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**New Bridges to New Literacies : Year five
and six students' use of hypertext in
information literacy acquisition**

**A thesis presented in partial fulfilment of the requirements
for the degree of
Master of Education**

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Jacqueline Mary Mason

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**The reseacher asserts her right and that of Dr. Ken Ryba to be identified
as co-authors of the diagram *Analysis of the Collective ZPD*.**

Abstract

This thesis addresses the some of the new issues for older New Zealand primary school students' information literacy acquisition. These issues have arisen as the result of the advent of computer-mediated interactive non-linear hypertexts, a new text type as opposed to traditional linear texts. The thesis maintains that the branching, expansive nature of hypertexts, coupled with socially constructed, strategic student learning, transforms the nature of learning itself, and creates a new synergistic learning environment and new conceptions of "literacy".

This potential for transformation is seen by the researcher as an ideal opportunity for teachers to design and implement new approaches to information literacy activity, and the process of this thesis puts this opportunity into action.

The research, then, seeks to clearly identify implications for teaching and learning of hypertext in relation to information literacy acquisition, through analysis and reflection of the experiences of the researcher in a classroom of year five and six students.

An ecological constructivist research perspective was selected as the philosophical, theoretical and methodological foundation of the research. This perspective clearly aligned with the research design and process. The research was designed as an ethnographic case study which was based on a model of analysis of the class "collective zone of proximal development" over three phases of development and observation.

The collection, analysis and "triangulation" of the eclectic range of data obtained from the ethnographic case study informed the analysis of conditions for successful "dynamic hypertextual literacy". This analysis in turn informed the construction of the findings, implications, and recommendations of the thesis.

Results from the study confirmed that hypertext does indeed require specialised strategies for accessing, processing and authoring. In addition, given the complexities of information hypertexts such as the Internet, socially-mediated settings which also allow opportunities for teacher guidance are critical to effective deep learning and construction of knowledge when these texts are used.

Further, the thesis suggests that the success or otherwise of "dynamic hypertextual literacy" is in the hands of teachers and the research embodies practical applications as well as outlining theoretical possibilities.

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Dedication

This thesis is dedicated to Peter and Gwennyth Sharp,
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Table of Contents

i)	Abstract	ii
ii)	Acknowledgements	iii
iii)	Dedication	iv
iv)	Table of contents	v
v)	List of Tables	ix
vi)	List of Figures	x

Chapter One – Introduction

1.1	Introduction	1
1.2	Background	2
1.3	Statement of Purpose	4
1.4	Organisation of the Thesis	5
1.5	Summary	6

Chapter Two – Literature Review

2.1	Introduction	7
2.2	Historical Background to New Zealand Literacy Teaching	7
2.3	Changing Views of Literacy : what <u>is</u> literacy?	9
2.4	Language Development and Acquisition	15
2.5	Socially-interactive, reflective ICT-enhanced learning environments	17
2.6	Text and Texts	21
2.7	Teachers Thinking in New Ways	32
2.8	Summary	34

Chapter Three – Conceptualisation of the Research Process

3.1	Introduction	36
3.2	Research Aim	36
3.3	Research Objectives	36
3.4	Defining a Theoretical Framework for the Study	37

3.5 Rationale for Selection of Research Perspective	49
3.6 Visual summary of Process of Selection	50
3.7 Summary	52

Chapter Four - Methodology

4.1 Introduction	53
4.2 Research Design	53
4.3 Justification of Research Design	57
4.4 Research Questions	57
4.5 Participants in the Research	58
4.6 Data Collection	61
4.7 How Information-gathering Strategies were linked to Research questions	63
4.8 Chronology and Description of Data Collection and Intervention Methods	65
4.9 Ethical considerations	72
4.10 Summary	73

Chapter Five - Results

5.1 Introduction	74
5.2 Section One : Analysis of the Class Zone of Current Functioning	74
5.3 Section Two : Formation of a Collective Zone of Proximal Development – direct peer tutor training in hypertextual search and reciprocal strategies, and authoring strategies	108
5.4 Section Three : Analysis of the class Zone of Future Functioning	120
5.5 Conclusion to Chapter Five	149

Chapter Six - Discussion

6.1 Introduction	150
6.2 The Impact of the Learning Environment on Students' Cooperative Interactions with Hypertext	157
6.3 How Students' Perceptions of Learning and Information Literacy Affected Cooperative Interactions with Hypertext	160

