the answer to a simple question may have required listening to the text being read, listening to characters in the story speaking, activating the animations or examining the illustration very closely. Within any one classroom many different interpretations occurred according to how deeply students explored the
storybook and these differing interpretations were reflected in the students’ writing, for example, in Nina’s writing an account of the party from the cake’s point of view, in Helen’s creation of each student’s own page for the storybook, and in Bob’s predicting what one of the characters would be doing in 10 years time. The acceptance of these different meanings for the storybook showed that the teachers were prepared to introduce the concept of knowledge as problematic within their classroom.

In all cases, classroom talk was active and relevant. For Bob and Helen the classroom talk had moved away from a teacher initiate/student response/teacher evaluation model and into more substantive conversations with the teacher and other students. These conversations could be observed as the teachers worked with individuals and small groups on the activities. Substantive conversation was not as evident in Nina’s classroom as she maintained a high proportion of teacher-led activities using the teacher initiate/student response/teacher evaluation model. I observed that her conversations with individual students were briefer than those of either Helen or Bob.

Within the case studies I expected to encounter the meta-language of literacy or literature and computing as these were key areas in the study. In fact there was very little use of meta-language in any of the classrooms. To a limited extent, Nina explained the meta-language of the narrative text type and Helen addressed some computing language. I did not find any evidence of metalanguage use in Bob’s classroom during the unit of work.

All of the units of work were constructed to allow students to draw on their own knowledge and to share with the class as they completed the learning activities. Each
unit linked to issues relating to real-life contexts. The themes of friendship, celebrations, growing up and pets had relevance for the case study students. From the observed enthusiasm with which they engaged in the learning activities, it was clear that electronic storybooks could be used to address issues relevant to the students in the class. A limitation on this use was imposed, however, by the fact that not all the literature that might be used in the classroom was available in this electronic format. In addressing real life issues each teacher had the opportunity to engage in problem solving as a strategy, but real life problems were treated only superficially. The usual process was to ask the students “what would they do if…” something occurred. This process provided a good basis for discussion but did not lead to the students actually developing a solution themselves, such as having a party or keeping a pet.

The factors, cultural knowledge, inclusivity, group identity and citizenship, included in Productive Pedagogy under the recognition of difference dimension were not addressed explicitly in any of the case studies. Gore (in Khoo, 2001) has indicated that the lack of focus on recognition of difference was true in most of the classrooms their research examined. Nina highlighted the existence of different cultural beliefs in her discussion of celebrations and friendships with students encouraged to share their own experiences. Despite there being no explicit addressing of the issues relating to recognition of difference, each classroom had a distinct identity that had developed over the year.

The success of the units of work was reflected in the ease with which the electronic storybook was integrated into a whole language based unit of work and in the lack of disruption caused to the overall program of learning for the class that year. Nina
indicated that while she felt her unit was a success, she would choose other forms of electronic text to use in her classroom in future, such as encyclopaedias, and saw only limited use for the electronic storybook software. Bob and Helen also considered their units to be successful and considered the electronic storybooks to have made a positive contribution to learning in their classrooms. Both indicated they would use the software again provided suitable titles were available. In fact Helen used another electronic storybook as the focus for an English unit later that year much to the delight of her class. In all case studies, because the electronic storybooks were all narratives, a greater proportion of the teaching that occurred in each classroom involved sharing and examining stories. Electronic storybooks thus provided a modern, different way to incorporate literature and the power of narrative into teaching and learning.

Observations of all three teachers during the conduct of the units of work revealed a fundamental difference in their attitude to using computers in their classrooms. Bob and Helen showed they were active users of the technology themselves and they spent time each lesson interacting with the group of students using the computers. Such an approach mirrored the constructivist approach suggested by Stern (1992). In contrast, after the initial introduction of the software to the class, Nina spent very little time interacting with the group using the computer, choosing instead to work with the students completing the group work or creative activities. Such an approach is in line with the survey conducted by Sherwood and Buchanan (1993) that identified generally positive impacts on teaching method and styles except for teachers who had nine to ten years teaching with computers. As an example, in Nina’s classroom the importance of the electronic storybook in the classroom learning faded away. Perhaps, as Sherwood and Buchanan (1993) suggested, Nina’s enthusiasm for computers had
run its course and real organisational change was needed. In Bob and Helen’s case, however, the electronic storybook was being discussed and used continually. Its importance to the classroom learning remained high throughout their units of work. The teachers’ beliefs about using computers highlighted in this situation by their use of electronic storybook software paralleled their views about the usefulness of electronic storybooks. The value of the electronic storybook was higher to those teachers who promoted the use of the software as an integral part of the unit of work and who demonstrated this through their actions in the classroom.

Table 7.1 shows the matrix of pedagogy factors examined in each case study in a summary form. Those factors shadowed correspond to the Productive Pedagogy factors.
<table>
<thead>
<tr>
<th>Factor considered</th>
<th>Eagle's Nest Case Study</th>
<th>Parkland Case Study</th>
<th>Wilderness Valley Case Study</th>
</tr>
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<tbody>
<tr>
<td>Philosophical orientation</td>
<td>Clear</td>
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</tr>
<tr>
<td></td>
<td>Not clear</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Overall Teaching strategy</td>
<td>Used before</td>
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<td></td>
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<td></td>
<td>New</td>
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<td></td>
</tr>
<tr>
<td>Knowledge integration</td>
<td>Single KLA</td>
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<td>✓</td>
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<td></td>
<td>Across KLA</td>
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<td></td>
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<td>Learning outcome areas</td>
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<td>✓</td>
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<td>Language literacy</td>
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</tr>
<tr>
<td></td>
<td>Behaviour</td>
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<td>School policy</td>
<td>Had impact on unit of work</td>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>A little</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Each lesson</td>
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<td></td>
</tr>
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<td>Deep knowledge – content cover</td>
<td>In depth</td>
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</tr>
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<td></td>
<td>Superficial</td>
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<td>Deep understanding shown</td>
<td>Through work samples</td>
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<td></td>
<td>Other work</td>
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<tr>
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<td>PET book homework</td>
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<td>Portfolio for assessment</td>
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<td>Student</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Explicit criteria for assessment of student work given?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Knowledge is presented as problematic</td>
<td>Not at all</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>A little</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Always</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Substantive conversation</td>
<td>Teacher led</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dialogue between teacher and student</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Metalanguage used</td>
<td>Not at all</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>A little</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is background knowledge valued and used?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Connection made to real-life contexts?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Problem based curriculum</td>
<td>A little</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>A lot</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Recognition of difference</td>
<td>Cultural knowledge, inclusivity, group identity, and citizenship were factors not addressed explicitly in any of the case studies.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit of work was a success?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Approach to use of literature</td>
<td>Whole language</td>
<td>Whole language</td>
<td>Whole language</td>
</tr>
<tr>
<td>Style of teaching</td>
<td>Narrative</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Expository</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Attitude to using computers?</td>
<td>Confident Integrated</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Confident Separate</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Confident Integrated</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

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7.3 Organisation

Within this study the organisation aspect of the teaching/learning situation referred to the way in which the teachers involved their students in decisions about how learning occurred in the classroom. It included discussion of the extent to which students were responsible for their own learning and evaluation of the learning program; provision of a range of ways students and teachers interacted; grouping of learners; identification of special needs of some learners and provision for them; and the extent to which students were on task and engaged in learning.

In adopting a workbook and contract, Helen and Bob sought to allow their students increased responsibility for their own learning. Bob gave the greatest control to his learners by setting only the beginning and end of the contract. All his students were free to complete the activities in the order they chose and could take as much time as needed to do each one. In Helen’s class the sequence in which the activities were to be done was more prescribed so that Helen could give the teacher directed activity each lesson. The use of each of these new strategies brought into sharp focus each learner’s ability to manage the available time in order to complete the activities. Both teachers under-estimated the time needed by their students to complete the tasks set. Bob was not able to cater for this within his unit of work and so many of his students expressed frustration and disappointment at not at least having a go at everything. All Helen’s students were able to complete the workbook because she extended the number of weeks the unit covered. She also allowed students to continue work on their workbook during time not originally designated for this unit.
As a result of this experience both Bob and Helen said they would use the strategy again. Bob would change the sequencing of activities so that easier activities were to be completed first with the harder or more time consuming ones to be completed later. He would also take time to model what was expected of the students in some tasks. Helen would allow more time overall and remove any tasks that required a lot of teacher direction.

The role of the learners in evaluating the unit of work in each case study again reflected the differing views of the teachers. Helen, because she was using the workbook strategy for the first time, recorded not only her own observations but also asked all the students specific questions about their work in the PET book. Helen, for example, recorded which pages of the PET workbook were the most popular and the level of support she had to give to the students so that they could complete each page. These data allowed Helen to make decisions about future activities based on relevance to topic, popularity with students, and level of difficulty. Bob asked a select group of students to give him a detailed response but he made sure the full range of ability was represented. He conducted open-ended interviews with four students and discussed with them their portfolio of work. Nina relied on her own observation of the students working on the activities. The conclusions about the units of work provided by Helen and Bob reflected opinions of both the teachers and the learners and hence provided a valid base for their further action.

Within each of the classrooms, the teachers interacted with the students differently. Both Helen and Nina incorporated a formal teacher directed activity each lesson. Nina’s was usually with the whole class, whereas, after the initial introduction of the
electronic storybook, Helen’s interaction was with a large group (one third of the class) each time allowing the others to complete storybook related activities. Bob did not have a formal teacher-directed activity at all during the conduct of his unit, preferring instead to assist individual learners as needed. By integrating teacher-directed activity with computer-based ones (recommended by Becker, 1992), Helen was able to maintain her students’ focus on the electronic storybook. Bob also maintained that focus by allowing no interruption to occur to his students’ work on the storybook activities. Nina’s actions, however, shifted the students’ focus from the storybook to what she wanted done, thus downplaying the relevance of the electronic storybook.

All three teachers chose to group the learners in their classrooms though different criteria were used (in line with Marsh, 1996). The prime rationale, however, was the same. The teachers grouped their students to facilitate the use of the limited technology resources available. To use each computer, Helen’s learners had to work in pairs, Bob’s had a maximum group size of three, and Nina’s worked in groups of four. Each of these small groups belonged to a larger grouping in the class. Helen divided her class based on ability groups and formed three groups. She kept the larger groups together for off-computer work by sitting them together at the three large groups of tables in the room. Bob based his large groups initially on Year levels and then divided these into two, forming two groups of Year 3 and two groups of Year 4 students. Within each of these, the small groups were formed and Bob’s students were free to stay or leave the small groups when they did the off-computer work. Nina formed her groups of four randomly and used them for both on and off-computer work. This variety of grouping structures reflected the teachers’ desire to ensure
student learning was maximised through efficient usage of the technology, provision of a workable group size, and some degree of choice for the learners. Whichever method of grouping was used the students adapted to it very quickly and acknowledged its purpose. In all three classrooms, for example, I found that all of the students knew exactly when it was their group’s turn to use the computers.

Identification of the needs of individual learners was seldom seen except in certain cases. Nina, for example, clearly identified the three students with learning difficulties integrated into her class and she made sure that she adapted the class work and assessment to allow them a measure of success. Helen identified the group of students who had the most difficulty and the group with the least difficulty with literacy and used them to form two of the larger groups in the class. This process allowed her to use resources and activities to match their literacy level in her teacher led time and to work with groups having similar needs when completing the other activities.

All the teachers wanted to see their learners show enthusiasm and sustained interest in their work and to demonstrate skill in using the technology to assist their learning. Nina and Bob considered their learners to be competent users of computers prior to the unit of work and so provided only minimum instruction in using the software. Helen, after identifying a lack of expertise among her students, provided the whole class with lessons prior to the unit of work. As a visitor to each of these classrooms I observed the level of on-task behaviour to be very high. Each teacher had ensured that the students knew what they had to do and where to seek support if needed. Students’ enthusiasm for working with the computers and on the learning activities meant I was
often enlisted as a second teacher and expected to help students get on with their learning.

Table 7.2 shows the matrix of organisation factors examined in each case study in a summary form. Those factors shadowed correspond to the Productive Pedagogy factors.

<table>
<thead>
<tr>
<th>ORGANISATION</th>
<th>Factor considered</th>
<th>Eagle's Nest Case Study</th>
<th>Parkland Case Study</th>
<th>Wilderness Valley Case Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student control of learning</td>
<td>Very little</td>
<td></td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Within limits</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students involved in evaluation of unit of work?</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Teacher – student interaction</td>
<td>Students on-computer</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students off-computer</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students grouped for on-computer work?</td>
<td>Yes in pairs</td>
<td>Yes in fours</td>
<td>Yes in threes</td>
<td></td>
</tr>
<tr>
<td>Student grouping for off-computer work</td>
<td>Individual</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small group</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large group</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Whole class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catered for poor readers?</td>
<td>By grouping</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Individually</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students engaged and on task during lessons?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

7.4 Management

Within this study, management issues focused on the management of the learning environment to facilitate the pedagogy and organisation of learners that the teacher had adopted. Each of the case studies addressed the issues in a similar way. All teachers considered the computing resources available, the physical layout of the classroom, the time allocated for the unit of work, and the creation of a positive classroom climate for the students.
Prior to the unit of work being implemented, each teacher had to ensure sufficient
computer resources were available for the class. Bob borrowed two computers and
Helen borrowed one computer from other classrooms as they believed they needed
more than one computer to successfully engage their students in learning. As a result
they had to re-arrange the desks in their classrooms to accommodate the extra
computers. In addition, room had to be made for enough chairs to be placed in front of
each of each computers.

The three teachers also had to facilitate the movement of students between the on-
computer activities and the tasks to be done away from the computer. Other furniture
in the room was thus reorganised to facilitate group work. Helen organised the small
desks into three large groups, Bob located desks in groups of two or four between
cupboards and included some single desks, Nina made special groupings of four desks
in her room for the group work activities. The students managed the mechanics of
each unit with little fuss and were able to move between the different physical settings,
as required, to complete on and off-computer activities. The amount of student
movement in the classroom varied as the proportion of the learning activities requiring
access to the electronic storybook differed between the case studies. Bob had
organised half his activities to have a focus on using the electronic storybook. Helen
devoted one-third of the time for on-computer activities as the students rotated
between the computer, PET workbook and teacher. Nina required her students to use
less than one fifth of the time completing activities that used the electronic storybook.

The units of work were all initially timed to last four or five weeks with between 150
and 180 minutes each week specifically devoted to working on the unit. Nina and Bob
kept to the planned time for the conduct of the unit of work. Helen, however, as a consequence of her observations of student progress, extended the total time and created other opportunities for the students to use the computers to ensure all students completed the PET workbook.

Good discipline and a positive learning climate (as described by Marsh, 1996) were evident in all classrooms. It should be noted that the implementation of the units of work occurred during the second half of the year by which time the class and teacher had developed an understanding of each other, how the class worked best and what was acceptable behaviour. Helen was the only teacher to feel that an area of classroom behaviour needed addressing. By the conclusion of the unit of work, however, the standard of work maintained by her class had allowed many students to demonstrate improvement in the area of working independently.

Classroom observations supported the teacher comments concerning the positive impact the use of electronic storybooks had on student interest and attention to learning. All students commented on the change in some students’ behaviour and the overall improvement for the class as an entity. Interest in working with the electronic storybooks was still high at the end of each unit, even for Helen’s class who had gone weeks longer than any other unit. Students were eagerly demanding more electronic storybooks be used.

Table 7.3 shows the matrix of management factors examined in each case study in a summary form. Those factors shadowed correspond to the Productive Pedagogy factors.
Table 7.3 Analysis of Management factors across three case studies

<table>
<thead>
<tr>
<th>Factor considered</th>
<th>Eagle's Nest Case Study</th>
<th>Parkland Case Study</th>
<th>Wilderness Valley Case Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer resources</td>
<td>Increased</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical layout of room</td>
<td>Changed</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Time for unit of work</td>
<td>As planned</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Changed during unit</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Proportion of activities computer based</td>
<td>33%</td>
<td>20%</td>
<td>50%</td>
</tr>
<tr>
<td>Classroom climate was positive?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Social support visible in classroom?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Self regulation of student behaviour visible?</td>
<td>✓ with some help</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

7.5 General uses of electronic storybooks

Electronic storybooks are not a literacy program in themselves. Like paper-based literature, electronic storybooks were used as an integral part of a whole language approach to literacy learning. In all three case studies the teachers moved beyond a narrow focus on reading and writing skills and used the electronic storybooks to foster the development of their students as readers and writers (Callen, 1991).