6.4 Key Features of Access to Hypertext	165
6.5 Strategies for Scaffolding Learning when Hypertext is a Medium for Learning	165
6.6 Conclusion	167

Chapter Seven – Conclusion

7.1 Introduction	168
7.2 Meeting the main research aim : Implications for Teaching and Learning	168
7.3 Meeting the aims of the research : Successes and Limitations	174
7.4 Recommendations for Best Practice and Research	177
7.5 Final Comments	178

References	180
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Appendices (contents only)

Appendix A

Item 1	Informed consent form
Item 2	Information sheet for participants and substitute consent givers
Item 3	Workplan for implementation of research activity
Item 4	Interview questionnaire (students)
Item 5	Interview questionnaire (teacher)
Item 6	Observation format (whole class)
Item 7	Tracking sheet – hypertext observations
Item 8	Retrieval chart 1 (used with hypertext activity in phase one)
Item 9	Transcripts (hypertext observations in phase one)

Appendix B

Item 1	Retrieval chart 2 (search plan and retrieval chart in phases two and three)
Item 2	Planning sheet/storyboard (used in phases two and three)
Item 3	Feedback after authoring, (phase two)

Appendix C

- Item 1 Retrieval chart 3 (used in phase three)
- Item 2 Interview questionnaire (students)
- Item 3 Interview questionnaire (teacher)
- Item 4 Table of teacher interview responses
- Item 5 Transcripts of hypertext observation, phase three

List of tables

Chapter Two

Table 2.1	Text-type contrasts	26
-----------	---------------------	----

Chapter Three

Table 3.1	Elements of the research process	41
Table 3.2	Learning perspective – information processing	44
Table 3.3	Learning perspective – metacognitive strategy	45
Table 3.4	Learning perspective – socio-cultural	46
Table 3.5	Learning perspective – constructivist	47
Table 3.6	Learning perspective – ecological	48

Chapter Four

Table 4.1	Number and gender breakdown	58
Table 4.2	Cultural heritage	59
Table 4.3	Reading ages	59
Table 4.4	Writing stages	59
Table 4.5	Links between information gathering strategies and research questions	64

Chapter Five

Table 5.1	Random observed dialogue	79
Table 5.2	Incidence and nature of researcher’s interventions	140

Chapter Six

Table 6.1	Metacognitive abilities and hypertext	155
-----------	---------------------------------------	-----

Chapter Seven

Table 7.1	Contrasts between traditional literacy and dynamic hypertextual literacy	171
-----------	--	-----

List of figures

Chapter Three

Figure 3.1 Schematic diagram of conceptualisation of the research process **51**

Chapter Four

Figure 4.1 Ecological analysis of the collective ZPD **56**

Chapter Five

Figure 5.1 Teacher talk **75**

Figure 5.2 Scaffolded language approaches **76**

Figure 5.3 Strategic knowledge developed by teacher **77**

Figure 5.4 Learning arrangements **77**

Figure 5.5 Hypertext observation process **92**

Figure 5.6 Hypertextual search strategies – training process **108**

Figure 5.7 Reciprocal strategy – training process **109**

Figure 5.8 Copy of reciprocal strategy reference chart **110**

Figure 5.9 Authoring strategies – training process **113**

Chapter One : Introduction

"We must seek to understand the new forms of strategic knowledge required in electronic literacy contexts as we seek ways to support students in developing this knowledge" Kinzer & Leu 1997 : 133.

1.1 Introduction

In the last decade of this century much of the world has become a substantively different place in terms of the advent of the Information Age. Change, and fast change too, has become a buzzword : our perceptions of time are altered. The world seems smaller when we can interact instantly through the Internet with people thousands of miles away whom we didn't know existed: our perceptions of space are altered. We often feel awed by the changes because we can look back to how the world was. These feelings can cause uncertainty.

In the researcher's opinion literacy education has also been affected by this uncertainty. Text, the bones of literacy, is changing radically. Theories of literacy learning and teaching are continuing to evolve. But some teachers cling to the past, some are confused, some "go forth boldly" into the new environments created by the changes. Students take the changes calmly as part of their lives : it is what they have grown up with.

Research calls for fresh perspectives on these changes. In particular there are calls for classroom-contextualised evidence on ways to help teachers make sense for themselves of the effects, on teaching practice, of the texts presented by new, interactive information and communication technologies (ICT). The researcher believes that the topic of this thesis is a significant and pressing one and has attempted to respond in a small manner to the calls.

This chapter sets the scene for the thesis by presenting background information and the purpose of the study. An outline of the organisation of the thesis is also presented.

1.2 Background

This study resulted from the researcher's accumulated teaching experience in the fields of literacy, language, and learning, and her perceptions of the effects of new interactive information and communication technologies on these fields and on students, both child and adult.

Over the last twenty years information and communication technology-mediated learning has slowly permeated New Zealand primary school educational settings. Many teachers still ignore "the machine" in the corner, or use it for "skill and drill" activity and for "games" as a reward.

However some teachers are looking far beyond a mechanistic view of the computer's part in student learning to a reality based on continuing experience of the remarkable transformations to learning and teaching processes that new interactive communication and information technologies can facilitate. The transformations are orchestrated by theoretically and practically informed teachers who guide and facilitate learning as well as developing instructional strategies of modelling, text analysis and information handling competencies. These teachers also work in an intuitive and observant manner with individual students and use this data to reflect upon provision for all students as well as their teaching practice, and also to assist students to reflect on their own learning. Their classrooms are alive with inquiry which integrates curricular areas and uses a variety of information and communication technologies to establish socially and interactively powerful communities of learners.

The scenarios described above are opposite ends of a spectrum. In between these two poles are many teachers who are working through the processes described above, attempting to come to grips with changes to teaching and learning that are evolving as a result of the age of information. The researcher, in her daily work as a pre-service teacher educator, goes into many primary school classrooms and is privileged to meet and talk

with many practising and training teachers. Issues that face teachers today, in the customised environment of Tomorrow's Schools, are overwhelming to many. For many the chance to "make a space" to think through some of the besetting difficulties of information literacy teaching just doesn't happen. To possibly assist teachers and their work with students is part of the reason for this study.

Another reason for this study is the apparent lack of New Zealand based research from an ecological research perspective in the area of primary school information literacy and hypertext.

A further reason arose from a long article the researcher wrote for the periodical *Computers in New Zealand Schools* (Mason, 1996). It was an emotional and compulsively written piece, an expression of frustration at the apparent slowness of others to grasp the implications of new interactive technologies for literacy learning. The resulting feeling was one of irresolution - that there was more to do. So in a sense the study was driven by personal belief and need.

The final reason for this study is the researcher's deep interest in literacy and texts, and also the exciting new learning environments created by interactive technologies, which led to her consideration of this thesis as a research project. How wonderful it is to think about the hypertexts - text that is so entirely differently-structured! How absorbing to think that patterns of thinking about linear texts are so different from those non-linear patterns required for effectual use of hypertext! How fascinating the hypertext authoring software is and how powerful the effect that it has on students' language learning!

And how important it seemed to add a different perspective and a voice to the ever-changing world of teaching and learning.

1.3 Statement of Purpose

The purpose of this study is to understand more about how certain conditions for learning operate to facilitate students' acquisition of information literacy when the text medium used is hypertext. The process of understanding is developed through critical reflection and analysis of a range of issues, and through the documentation and analysis of situated student learning experiences and responses within a "socially-interactive, reflective ICT-enhanced learning environment".

The study adopts an ecological research perspective which informs and defines the philosophical and theoretical basis of the study and gives it holistic boundaries. The theoretical perspective translates into a research design which reflects holistic elements in learning processes as well as responsive teaching practices.

This study can best be defined as an ethnographic case study because the researcher sought to be immersed in a particular learning environment in order to document the effects of a this environment on participating students in relation to their acquisition of information literacy. The study also sought to accumulate evidence by analysing and "triangulating" information related to participants' perceptions, social interactions and shared cognition processes.

This thesis hopes to uncover some of the elements of successful adaption to new interactive texts and technologies, as demonstrated by interventions made by the researcher, in a participant role, to set up particular conditions for learning within this ethnographic case study of particular students in a particular setting. It is hoped that some of the discoveries will generate recommendations for teaching practice, and challenge readers to debate the implications for their own work with students. Most of all it is

hoped that the study and its findings may be of assistance to others who are grappling with changes in literacy teaching and learning on the edge of the millennium.

1.4 Organisation of the Thesis

A brief description of each chapter of the thesis is presented below.

Chapter one sets the scene for the study by outlining the significance of the topic, and providing a statement of purpose and background information.