Nicoll and Roberts (1994) proposed a series of reasons for using literature in literacy programs and these case studies showed that such reasons also apply to electronic storybooks as all three teachers used electronic storybooks to foster an attitude change in their students, whereby the students continued to read the electronic storybook beyond the point at which it could be read orally. All three teachers encouraged the students to make meaning and sense of the language and media used. The teachers created learning activities that allowed them to explore, with their students, the values promoted by the authors in the electronic storybooks. All three teachers used the electronic storybook as a model and stimulus for writing. Within all the case studies, electronic storybooks were used to form the stimulus for and introduction to the unit
of work each teacher implemented. By using the electronic storybook throughout the
unit, student interest and participation remained high.

Nina and Bob used the electronic storybook to explore a range of texts and for
students to re-create the author’s story for themselves. Helen and Nina explored the
use of the illustrations and animations in the electronic version of the storybook.
Helen’s unit of work demonstrated most clearly how the electronic storybook could be
used to support and enrich other areas of the curriculum.

None of the teachers had any difficulty selecting suitable learning activities for the
unit of work. By using the electronic storybooks teachers accessed the range of known
learning activities incorporating paper-based texts and this provided a secure base
from which to explore the electronic version of the storybook. The introduction of the
technology into their teaching and learning was therefore manageable and successful.

7.6 Concepts of literacy

In working with the teachers I was concerned to identify how the electronic storybook
software would assist individual learners with poor literacy skills. This was an interest
because both the preliminary studies had shown that teachers and students believed
that poor readers would benefit from the use of electronic storybooks. Across the case
studies three phenomena consistently emerged. First, the students with poor oral
reading skills accessed, on occasions, the inbuilt rereading feature of the software.
This action usually occurred when the students knew they would be asked to read the
text aloud as part of the unit of work. Helen, for example, required her students to read
their favourite pages aloud as one of the activities. As we listened to this reading,
Helen and I recorded how often the reread facility was used. Half of the class did not access the feature at all. Five students accessed it once only. The remaining ten students accessed it a number of times with the most often being five times. Secondly, the students in all three classrooms showed little interest in interacting with the text of the story when reading preferring to listen to the reading and then explore the pages’ animations, sounds and other special effects. Nina observed her class’ fascination with the animations and special effects and concluded that the students were only interested in the electronic storybook because of these extra things that it did. Thirdly, all students were able to read and recall the story line very accurately after one reading. Helen, for example, was made aware of this as she conducted the sequencing activity with her group of weaker readers. Bob was forewarned of the possibility by his young daughter’s reading demonstration when he took the software home to try as he was constructing his unit of work. This third phenomenon led to the teachers claiming that the electronic storybooks were too easy for their students. It did not stop them from using the software but it meant that they focused more on language activities involving writing and reflecting on the text rather than those relating to oral reading.

These phenomena prompted further questions. Initially, I believed that the electronic storybooks would provide a modern version of books on tape that had been used extensively with the ‘read-a-long’ strategy to help poor readers. This belief was not the case as the learners quickly lost interest in hearing the story, preferring instead to adopt a more active role as a reader and exploring the story for themselves. Those who needed some help with oral reading expected the rereading feature to be in the software, but wished to be the one who controlled when it was used. There was no embarrassment attached to rereading the words as many times as needed.
The speed with which the learners picked up the storyline was a surprise to the teachers and me. We had hypothesised that it was probably a combination of the visual and auditory presentation on the computer with the learner control of the reading that created this phenomenon. Whether the text was too easy for the students, as claimed by two of the teachers, was not resolved. This phenomenon was also reported in the Australian Newspaper in a interview by Bruce (1995) of Mark Schlichting, the creator of the first Living Books, Just Grandma and Me. Bruce commented that infants teachers to whom she had shown the storybook had complained that the reading level was mid-primary. Schlichting did not deny this comment, but believed instead that three and four-year olds who read the books over and over and learnt the whole story could then read the text from print books accurately. Such an apparent conflict of ideas provides support for the contention that literature can be used at all levels of learning (Cairney, 1988; Winch, 1988; Barnett, 1988). It also challenges the concept of the necessity to match the reading level of the text to the student’s reading ability, and other assumptions about literacy, when a multimedia electronic format is used (as does Derewianka, 1993).

7.7 Construction of electronic storybooks

Based on the data from the preliminary studies, Helen, Nina and Bob chose to use Living Books titles in their units of work. They did this because the students were attracted to the sounds and animations and the teachers felt these features would help the students remain on task during lessons. Helen and Nina made particular use of the hidden object feature in their learning activities. Helen’s students, for example, created
extra pages with a hidden bone as part of their art-work. All three teachers preferred the electronic storybooks that included sounds and animations.

The teachers all made use of the feature of the electronic storybook that allowed the students to read the story but not interact with any animations as the introductory reading for their units of work. By doing this, the teachers highlighted to the students the connectedness of the narrative and the importance placed on the story being told. The students were allowed to interact with the storybook as much as they wished during subsequent readings. While some students were observed spending a lot of time clicking on a page, this activity did not impact negatively on the students’ recall of the story.

In reflecting on the way the electronic storybooks were constructed, both the teachers and students had suggestions to make. In relation to literacy development, electronic storybooks would be even more useful if they:

- allowed the students to record their own reading of the story and then compare it to the recorded version;
- included pages consisting only of the illustrations so that students could write their own version of the story;
- included pages with only the text on them so the students could add their own illustrations;
- could add further chapters to the storybook; and
- were able to move characters around on the screen leading, perhaps, to the creation of a movie of the storybook.
These suggestions demonstrated that the students had readily accepted the electronic version of the storybook. The students also demonstrated their understanding of literacy through their suggestions that sought to integrate reading and writing within the one storybook. No student or teacher proposed that the narrative should be interrupted by activities, preferring instead to demand even more paper-based stories be converted to the electronic form and be available in their classroom.

7.8 Conclusion

In terms of the dimensions of Productive Pedagogy each of the case studies would have scored highest in the supportive classroom environment dimension. While I would then rate intellectual quality and relevance almost equal, both contained factors that were hardly visible in the classrooms I visited such as problematic knowledge, metalanguage and problem based curricula. All three classrooms would score poorly on the recognition of difference dimension. The Productive Pedagogy framework provided a new way at looking at the classrooms and provided an indication of areas of action to make learning more successful.

The teachers regarded each of the units as a success and all, except Nina, were able to imagine further use for electronic storybooks in teaching and learning. Helen thought she could use them in a different way as part of a literature unit and did so later in 1995 with the electronic storybook *The Paper Bag Princess*. Bob was interested in combining different titles again to use in support of other themes. He was not as confident about using them in a literature unit as Helen was. Nina indicated she would use some other form of electronic text in the future units of work rather than the storybook, preferring to keep paper-based texts for reading material for her class.
Whatever their differences all the teachers indicated in their reports that they would recommend the use of this software to other teachers.
Chapter 8: Conclusions

8.1 Introduction

This study had as its context the interactions between students, teachers and technology in primary classrooms. It looked at what happened when a particular style of software was introduced into that context. The teachers' pedagogy, organisation and management strategies were monitored. The macro view was provided by the three case studies using volunteer teachers, in different classrooms and using different teaching approaches. The micro view of each classroom was provided by the action research of the teachers that allowed them to examine and develop their own practice as well as provide recommendations for others.

The examination of experience in these classrooms with technology is vital to those teachers seeking to improve student learning. Teachers and students have moved beyond the point where the technology is new, it is now commonplace. By examining a number of different classrooms, this study highlighted the pedagogy, organisation and management issues that the teachers in these classrooms faced and overcame in their unique ways. This study did not find a miraculous solution that, if applied to all classrooms, would have technology enhancing all learning. What it did do, however, was identify what needed to change in order for the process of enhancing student learning through technology to begin and to be sustained.

The use of multiple case studies allowed the classroom context to be explored (Yin, 1994; Tellis, 1997) and in using action research (Myers, 1997; Schmuck, 1998) the teachers themselves became an integral part of the research. From the data conclusions can be drawn concerning
• Pedagogy, organisation and management in the classroom context
• General use of electronic storybook software
• Concepts of literacy
• Construction of electronic storybooks
• Recommendations for other teachers.

8.1 Pedagogy, organisation and management

Pedagogy concerns the teaching strategies and assessment practices teachers employ everyday in their classrooms (Newmann, Marks and Gamoran, 1995). Four key aspects of pedagogy emerged from this study: the beliefs of the teachers which informed the choices they made; the goals set for the learning program; the selection of the content; and the teacher’s behaviour in the classroom.