Chapter two discusses theoretical and practical phenomena which underpin the study, then considers focal points of the study itself, with reference to existing literature. Current issues related to learning, literacy and text are extrapolated from available literature and sometimes discussed from the researcher's viewpoint.

Chapter three describes the process of conceptualising the research with respect to philosophical and theoretical frameworks which lead to the selection of a research perspective. This perspective is described and justified in depth. The research aim and specific research objectives are stated.

Chapter Four presents and justifies the research design, and sets out the methods and procedures for data collection. A chronological description of the procedure of the study is also outlined.

Chapter Five presents the results for the three phases of data collection. This information is organised in three sections. The first section corresponds to the first phase in the research design, and culminates in a description of the "class zone of current functioning".

The second section evaluates the intervention phase in the research design where an “intellectual collective” - the “collective zone of proximal development” - is established. The third section corresponds to the third phase of the research design, and uses themes emerging from sections one and two in order to analyse students’ learning and describe the possibilities for a “class zone of future functioning”.

Chapter six discusses the main findings of the study in relation to the research questions and with respect to the integral relationship between these questions.

Chapter seven considers the extent to which the thesis was successful in achieving its main aim and responding to the specific objectives of the research. The chapter also debates the adequacy of the research methodology and the limitations of the study. Some implications of the study are outlined with respect to theory, research and teaching practice.

1.5 Summary

In this chapter the study has been introduced and the background and purpose established in a general manner. The next chapter focuses in depth on a review of available literature that informs the study.

Chapter Two : Literature Review

"In its structure of branching links and nodes, hypertext stimulates the mind's associative processes, thereby providing an electronic platform for constructing and reconstructing the reader's literate thinking - an evolving process that Blau calls the "vision" and "revision" of text by which readers construct meaning" Dryden, 1994 : 285.

2.1 Introduction

This chapter endeavours to justify the study in terms of existing literature related to its main aim which is : *to identify teaching and learning implications of hypertext in relation to information literacy acquisition in older primary school students.*

This piece of research is very strongly underpinned by a range of separate yet interconnected phenomena which require explication and discussion in relation to existing literature sources. The complexity of these underpinnings has led to the separation of them in this chapter, in order to give each part its own due. Where relevant, links are made to other parts of the whole.

First, this chapter gives a brief recent historical overview as background to the evolutionary nature of literacy teaching and learning in New Zealand. Second, material about literacy and information literacy, language development and acquisition in older primary school students, and the importance of learning environments is presented. Third, the nature and features of linear and non-linear text, and hypertext and its bearing on information literacy are discussed. Finally, the role of teachers is considered.

2.2 Historical background to New Zealand literacy teaching

2.2.1 Holistic origins Literacy programmes in NZ middle primary classrooms appear to be based on a mixture of principles related to successful learning which have evolved mostly from within the New Zealand environment. Richardson's experiential inquiry-based approaches to learning (1964) and Ashton-Warner's "organic" approaches to

language and literacy acquisition (1965) were early influences which established the power of child-centred literacy learning environments.

2.2.2 A strategic balance The research of Holdaway and Clay since the 1970s has provided a range of strategic approaches to early and later literacy teaching which expects that teachers ensure that students “move on all fronts” and that responsive monitoring of students’ literacy development is undertaken in order to assist further strategic teaching and learning. The typical “balanced language programme” which developed during the 1970s and 1980s included a variety of approaches such as shared and guided reading and writing, an organisation which differentiated student ability and development and provided for a range of literacy development, systematic monitoring of reading development through prose inventories (Holdaway, 1980 : 87 - 97) or running records (Clay, 1979) and experience with a range of text (*LARIC*, Department of Education, 1983).

During the 1980s and early 1990s, new ideas such “process” approaches to writing (Graves, 1983), functional views of literacy which involved text analysis and “genre-based” approaches to writing (Collerson, 1992), and a process approach to inquiry-based learning (Gawith, 1987), all contributed to influence and shape adaptations to basic literacy teaching and learning in some middle primary classrooms. Providing an “umbrella” of optimal conditions for language and literacy learning continued to be important, and the explicit exposition of such conditions as the result of the research of Cambourne in Australia (1988) complemented and affirmed existing practices in New Zealand.

2.2.3 A new curriculum document *English in the New Zealand Curriculum* (Ministry of Education, 1994) attempted to synthesise many of the elements listed above to develop a rationale for approaches to language and literacy learning in New Zealand and to describe

systematically developed levels of language and literacy learning through the statement of achievement objectives.

Ministry of Education teacher handbooks such as *Dancing with the Pen : The Learner as a Writer* (1992), *The Learner as a Reader : Developing Reading Programmes* (1996) and *Exploring Language* (1996) articulate philosophy and theory, and describe and support teaching practices reflecting *English in the New Zealand Curriculum* principles and requirements which are in turn based on the evolution described above. It should be noted that Cambourne's conditions for learning (1988) are an integral part of this support (Ministry of Education, 1992 : 16 - 20 and Ministry of Education, 1996 : 15 -17).

2.2.4 '90s broad influences During the 1990s the development of constructivist and social-constructivist theory concurrent with developments in educational communication and information technologies has impacted dramatically on some New Zealand teachers' literacy practices. Resultant changes to conditions for learning and transformations in teaching and learning are discussed further later in this chapter.

The filtering through of change in literacy practice appears to be gradual and this possibly stems from views of literacy and learning that are traditional : it is possible to surmise that many New Zealand middle-school classrooms operate on assumptions about literacy that are based in the traditional views of literacy learning and teaching which are described in the next part of this chapter.

2.3 Changing views of literacy : what is literacy?

2.3.1 Traditional views of literacy There is much contention about definitions of literacy. Unitary or traditional definitions are based on assumptions that literacy refers to a finite set of skills related to print-based text, for example "*literate, (adj.) learned : able to read and write*" (Chambers Twentieth Century Dictionary).

In New Zealand, as elsewhere, traditional notions of literacy have obviously impacted on teaching and learning in the huge emphasis on teaching students to read and write print-based text, and the massive amounts of research of global interest directed to honing and refining reading and writing methodologies (for example the work of Clay, Holdaway, Tunmer, Nicholson and Phillips). Debate on the nature of literacy acquisition, especially reading, is ongoing and stimulating.

Prior to 1994 in New Zealand primary schools, explicit attention to the strategic decoding and recoding of meanings in oral and visual texts was considered less important than that of written texts, given their very minor role in teaching and learning programmes. New Zealand's "balanced language programmes" were renowned for their efficacy and the overriding emphasis was on print text (Ministry of Education, 1985 : 56).

2.3.2 Widening views of literacy Socio-cultural and constructivist learning theory, functional views of language and empowerment theories were instrumental in affirming the primacy of oracy and semiotics in language development (for example Vygotsky, 1978; Bruner, 1974, in McInerney & McInerney, 1998; Halliday, 1975; Friere, 1972, in Giroux, 1981). Such thinking was reflected in New Zealand's English Curriculum document which recognised and required equal development of the three central strands of oral written and visual language in classroom programmes (Ministry of Education, 1994 : 19).

The question continues however. What is literacy? Is there one overarching "literacy" which encompasses these three dimensions of language. Or are there three separate literacies? Or something else? Does it depend on one's viewpoint? Considering the "pinning down" connotations of the word "definition" can literacy be defined?

Langford, attempting to cut through the plethora of often confusing thinking about literacy, concludes that “there is considerable support for viewing literacy as a continuously evolving concept allowing for more liberal understanding and hence development of the initial ideal of the universal right to be able to read and write” (1998 : 65). This study reflects Langford’s general view, as discussed next.

2.3.3 Views of the dynamic nature of literacy and multiple literacies Leu (1997 : 63) quotes Manguel (1996) to note that literacy has never been static - a notion that is somewhat implicit in many traditional views of literacy - that “it continually changes in historical, cultural and technological contexts”, and he gives many examples from history, citing the type of “world” that people lived in as the context.

This point has relevance to the kind of world we in New Zealand find ourselves in on the edge of a new millennium : in a post-modern world of plural ideologies, cultures and languages, the concept that literacy is historically, socially and culturally produced gives rise to pluralist views of literacy which maintain that “literacy is a complex process beyond a discrete set of skills” (Wilson, 1997 : 4).

The world that Leu and many others call “the information age” (1997 : 63) has reinforced and hastened the recognition of pluralist views of literacy as researchers, teachers and students struggle to capture and make sense of the new ways of “knowing the world” that information and communication technologies are presenting (Todd, 1998 : 29; Leu, 1996 : 162). The commitment of the New Zealand government to the creation of a “knowledge society” based on new information and communication technologies is a reflection of this immediacy.