The philosophy underlying what teachers do has been evolving and at the time of this study was best summarized by Sandholtz, Ringstaff and Dwyer (1997, p. 14) in their description of teaching as a range from instruction to construction. The approach taken by a teacher within the classroom can also be determined by school wide policy as it was for Helen and Bob in this study. In terms of using technology, however, the philosophical approach was not critical to the establishment of a successful unit of work. An area of difference emerged, however, when the role of the technology was identified in each classroom. Helen and Bob placed the technology in a central role and maintained that throughout the unit of work. The computers merged into the teaching and learning activities being done to become almost invisible, in other words, no longer something special or different. Helen and Bob had taken steps to integrate the technology into their everyday activities. In Nina’s classroom the computer was
also almost invisible, but for very different reasons than those of Helen and Bob. Nina
gave the electronic storybook a very minor role in the learning program and once the
students had read the storybook, they only returned to it for amusement as they could
do the set activities without further reference to the storybook itself. Nina had not
begun to integrate the technology into her daily routines.

The goals set for the units of work were very similar in all three classrooms. These
goals were concerned with literacy, behaviour and technology use. The literacy or
language goals emerged primarily because the software used was an electronic
storybook and these core literacy goals were the same as those for a non-electronic
narrative text. Behaviour goals related to the interest and the enthusiasm of students
for using the software and being on task. The three case studies showed these goals
were met. Goals relating to technology use varied between case studies depending on
the level of computer expertise of the students. Helen was the only teacher who felt
the need to include specific goals relating to basic use of a computer in her program.

The two previous factors impacted greatly on the teachers’ choice of content for the
unit of work and the specific learning activities the students were to engage in. All
teachers began with language activities they were familiar with from previous units of
work using paper-based texts and all used a whole language approach (Weaver, 1994)
to literacy learning. Differences emerged in terms of changes to the activities selected
because of the electronic nature of the storybook. Both Helen and Bob chose to
incorporate those known teaching strategies into a new framework because they
believed the framework would allow their students to make use of the electronic
storybook more fully in their learning. Activities changed as well, for example,
comprehension exercises which previously would have required answers from a reading of the text now required the student to read the text, listen to the reading, watch the animations or explore the hot spots on each page to achieve a response.

It was, however, only when I observed the teachers in their classrooms that two significant differences became visible. Firstly, the teachers differed in the extent to which they needed to be the person in control of the learning during each lesson. Nina was the teacher with the greatest need for control, whereas Bob had the least. Secondly, the teachers differed in their own attitudes towards technology. Nina had little to do with the computer once the introduction to the storybook had been made, whereas Helen and Bob showed interest and enthusiasm for the storybooks throughout. Once the teaching strategies and goals were chosen, this study showed that further enhancement of learning through technology occurred if the teacher relinquished some control over the learning process to their students and removed themselves as the focus every lesson. The teachers also needed to be confident and comfortable in using the software and show their enthusiasm in the way they interact with the technology and students. The best message about learning and technology was given by the teachers who demonstrated their own commitment and enthusiasm each lesson.

Within this study the term organisation has been used to refer to the ways in which teachers involve the learners in decisions about how learning occurred. Each case study incorporated student–teacher interaction in a variety of ways (individual, small group, large group, whole class) and each showed students on task and engaged in learning. The amount of student control over when and how learning took place was
greatest in Bob’s class because of his use of a contract. All three teachers involved their students in evaluating the unit of work in some way although only Nina’s class were involved in assessing each other’s work. Two other organisational factors emerged as significant for the use of technology: the need to group students in some way; and support for weaker readers.

Given the limited availability of computers during this study the only way to ensure each student had sufficient access was to engage in a grouping strategy and provide a rotation between on and off-computer activities. All the teachers did this, although the groups using the computer varied in size from two to four. Fewer students on the computer meant each student got a better use of the computer, but it had the disadvantage of lengthening the time needed for all class members to complete their work.

The preliminary studies had indicated that electronic storybooks might be useful for weaker readers and the case studies showed exactly how this process occurred. While most students showed they were not interested in interacting with the text during the reading of the storybook, the weaker readers engaged in text interaction by using the rereading feature. The weaker readers accepted the assistance provided by the electronic storybook when they needed it and, in fact, indicated that they expected some sort of support would be available because they were using computers. The implications for the teachers were threefold. Firstly, to include some oral reading activities meant that they would need to allow the weaker readers to access the rereading support. Secondly, if the teachers wanted to focus on the text of the story they would need to explicitly engage the students in activities designed to do just that.
Thirdly, other language activities, such as writing, would need to assume a greater role in each of the units of work.

Management issues focused on creating a learning environment to facilitate the pedagogy and organisation of learners that the teacher had adopted. The creation of a positive classroom climate was a goal all the teachers worked towards. They found that the use of electronic storybooks facilitated this positive climate as each teacher had a class full of enthusiastic, interested students. In practical terms, however, three key management issues had to be faced by each teacher and a solution found prior to the implementation of the units of work. These issues were:

- number of computers for implementation of the unit;
- layout of the computers within the classroom; and
- length of time allocated for the unit of work.

All three case study classrooms contained one computer prior to the commencement of the study. Both Helen and Bob decided that they needed more computers. They achieved this goal by borrowing from other classrooms under a reciprocal agreement. Nina decided to stay with the one computer she already had. Fitting the extra computers into the classroom required careful planning and lateral thinking, as it was not just a matter of placing the computer on a spare desk. The vacant desk had to be big enough to hold the computer keyboard and mouse, near power so electrical cords would not be lying around the floor, and have sufficient floor space around it to seat the students in the group who would be required to use it. Both the number of computers available and fitting them into the classroom impacted on the length of time that was needed for all students to complete the unit of work. The teachers all
addressed this issue through their grouping strategy. Nina and Bob were able to keep to the original allocated time, but Helen could not. Helen had her students working in pairs that meant that it took a longer time for each pair to complete all its work. As it was important to Helen and her students that they all complete the unit of work, Helen found extra time for students to use the computer that ultimately lengthened the unit of work by two weeks.

The practical considerations of how many computers there are and how they are placed in the classroom have often seemed insurmountable difficulties to teachers. Certainly in this study Nina showed that you could make no change to your computer resources and still create a successful unit of work incorporating technology. What she compromised, however, in doing that was the extent to which the technology was integrated into the teaching/learning program and hence, the use the students made of the technology to enhance their learning. Bob and Helen, on the other hand, increased the level of technology, which allowed their students greater use of the computer to assist their learning.

8.3 General use of electronic storybooks

This study showed that it was possible to replace paper-based literature in learning programs with an electronic version without having to change much at all, as Nina did. Thus electronic storybooks are a good way to begin to introduce technology into teaching and learning. The study also showed that it was possible to use electronic storybooks as a means to explore new ways of organizing the learning, as Helen and Bob demonstrated. What emerged as critical for the use of electronic storybooks was whether the existing teaching and learning program had incorporated paper-based
literature. The three teachers in this study were using literature within the context of a whole language approach and so had positive expectations relating to the stimulation of interest and creativity that might result. These expectations were confirmed when the electronic versions were used. As well as including activities centred on paper-based literature, the teachers modified some activities to allow for possible changes due to the electronic nature of the storybook, for example, looking for meaning in the sounds, pictures and animations on each page as well as the text or comparing the paper and electronic texts in a similar way to a comparison of book and movie.

In this study, there was a positive impact on student outcomes by the use of electronic storybooks, however, this impact was mediated by the extent to which the teachers themselves interacted with the technology and how important the storybook was to the outcomes of the unit of work. A clear contrast was seen between the outcomes of Nina’s unit of work and that of Helen and Bob when these factors were taken into account. There were more positive outcomes for Helen and Bob and their students in that the outcomes were achieved through the use of the technology as well as the positive role model of a computer user demonstrated by each of them.

Electronic storybook use also contributed to the maintenance of a positive classroom climate and to time on task for each student. The students showed enthusiasm every lesson during the unit of work. They were very vocal in their opinions of the electronic storybooks and their suggestions on how they could be improved.
8.4 Concepts of literacy

This research highlighted two broad issues concerning literacy. The first related to the importance of oral reading to overall literacy standards. Within this study, it emerged that students, whatever their age, could successfully read the text of the storybook aloud after working with the electronic storybook for only a short while. As a result, the teachers spent little time on oral reading aspects of literacy in the units of work and turned instead to comprehension, writing and creative response aspects instead. For the weaker readers, their inability to read the text aloud fluently dropped in importance when they realized they could access the support provided by the software any time they chose. This feature had a positive impact on the confidence and enthusiasm of those students as they completed the language activities in each unit of work.

The second issue concerned how teachers envisage literacy in a multimedia environment. Many of the positive outcomes from the use of electronic storybooks seen in this study were related to the fact that the book being used was not paper-based and that it included sounds, illustrations, and animations. This change of media reflected the widening of the range of texts students are required to read, both paper and electronic. This study demonstrated that positive outcomes emerge from a move to electronic text, though it did not identify any specific features to be responsible. It also showed that the students’ basic technological literacy, that is their ability to use the computer and software, was not an issue. The skills needed were attained quickly if they were not already in place. The focus of the learning then returned to the text being presented, the form it took and the meanings it conveyed.
8.4 Construction of electronic storybooks

From this study two factors emerged that related to the construction of more electronic storybooks. Firstly, there was the issue of whether the sounds and animations included in the storybook detracted from the story. This study illustrated that students preferred to use those storybooks that contained these extra features. During the units of work students were seen enthusiastically interacting with the animations yet their knowledge of the story and their ability to read it aloud were not diminished by this interaction. When asked for ways to improve electronic storybooks most students indicated more interaction rather than less.

Secondly, there was the issue of whether the narrative of the electronic storybook should be presented in an uninterrupted way. All the electronic storybooks used in this study presented the story as a continuous narrative. Some of the newer titles, from different publishers, have included games and activities within the pages of the book. These games and activities are often phonics based and designed to ensure the students focus on the words used within the text. I do not believe that such storybooks would have the same positive outcomes because they lose the overall connectedness of the story. They have also pushed the students’ focus from the narrative to the phonics and away from construction of meaning.

Many of the students in making their suggestions of ways to improve electronic storybooks indicated that they would like to see a closer link between the storybook and the activities that their teachers had devised for the unit of work. Helen’s class enthusiastically talked about being able to change the text or to write their own text to accompany the storybooks’ illustrations. Such improvements would strengthen the
link between those aspects of literacy and, combined with existing support for oral reading, provide a new resource for literature-based teaching. In fact, these improvements have been incorporated into an electronic book series called *WiggleWorks* produced by Scholastic and released in schools in 1994.

### 8.6 Recommendations for other teachers

The NSW Department of Education and Training has been supplying schools with computers over the last 6 years so that a large amount of the technology is available but teachers have not rushed to implement changes in their classrooms. Dwyer, Ringstaff and Sandholtz (1991) identified four stages that teachers go through as they come to terms with technology rich learning environments and these stages can be seen in the work examined in the case studies. The first stage is where teachers are concerned to use the technology to support traditional curriculum and methods of instruction. The second stage is where teachers can use the technology to cover the curriculum faster and hence have time to experiment with organisational changes. Nina showed that she was positioned as moving between stages 1 and 2 because she had made little change to the curriculum but had decided to experiment a little with group work.

The third stage involved teachers undergoing a fundamental shift in their views about learning and allowing the technology to become integrated into the teaching/learning process. It is characterised by innovative approaches such as team teaching, student collaboration and interdisciplinary projects. The fourth stage involved teachers building new learning environments that employ technology as a flexible learning tool. Learning was viewed as a creative and interactive process. Both Helen and Bob
demonstrated they had reached the third stage as they had integrated the use of the technology and were experimenting with different ways of structuring learning activities.

Teachers wishing to incorporate electronic storybooks into their own teaching/learning program can gain insight from this study. They can see from Nina’s experience at Parkland Primary School that it is possible to make use of electronic storybooks and only make small changes to established practice. What they can also see from this study is how the same software can be more fully integrated into a teaching/learning program as demonstrated by Helen at Eagle’s Nest Primary and Bob at Wilderness Valley Primary.

All the units of work created for this study made use of established principles for using literature in classrooms, available to teachers since the early 1990’s and outlined in the work of Nicoll and Roberts (1994) and Callen (1991). In taking note of how these principles might be changed to cater for electronic storybooks some guidance might be taken to examine how other electronic text (such as encyclopaedias and the Internet) might be used in classrooms.

The teachers participating in this study all provided some recommendations for other teachers based on their experiences. These recommendations formed the final part of the action research cycle in this study as the teachers had planned, implemented, observed, gathered data, and reflected on their own classroom situations. By the end they were at the stage of looking ahead to future units of work.
These recommendations are not exhaustive as they are based on only three case studies and many require complementary decisions in areas of pedagogy, organisation and management to be implemented as well. The teachers of this study proposed that in creating a unit of work incorporating electronic storybooks, positive outcomes are more likely to result if teachers:

- selected a popular theme for the unit of work that had an electronic storybook(s) closely related to it;
- provided a variety of tasks for the students to do both on and off-computer. The off-computer activities must be related to the storybook and provide a link with the on-computer activities. On-computer activities should be short in duration as each student’s time on the computer will be limited. This study averaged only 15 minutes per group each time they were on the computer;
- ensured that the weaker readers had the opportunity to access the non-threatening support for correct oral reading provided by the storybook;
- made use of the multimedia features of the electronic storybook to add depth to their language activities. The electronic storybook, for example, could be used to focus on the characters within the story as they are more easily identified through the sound and animations accompanying the text than they are in paper-based versions; and
- allowed themselves at least two hours per electronic book when preparing the unit of work to ensure that they, as the teacher, had a thorough knowledge of the software and all its features.

Positive outcomes are also likely to result if students:

- completed different types of activities each time the electronic storybook was used;
• maximised their time on the computer through the use of a minimum of four computers; and

• read in pairs at the computer, taking turns to choose the time to turn the page, to read aloud certain pages and to access the animations and other special features.

8.7 Research initiatives

In merging technology, literacy and teaching practices this study highlighted the need for more extensive research in five areas. The first of these areas relates to the identification of successful ways to encourage teachers to integrate technology into their teaching and learning practices. The research might mirror the work of this study and select certain software that allowed teachers to make use of existing teaching and learning practices. The goal for research in this area would be to facilitate teaching moving into the fourth stage of implementing technology as identified by Dwyer et.al. (1991). Further research is needed to demonstrate how technology integration can be done in classrooms and to develop best practices in organisation and management of learning.

The second area relates to the development of pedagogy that clearly supports technology integration. The Productive Pedagogy framework, for example, and any research into improving student learning outcomes must incorporate technology, not as a resource for the classroom, but as an integral part of teaching and learning. Such research must be situated within classrooms in order to provide teachers with clear links and applicability to their individual situations.
The third area relates to the importance of presenting the electronic storybook as an uninterrupted narrative and not providing, as some storybooks producers have insisted, phonic exercises, puzzles and comprehension questions after each chapter. Such research could be supplemented by an examination of the storybook software which presents the narrative in an uninterrupted form, but which also provides facilities for students to modify text or illustrations and compose their own written text, such as in the *WiggleWorks* series.

Fourth, attention needs to be given to close exploration of the impact of the multimedia presentation of text and the role that hypertext might play. The nature of the text being read will almost certainly impact here as observations of students in this study indicated that hypertext was not accessed if the narrative was being read, yet it is a feature used extensively with factual text and when on the Internet. The separate contribution that the sound, pictures and animation might make also needs to be investigated to provide an answer to the concerns raised by teachers and researchers (for example, Glasgow, 1996 and Wild 1995) as to whether these features detract from the reading of the text. Although the evidence collected in this study indicated that extra features did not disrupt the reading of the text more investigation needs to be carried out.

Closely related to the two previous questions is the need for research to find a resolution to the apparent mismatch between the perceived reading level of the storybooks in paper form and the apparent ease with which students can read that paper version after a short time using the electronic format. This question did not become an issue in this study, though all teachers mentioned it in their reports. In this
study the teachers accepted that it occurred and made changes to their activities accordingly. It is, however, worth identifying what is happening because, as a result, new strategies and materials might then be able to be recommended for use to help those who struggle with reading whatever their age.

8.8 Conclusion

The introduction of electronic storybooks has been shown to have a positive effect on student motivation, enthusiasm and achievement of goals. This research study provided teachers with evidence of their own ability to move forward in their endeavours to integrate technology as part of their regular classroom activities. Introducing electronic storybooks resulted in changes in the classroom, in its physical composition and in the way learning was structured. There is strength also in what the study did not conclude. It did not identify only one correct way of managing the learning environment. It did not align the use of electronic storybooks to any one philosophical approach to teaching. It did not develop a set of worksheets or activities that teachers should use. In fact, this study showed that the differences in terms of pedagogy, organisation and management did not hinder the integration of technology into teaching and learning. Given the guidance of the preliminary studies, the teachers were able to find their own solution for the learners in their classroom and, by doing so, they maximised the positive effect.