2.3.4 Taking the “literacy” concept further As already implied, the ever-changing nature of information and communication technologies and the global immediacy conveyed by

news media has produced an increasing impression to many people that time has “speeded up”. This lends an impermanent note to views of literacy, underlining the necessity of open-mindedness and the importance of maintaining “flexible, unstable and ephemeral” views of literacy in a constantly changing environment (Roberts, 1997 : 5).

Thus, perceptions of literacy that rest in traditional views need to be revisited and “reconstituted in relation to the interactions between writers, texts and readers” (Roberts, 1997 : 2), especially in relation to new text-types that are emerging as a result of new technologies (Kinzer & Leu, 1997 : 126). Furthermore, traditional codes of reading and writing are used in new ways with new technologies, hence different strategies for access and composition are needed (Emmit, Pollock & Limbrick, 1996 : 12).

So definitions of “literacy”, according to many, now refer not to an achieved state of being, as in a “learned” reader and writer, but to what Leu (1997 : 65) calls a state of “becoming literate” and to what he sees as a lifetime process which will change and flex as new technologies continue to emerge and require new “literate” strategies from users.

A final point to be made about literacy is that empowerment through literacy - as students become more able to create their own informed views of the world through critical discernment they are actively able to shape and transform their realities (for example Lankshear, (1994); Friere, 1978, in Giroux, 1981) - is a dimension to be considered in any conception of literacy. It is never so intensified as today when access to literally millions of texts and virtual experiences can be available in one’s home or school.

The need for students to be able to strategically explore and critique text of all kinds is critical : “We must (also) give students the tools to overcome the weaknesses of the new information sources...a toolbox of thinking and problem-solving skills” (McKenzie, 1998 : 27). It is this “toolbox” which is at the heart of innovative efforts to adapt literacy

teaching and learning to the power and constraints of emerging information and communication texts and technologies (Ryba, 1996 : 4).

The same principle of empowerment applies to teachers : in inspecting and critiquing one's own perceptions and preconceptions about literacy one can acknowledge how one's "culture" is inherent in how one views and teaches literacy (Friere, 1994, in Mason, 1996 : 14). The implications of this are discussed later in this chapter.

To conclude, Leu's following synthesis is an aptly-stated perspective on the above issues : "Here we stand between traditional forms of literacy and new forms of literacy that are continually appearing....what it means to become literate has become a moving target, one we can never completely define because information and communication technologies continually change" (1997 : 62). It is a similar perspective to that which will be presented in this study.

2.3.5 So, what is information literacy? To some, the term "information literacy" - the specific literacy focus in the study - is an elusive one. As with literacy in general, there is much variance and lack of cohesiveness in theoretical viewpoints. Langford (1998 : 60 and 61), while attempting to clarify the term, suggests that because information literacy is so closely linked to the ever-evolving "Information Age" it is also dynamic in nature, and it changes as educational processes change to incorporate changes in information and communication technologies. It is therefore a mercurial term.

On the other hand, Gawith (1998b) is definite and succinct in outlining what she sees as main information literacy processes :

- identify an information need and translate it into questions
- select and retrieve information from appropriate sources and technologies, applying questions

- analyse/identify key issues, facts, ideas, arguments - synthesise and interpret information to build answers to questions
- collate, interpret and communicate information in a variety of formats. using a variety of technologies

(directly quoted from Gawith, 1998b : 7)

This clear working structure is useful for teachers to bear in mind, as the researcher did, when adapting information literacy programmes to new texts and technologies.

2.3.6 Issues of acquisition of information literacy The main issue in this area relates to the need for students to be active “deep” processors of their learning. Teachers need to develop information literacy frameworks such as Gawith’s *Action Learning* model of research processes (1987, referred to in 2.2) in order to avoid what Gawith calls “cognitive bypass learning” - the electronic processing of information without it being processed in the mind (Gawith, 1998a : 2). The main points consistently raised by Gawith in relation to information literacy acquisition is that frameworks such as the Action Learning model can provide the metacognitive contexts for students to develop the crucial higher-order thinking that will enable them to negotiate and make informed decisions about information and information processes, and that the information and communication technologies themselves are of little value to learning without the application of thinking (1998b : 7).

This issue is supported by others - McKenzie’s three major components of “information literacy” - prospecting, interpreting, and creating new ideas - all contribute to “learners being able to make up their own minds” and are clearly explicated with reference to the kinds of thinking processes expected by these components (1998 : 1).

Leu discusses extensive surface exploration of hypertext (for example the Internet) versus intensive deep thinking about text by students and the need to enable students to look

beyond the “cool” elements of exploding graphics etcetera to actively and “purposefully integrating the rich information sources that exist within them” (1996 : 163).

Oberman advocates the need for students to acquire the “conceptual tools” that enable them to “sort hype from reality” in order to cope with the “rapidly-changing world of information” (1996 : 1).

Finally, the New Zealand National Education Monitoring Project in Information Skills (Ministry of Education, 1998) which investigated year four and year eight students’ abilities to develop appropriate questions, find suitable sources of information, search the sources for specific information, and interpret, collate and represent the information (1998 : 10), found that students experienced more difficulty with the greater “intellectual demands” of cognitive and metacognitive processing of the information than the more surface-level activity using technologies to locate and retrieve information : “finding information is clearly important but its value is greatly dependent on the extent to which it can be validly interpreted and used to answer important questions” (1998 : 11).

So, a question for information literacy teaching and learning is - how can learning environments and experiences be designed to nurture this cognitive and metacognitive growth in students? This is discussed in a later section.

2.4 Language development and acquisition

2.4.1 Language development The phenomenon of language and its acquisition by older primary school students underpins the information literacy focus of the study. The acquisition of increasingly complex language is an underlying key to any literacy development in older children, such as the students in this study who were aged from nine to eleven.

However Brooks (1992 : 39 and 40) maintains that there is a shortage of research evidence about language development in students of these ages, and many areas such as interactive talk and linguistic experience and skill require further investigation. Brooks, in discussing the problematic nature of such research, emphasises that it would need to be on a wide scale, be longitudinally-based, and produce both qualitative and quantitative evidence (1992 : 37) which may explain the apparent lack of further conclusive evidence in this area since then.

Speaking generally, most students have mastered the main structures of their first language by age six, and continue to expand vocabulary and meanings in both “generative and interpretive” ways in relation to their socio-cultural environments (Emmit, Pollock & Limbrick, 1996 : 179). Some major functional developments in spoken language that may occur between the ages of eight to thirteen are use of present and perfect participles, connectors that relate concepts to general ideas, auxiliary verbs, and the ability to articulate hypotheses and use logical constructions (adapted from Chomsky, C. (1969) in Emmit, Pollock & Limbrick, 1996 : 179 and 180).

As well as being able to use structural features of language in more depth, older primary students are capable of manipulation of these structural features to become aware of how texts work and to articulate and apply this metalinguistic awareness through the ability to “decentre” - the “shift of one’s attention from message content to the properties of language used to convey content” (Tunmer, Herriman & Nesdale, 1988 : 137, discussing five to eight year-old students).

A key point made by Tunmer et al. from their research is that high levels of metalinguistic ability do not appear to develop spontaneously in students (ibid. : 137) and it is of interest to note the implications of this point for teaching practice in the scaffolding of language use, especially in the development of reflective talk.

2.4.2 The importance of oral language Oral language, or talk, is a most important indicator of thinking, learning and language development, and helps students to “work on understanding” in their active reshaping of already-held knowledge in the light of new information and new perspectives afforded by interaction with others (Barnes, 1992 : 125). This point reflects Vygotsky’s social constructivist perspective about the centrality of talk and social activity in assisting internalisation processes in learning : “Human learning presupposes a specific social nature and a process by which children grow into the intellectual life of those around them” (Vygotsky in Barnes, 1992 : 128).

Further to this, the metaphor of “scaffolding” (Bruner, 1974), which involves interaction by students with more able others to facilitate movement into new areas of learning, is dependent on oral language as its main catalyst to establish “zones of proximal development” (Vygotsky, 1978 : 86).

The advent of new technologies has presented new opportunities for language acquisition and learning through social interaction and this is discussed in the next section.

2.5 Socially-interactive, reflective, ICT-enhanced learning environments

2.5.1 An ecological perspective A pivotal factor in this study is the influence of the research of Ryba whose work in computer-enhanced learning environments led him to propose an ecological view of learning environments supported by developing technologies (1989 : 217 - 231). This far-seeing construct clearly broadens and deepens the potential of the “balanced language programme” mentioned above. What is such an environment and how does it work?

As described and discussed by Ryba (1989 : *ibid.*), an essential quality of an ecological perspective is its base in social-constructivist learning theory and its focus on the

interactions between students, teachers, computers and the general environment. Students are expected to take responsibility for the active construction of their own learning through the conscious development of social, cognitive and metacognitive competence, thus working towards becoming “teacher-independent thinkers”.