Surveys (Becker, 1991; Sherwood and Buchannan, 1993) have shown that teachers in Australia and overseas have been reluctant to take up the challenge of integrating technology into their classrooms despite the computers and guidance that their employers have provided them. I believe, supported by this study, this reluctance may
occur because the change must be made at the individual teacher level. It may involve
the teacher taking small steps, like Nina, or much larger ones, like Helen and Bob.
This study demonstrated clearly that the steps can be taken if the teacher is willing,
good software is available, and the teacher is free to use strategies that best suit the
learners in their classrooms.

A concern might be whether the steps taken by these teachers can be sustained. While
that was not within the scope of this study, some data are available to illuminate what
has happened in the time since the case studies were completed. Nina has tried other
software such as computer-based encyclopaedias and her students have become avid
users of the Internet. Helen introduced a different type of electronic storybook into her
classroom before the end of 1995 and made electronic versions of literature an
essential part of her language resources for her class. She also explored what happens
if you make use of a computer room format for a unit of work. Bob expended his
interest in creating and identifying suitable software for use in classrooms by taking up
an advisory position with the Department of Education and Training so that he can
help other teachers integrate technology into their teaching and learning. In light of
this finding, I concluded that the steps are continuing.

Other research (Swan and Meskill, 1996; Mike, 1994; Parham, 1993; Perry and Perry,
1992) about using software in classrooms has often focused on what the software and
the students do. While these aspects are important and were included in this study, the
role of the teacher was also found to be most important. The teachers are the ones who
make the decisions about why, how and in what way learning occurs in the classroom.
This study concluded that teachers can successfully answer these questions by
integrating electronic storybooks into their classroom practices and that the decisions they make, result in positive and productive learning for their students.
References


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Tellis, W., (1997). Introduction to case study. The Qualitative Report, 3(2) (Online) http://www.nova.edu/ssss/QR/QR3-2/tellis1.html


Appendix 1: Teacher survey

To: Primary Computer Co-ordinator

EVALUATION OF ELECTRONIC BOOKS

As CD-ROM technology becomes more widespread in schools there is great pressure placed on teachers to incorporate this technology into their teaching and learning programs. As part of my PhD research I am examining how we can best use electronic books to assist young students develop their language skills.

You probably know of electronic books such as Grandma and Me, The Tortoise and the Hare, Little Monster Goes to School, The Paper Bag Princess, Peter Rabbit, Arthur's Teacher Trouble, The Ugly Duckling, and so on.

I would appreciate it if you (or another member of staff) would take a few minutes to complete the following survey to provide me with a base of teacher opinion on the use of electronic books. A summary of the data will be provided in Term 3's edition of Reaching Out.

This research is approved by the University of Western Sydney and also has the approval of the Metropolitan North Region Research Committee.

Please return surveys into State Mail by 30th June, or fax to:
Coral Shand
Computers in Education
PO BOX 450
Hornsby 2077 or FAX 02
(This is so I can collect them from the office later in the school vacation time)

THANK YOU FOR YOUR ASSISTANCE.

-----------------------------------------------
TEACHER COMMENTS ON ELECTRONIC BOOKS

(A) Which electronic books have you looked at or used? Please give their titles.

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________
(B) In your role as a teacher please rate how useful electronic books could be as a means to:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Encourage reluctant readers</th>
<th>Help poor oral readers</th>
<th>Provide a model for creative writing activities</th>
<th>Keep a student busy/occupied</th>
<th>Encourage talk between students to read the book together.</th>
<th>Introduce a story to the whole class.</th>
<th>Encourage the asking of questions such as &quot;I wonder what would happen if....&quot; while reading.</th>
<th>Develop positive attitudes to reading.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tbody>
</table>

(C) Describe how you have used electronic books in your classroom so far. (If you haven't used them yet, you might indicate how you would like to use them, or skip to part (D)).
(D) Some particular features of an electronic book may be more useful in assisting learning than others. Please indicate how important each of the following features are to you.
(1= not useful at all, 5= very useful)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The text is highlighted in meaningful phrases as it is read by the computer software.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. The reader can reread individual words or paragraphs.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. The software can record the reread words for the teachers to refer to at a later time.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. It is possible for the reader to interact with the text in order to gain: word meaning; correct pronunciation.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. Illustrations are in colour.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. Animations accompany the computer's reading of the story.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. The reader can activate animations by clicking on the pictures or text.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8. There is a lively introduction to the story.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. Sounds accompany the action of the story.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10. There is a musical theme or song associated with the story reading</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
(E) In your opinion, which classroom language experiences would allow poor struggling/slow readers to benefit most from the use of electronic books?

THANK YOU ONCE AGAIN FOR YOUR ASSISTANCE.
Appendix 2: Structure interview - students

Student ID:

Age: Year: 2 3 4 5

Teacher reading ability rating: poor average good

Information provided by student:

1. Experience with computers
   - Do you have one at home? Yes No
   - Do you have one in your classroom? Yes No
   - Do you go to the computer room with your class? Yes No
   - Do you play games on the computer? Yes No
   - Which is your favourite? (Not real good average pretty good excellent)
   - What other computer programs do you know? Yes No

2. Experience with electronic storybooks
   - Have you seen this software before? Yes No
   - If yes, which titles?

3. Attitude to reading and writing
   - How good a reader are you? not very good OK good very good
   - How good are you at writing stories? not very good OK good very good
   - Do you like to read books? Yes No
   - If you had a choice would you prefer to read poems or stories? Poems Stories
   - Do you like to write stories? Yes No
   - Do you like to read by yourself or with friends? Self Friends

4. Introduction to electronic storybooks given.

5. Observations of student reading.
   - How did they approach the task?
   - What actions were taken?
   - How much interaction with the visuals and text was there?
   - Did they need any help?
   - Did they want to involve me in the reading task, talk to me while reading?
6. If you could have a say in how electronic storybooks were produced, how would you rate the following features?

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening scenes</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
</tr>
<tr>
<td>Sound effects</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
</tr>
<tr>
<td>Having the text read to me</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
</tr>
<tr>
<td>Pictures with the text</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
</tr>
<tr>
<td>Animations while reading</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
</tr>
<tr>
<td>Being able to click on words to get meaning or hear things being pronounced again</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
</tr>
<tr>
<td>Being able to click on pictures/text to see extra animations</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
<td>................................................................................................</td>
</tr>
</tbody>
</table>

7. If you could give your teacher some advice, how would you like him/her to include electronic storybooks in your lessons?
Appendix 3: Case Study 1 – 4MAT plan for unit of work

Helen’s program of work using 4MAT approach

<table>
<thead>
<tr>
<th>4. Creating new ideas. WHAT IF?</th>
<th>1. What I know. WHY?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher’s role: Evaluating/Remediating</td>
<td>Teacher’s role: Motivator/Witness</td>
</tr>
</tbody>
</table>

- Project on pets
- Innovate on text
- Stencil - double sounds
- Listening to music and responding
- Senses - how do pets use them?
- If you could have any pet in the world what would you choose? Why?
- Write a story from the pets point of view
- Write a newspaper article on ‘The Importance of Keeping a Dog on a Leash’.
- Create a poster to make others aware of the needs of animals as part of our environment
- Draw - hidden picture

<table>
<thead>
<tr>
<th>WHAT IS A PET? WHAT ARE THEIR NEEDS?</th>
<th>RSPCA - guide dogs</th>
</tr>
</thead>
</table>

- Write four riddles about pets
- What is a veterinarian?
- Design a pet shop
- Debate: Giraffes make good pets.
- Copy part of a poem or story
- Tongue twisters
- Time line - activities I need to do as a pet owner
- Video strip (drawn) - caring for pets
- Phrases e.g. timid as a mouse
- Visit by local vet
- Make a sock puppet
- Role play - How a pet might react if...
- Book review
- How do we feel about our pets?
- What jobs do pets perform?

<table>
<thead>
<tr>
<th>3. Practical application. HOW?</th>
<th>2. What I need to know. WHAT?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher’s role: Coaching/Facilitating</td>
<td>Teacher’s role: Teaching</td>
</tr>
</tbody>
</table>

- Make an activity page for a student in Kinder e.g.
- dot to dot
- Classify pets - invertebrates, mammals, birds, fish, reptiles, amphibians OR by body coverings
- Reading - research
- Pets brought to school
- Maths problem - number sentences
- Vocabulary related to pets
- Discussion:
  - Why do we have pets?
  - Do all people have the same pets?
  - How do people choose a pet?
  - Can all animals be kept as pets?
  - What are the needs of pets?
  - How can I be a responsible pet owner?
  - How are pets protected?
  - How do we communicate with pets?

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Appendix 4: Case Study 2 – activities list for unit of work

List of the teaching/learning activities:
1. Introduce the book and read as a picture book.
2. Students read the book on the computer in pairs.
3. Students commence group work cards in groups of 4 with one group each day being withdrawn to use the electronic book. In all, each group should have completed 6 cards.
4. Class discussions: The class sits in a circle and pass a ball to have a talking turn. Only a few questions were used each session. Student questions were also encouraged for discussion.
   - Should we have all girls or all boys parties? Why? Why not?
   - What has been the best party you have been to? Why?
   - Do you have to have a party?
   - What makes a good party?
   - What is best - a morning, afternoon or evening party?
   - What are the most important things about a party?
   - What makes a good friend?
   - Does a friend always have to do what you want?
   - What could have been inserted, omitted or changed to make the story end differently?
   - What questions would you like to ask Arthur?
   - What does not seem real about the story?
   - What else do you wonder about the story?
5. Spin the Bottle Spelling using words associated with friends and birthdays as suggested by students. Form a word bank of these.
6. Class game: How many syllables in the word before..... on the computer screen.
7. Quiz page: In groups students make up quiz questions asking what happens when a particular interactive feature is accessed. Three answers are suggested and the correct one can be identified. These could be formed into a book.
8. Glossary page: In groups students choose 6 words per page and use dictionaries to find word meanings. These can be compiled into a glossary in alphabetical order.
9. Design and make a birthday cake for Arthur or Muffy out of cardboard.
10. Read and sing words of Arthur’s Birthday song to the tune of the Limerick song.
11. Write a report of the party as told by the birthday cake. Read the story on to audio tape if possible.
12. Write a conversation among 3 story characters using speech balloons.
13. Illustrate one part of the story and tell where it comes from in the book.
14. Oral reading to the teacher from the book or computer. Often using the ‘each student read one page and then pass it on’ method.
15. Literature talks
   - Books that come in a series (The Arthur books are a very large series)
   - Recognising that narrative stories have a pattern: orientation, complication, conclusion.
16. Make a calendar for the month and fill in some birthdays and special events.
17. Cut and paste pictures in their correct places on a story map showing orientation, complication, conclusion.
18. Find as many interactive hot spots as possible on one page and write what happens when the spot is clicked.
19. Make a birthday card for Arthur or Muffy.

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Appendix 5: Case Study 3 – contract sheets

The *Living Books* contract sheets

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**The Berenstain Bears Get in a Fight**

**Computer Based Activities:**
1. Let the computer read the story to you.
2. Use the “Let me Play” button to reread the story.
3. Use the “Options” button to choose a page.
   - Find the bee.
   - Write four sentences that give clues for other students so they can find the bee.
   - Don’t forget to tell them the page number and try not to make it too easy.
   - Give your work the heading “Bee-ing There”
4. Click on the “Meet the Authors” icon.
   - Watch the video and take notes.
   - Write a half page report on the authors and the way in which they write their stories.

**Off-computer Activities:**
1. If you were one of the younger bear’s parents how would you have solved the problem?
   - Write a half page of what you would say to Brother and Sister Bear.
2. Design your own interactive page.
   - On a half page of A4 paper draw a page from the story.
   - Number 10 things on your picture.
   - Underneath your picture write down what would happen if you clicked on a number. Don’t forget to use sentences.
3. Who was at fault in the story, Brother Bear or Sister Bear? Why?
   - Write 5 sentences to explain your reasoning.

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**Arthur’s Birthday**

**Computer Based Activities:**
1. Let the computer read the story to you.
2. Use the “Let me Play” button to reread the story.
3. Let the computer read the story to you.
   - As you listen write down 20 words from the story. Make sure they are interesting or action words.
4. Use the “Options” button to go to page 4.
   - In your own words describe what is happening.
   - Give your work the heading “Decisions”

**Off-computer Activities:**
1. Using the words from part 3 create a crossword on a sheet of 1cm grid paper.
2. Make a booklet showing the people in your family
   - If possible, use photos from home.
   - Write a little about each person under their portrait or drawing.
3. Re-write the story from Muffy’s point of view.

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### Arthur's Teacher Trouble

**Computer Based Activities:**
1. Let the computer read the story to you.
2. Use the “Let me Play” button to reread the story.
   - See if you can find the paper aeroplane on each page.
3. Use the “Options” button to choose a page.
   - Find the paper aeroplane on the page.
   - Write four clues for other students to find the aeroplane.
   - Don’t forget to tell them the page number.
   - Give your work the heading “Where oh where has my little plane gone”
4. Use the “Options” button to go to page 23.
   - Pretend that you are Arthur.
   - Write out a speech that you would give to the assembly.
   - Give it the heading “Arthur’s Speech”

**Off-computer Activities:**
1. Create a close passage based on the book.
2. Using the stencil provided make an Arthur doll
   - Write a short adventure for Arthur.
   - Get your Arthur doll to present “his” adventure to the class.
3. Choose a character from the story.
   - Predict what they will be doing in 10 years time and then predict what they will be doing in 20 years.
   - Your predictions should take about half a page.
   - Give your work the heading “Predictions for (your character)”
4. Write a procedure on how to fold a paper aeroplane.
   - Give your instructions to a member of your group and ask them to construct an aeroplane using your procedure.
5. Write another Arthur adventure and publish it as a book.
Appendix 6: Sample Interview record and summative report

Notes from interview number one with Bob at Wilderness Primary School. ¹

- Yr 3/4
- Relationships Theme - How do I get in?
  - Loan - Arthur Teacher Trouble
  - Arthur's Birthday
  - Moving gave me a stomach ache
  - George Alternatives

- Copy of issuing books framework video
- At Arthur's Teacher Trouble session

- MAC & DOS - School MAC
  - 3 machines

Scanned summative report from Bob follows.

¹ References to actual school have been crossed out.

Part A- General Background Information:
* School: [Redacted] Public School is located on the Central Coast of N.S.W. It has a school population of approximately four hundred and thirty children. This comprises fifteen classes from kindergarten to year six and three special education classes. The population of the school includes children from NESB, ESL and Aboriginal backgrounds. The area includes a number of housing commission homes and three caravan parks. The school also has a large number of single parent families and unemployed parents. [Redacted] has been on the Disadvantaged School Program for the last six years.

* Students: Class 3/4G comprises fourteen students from year three and fourteen students from year four. Year three comprises five boys and nine girls while year four is made up of five girls and nine boys. Most of the children of the class are working at an average or above average level in English (as reported by standardized test such as Torch Reading Comprehension, Pretos Spelling etc.) however, there are six children in the group whose English level would be described as very low.

* Classroom Organisation: Four Mac575 computers were used by the children for their work on the living books project. Installed on the computers were Arthur's Birthday, The Berestain Bears get into a Fight and on two computers Arthur's Teacher Trouble. The children were broken into four main groups, one for each computer, and these groups were then split into three subgroups. The main groups rotated computers every six days so that all children experienced each living book program. Lessons for the living book project were broken into on computer and off computer activities. During each lesson, which was approximately seventy-five minutes, each subgroup had twenty-five minutes on computer time and fifty minutes to complete their off computer activities. The main reason for the subgroupings was to limit the number of children on a computer to no more than three at one time. The time taken for the unit of work was approximately five weeks.

* Teacher experience: I have been teaching for eighteen and a half years. I started teaching at [Redacted] then moved to [Redacted]. When [Redacted] was opened in 1980 I transferred to [Redacted] and taught there until 1994 when I was promoted to Executive Teacher Primary at [Redacted]. Public and commenced duty in 1995. My initial contact with computers was in 1987 when I helped inservice staff on Microbee computers and programs. In 1993 I was made AST for computers at [Redacted] and taught computing to children in years two to six in 1993-4 as part of the R.F.F. program. I have had units of work published to support Eco Quest I and The Science Knowledge Adventure Series, both programs distributed by Sega-Ozisoft. I am presently involved in EDUCATE.BBS, a BBS situated at [Redacted], Technology High which is designed and run by students and teachers mainly for students and teachers I am heavily involved in both the Development and Education Teams whose main aim is to promote literacy, telecommunication and computer skills.
Unit of Work
Growing Up

Part B - Information about the unit of work conducted:

* Rational - The unit of work was an English unit based on the theme "Growing up" and included both on and off computer activities. Three living book programs that were chosen were Arthur's Teacher Trouble, Arthur's Birthday and The Berenstain Bears Get In A Fight. They were chosen because they depict incidents that the children may encounter while they are growing up.

* Content - The unit focussed on level two outcomes from the English Primary Syllabus. The unit included activities that had to be completed using the computer and the living book programs and activities that were related to the living book programs but didn't need the use of a computer for them to be completed. For a more detailed list of the contents of the unit and the activities the children had to complete refer to appendix 1.

* Teaching/learning strategies - The unit of work was issued as a contract that had to be completed and handed in at the end of the five week period. Most of the outcomes that the children had to complete didn't involve any formal teacher directed lessons as such, however, children that were experiencing problems were treated individually or in a small group situation on a needs basis. As well as looking at the level two English outcomes I was also looking at how the children utilised their time as this was the first time that the children has experienced a contract system with me this year.

* Student Outcomes - The following level two outcomes from the English syllabus were the focus of the unit Growing Up.

2.1 Considers how own speaking and listening is adjusted in different situations.
2.3 Recognises that different kinds of spoken texts have different organisational patterns.
2.5 Experiments with different linguistic structures and features for expressing and interpreting spoken ideas and information.
2.8 Engages with events, incidents, and characters in literacy (including media) texts.
2.11 Constructs and retells meanings from short written texts with familiar topics and vocabulary, predictable text structures and frequent illustrations.
2.13 Recognises some of the purpose and advantages of writing.
2.14 Writes brief imaginative and factual texts which include some related ideas about familiar topics.
2.15a Writes using letters of consistent size and slope in NSW foundation Style.
2.16 Uses talk to plan and review own writing.
2.17 Usually attempts to spell words by drawing on knowledge of sound/symbol relationships and of standard letter patterns.
2.18 Uses some basic linguistic structures and features of written language so that writing can be readily interpreted by others.
* Evaluation process - Every student has a portfolio in which samples of their work are collected and sent home at regular intervals. These intervals are usually every five weeks. Each student is given an outcomes sheet for the unit of work they will complete in that five week period. Outcome sheets only include English and Maths outcomes at this stage. See appendix 2 for the sample sheet for this unit. While the sheet is labeled outcomes the reality is that the sheet lists activities or pointers for outcomes as the school has found that the outcomes are too vague and full of jargon to be of any value to most of our parents. The children are given the following rating: B- for beginning, D- for developing, C- for consolidating and E- for extending. There is also a comment for application and progress. To determine how the children went with the unit I have selected four children's work samples, two from year three and two from year four. I have included children who are above and below average in each grade sample. I have only included work completed by girls so that sex is not a factor in the evaluation process. See appendix 3 for the work samples.

* Evaluation of the unit - The first thing I noticed was that none of the children finished all the activities that were set for them. This is because there were too many tasks set for the children to complete within the five week period. I also noticed that some children were not utilising their time appropriately and there was a big rush to finish their work in the last week. This could have been overcome by staggering the marking throughout the unit rather than marking all the work at the end of the five week period as was the case. While the idea of a contract was a valid one I think that it would have been more appropriate for each living book to have its own sheet rather than be lumped together as I don't think the children were capable of visualising the amount of work to be done in the time frame.

Overall I was impressed by the standard of the work that the children submitted. All the children enjoyed the unit and couldn't wait to be involved. This was the first time that the children had access to that number of computers within their own classroom (the school does have a lab of fifteen Apple 2e's) and I was also impressed by the increased level of computer literacy and competency during the five week period. The use of an interactive program definitely improves the children's enthusiasm for work.

If I had to do the unit again I would allow time for some teacher modelling activities, especially for the less able students. I would also have involved the written texts that accompany the program so that the children could make a comparison between the written and multimedia texts.

None of the activities were too hard for the children but the level of ability to deal with the tasks is definitely evident. Danielle (year 3) and Lauren (year four) both struggled with both the quantity of the work but as can be seen from appendix 4 this work was an improvement on work from the previous term. Cassie (year 3) and Jennifer (year four) also struggled with quantity, however it is always good to provide a challenge for the more able students. Again when looking at their work from appendix 4 and appendix 3 there has been a noticeable improvement in the quality of the work that they are now producing.
Part C: Comments on the use of Electronic Books within the Classroom:

"Conclusions about electronic books in the classroom - The electronic books were an excellent starting point for the unit as they generated a lot of enthusiasm from the children. I also found that they stimulated the children's creativity and I had a greater range of ideas from their off computer activities than I would have if I would have given a demonstration lesson. Even today the children still ask, "When are we going to do some more living books?" The simple layout, brightly coloured pages and interactive nature meant that the children could become involved without teacher assistance so that the teacher could concentrate on the children having problems or modelling work for the other children. The interactive nature of the programs also catered for children with diverse range of learning styles.

I would, however, have grave reservations about using the programs solely as a reading program. I don't feel that they generate a lot of reading, and to back up this statement I would volunteer the following information. Before the project started I took a computer and the programs how during the holidays to familiarise myself with the programs and their content. My two year old son decided that Dad had brought the programs home for him to use and by the end of the two week holiday period could practically recited all the programs word for word despite being a non-reader. He would spend hours one the programs to find all the interactive elements, music or just listening to the stories. This example also illustrates the ease of use of the programs and the interest that they do hold for the children. I also found that the level of language used in the programs was far below the reading level of most of the children in year three and year four.

Another concern that I have with the program is the use of an American voice. I firmly believe that it would be much more appropriate to have an English or Australian accent for the children to model rather than the one presently used.

"Advice for teachers - The most important aspect I found was getting access to a number of computers. While four computers was adequate I believe that this was the minimum number of computers that I would use to successfully implement such a program and allow all the children to have reasonable hands on access to a computer. I would also suggest that teachers become very familiar with all aspects of all the programs before they started any program such as this and by that statement I would say a minimum of two hours on each program. Another suggestion is the use of headphones for the children using the computers. The children doing the author study on Stan and Jan Berenstein had great difficulty hearing the video while the other children were using other programs. This may have been a problem with the Mac computers which have a limited sound capability compared to I.B.M compatible computers. I also found that the children doing off computer work could also become distracted by the noise of the programs.

Another point I would suggest is to group children according to ability and to provide a more diverse range of activities to cater for these groups rather than provide one set of activities for all students.
* Recommended teaching/learning strategies - I would suggest both on and off computer activities for the children. A contract system works well as long as the previously mentioned points are taken into account. The should also be some form of teacher directed activites. Grading the activities the children are to complete, and the children according to ability groups is also desirable as it allows for individual differences.
Appendix 7: Productive pedagogy dimensions and factors

Dimension 1 – Intellectual quality
1. Higher order thinking: Are higher order thinking and critical analysis occurring?
2. Deep knowledge: Does the lesson cover operational fields in any depth?
3. Deep understanding: Does the work and response of students provide evidence of depth of understanding of concepts or ideas?
4. Substantive conversation: Does classroom talk break out of the initiation/response/evaluation pattern and lead to sustained dialogue between students and between teachers and students?
5. Knowledge problematic: Are students critiquing and second-guessing texts, ideas and knowledge?
6. Metalanguage: Are aspects of language, grammar and technical vocabulary being foregrounded?

Dimension 2 – Connectedness
7. Knowledge integration: Does the lesson range across diverse fields?
8. Background knowledge: Is there an attempt to connect with students’ background knowledge?
9. Connectedness to the world: Does the lesson and the assigned work have any resemblance or connection to real life contexts?
10. Problem-based curriculum: Is there a focus on identifying and solving intellectual and/or real world problems?

Dimension 3 – Supportive classroom environment
11. Student control: Do students have any say in the pace, direction or outcomes of the lesson?
12. Social support: Is the classroom a socially supportive and positive environment?
13. Engagement: Are students engaged and on task?
14. Explicit criteria: Are the criteria for judging student performance made explicit?
15. Self-regulation: Is the direction of student behaviour implicit and self-regulatory or explicit?

Dimension 4 – Recognition of Difference
16. Cultural knowledge: Are diverse cultural knowledges brought into play?
17. Inclusivity: Are deliberate attempts made to increase the participation of students of different backgrounds?
18. Narrative: Is the style of teaching principally narrative or is it expository?
19. Group identity: Does the teaching build a sense of community and identity?
20. Citizenship: Are attempts made to foster active citizenship?