In this environment a knowing and supportive teacher is an essential presence to progressively and systematically model, guide and facilitate social, cognitive and metacognitive strategies for operating on text that students need in order to achieve independent thinking.

An equally essential quality relates to the “positive interdependence” generated by collaborative and cooperative learning arrangements and enhanced by the particular and unique role computers can play by providing “tools and structure for learning” and allowing “teachers to engage in interactive, adaptive and dynamic interactions with learners” (Ryba, 1989 : 228). Further to this are the benefits for individual students’ learning gained by participation both as mentor and at the point of one’s own zone of proximal development in a community of learners. As discussed in 2.4 the critical feature of this positive interdependence is the catalysing function of oral language and the link to social-constructivist theory.

A further essential element in this environment is the unique ability of interactive information and communication technologies to enhance and transform learning environments through the active way in which text can be manipulated by students and “responded to” by computers thus providing powerful opportunities for co-operative problem solving and inquiry based learning (Ryba, 1989 : 217).

2.5.2 Supporting literature Aspects of an ecological perspective can be supported by much evidence from other research. In particular the two main studies that have

influenced this researcher's thinking are those of Clements and Nastasi (1988) and Paris and Winograd (1990).

Clements and Nastasi's findings from a study of young students working co-operatively at computers present the idea that cognitive development grows from "the conflict of ideas that arise out of social interchange and the consequent attempts to resolve these conflicts" (1988 : 88) and how the attempts of students to "synthesise their actions (socially) with those of their partners" fosters the social interaction and the "coordination of centration" which are essential to cognitive growth (1988 : 99).

Paris and Winograd review research about cognition and metacognition. They consider effective practices which focus on explicit strategy-based reflection on thinking and metacognition, and the powerful effects such practice can have on students' motivation and self-efficacy (1990 : 10). They emphasise the positive effects of co-operative learning settings which encourage problem solving (1990 : 12). They stress the importance of socially-mediated learning and the "cognitive tools for the craft of learning", the metacognition activity which is embedded in ongoing thinking and problem solving activity (1990 : 9).

2.5.3 Ryba's later work and the influence of Lave and Wenger Ryba's research since 1989 has continued to evolve the position discussed above and his more recent findings strongly indicate influences suggested by the emergence of the Internet, and social practice theory and analytical perspectives on learning (Lave and Wenger, 1991 : 35 and 39).

Lave and Wenger theorise that shifting "the analytic focus from the individual as a learner to learning as participation in the social world, and from the concept of cognitive processing to the more encompassing view of social practice" gives a richer view of learning and a more complete way of understanding learning (1991 : 43).

Their construct of LPP (legitimate peripheral participation) forms what they call a “conceptual bridge” to understanding the power and the potential of “communities of practice” and the balance and nature of apprenticeship - master relations : “participation is always based on situated negotiation and renegotiation of meaning in the world. This implies that understanding and experience are in constant interaction, indeed are mutually constitutive” (1991 : 51 and 52).

Clearly one part of becoming part of a community of learners necessitates “learning to talk” in ways that will take the individual from peripheral towards full participation (1991 : 37 and 109). This point links back to the comments made about oral language in 2.4, and it would appear that this is a key consideration for this study.

Ryba’s view of new technologies as powerful catalysts for socially-interactive learning settings continues to develop through his investigations of successful adaptive and innovative practice. Some of his themes focus on the development of capable learners through use of new technologies, educational transformations occurring through the use of new technologies, and the creation of communities of learning based on legitimate peripheral participation referred to above (for example, Ryba, 1996 : 3 - 5; Ryba & Selby, 1995 : 217 - 231; Ryba and Brown, 1996 : 13 - 15; Ryba and Brown, 1998; and Ryba, Selby and Kruger, 1999).

To a teacher such as this researcher Ryba’s ideas have been powerful and mind-expanding because they have made sense in the precarious educational environment of the mid and late 1990s in New Zealand. They have opened up a world far beyond the “balanced literacy programme” and suggested innovative ways of exploring new technologies to help students enjoy learning and become truly engaged and competent in literate activity.

Other literature reviewed in this section is noteworthy in that it particularly exemplifies the reinforcement of central precepts of an ecological perspective. These ideas are at the heart of this study as it emulates an ecological perspective both in the attempt to create a “socially-interactive, reflective, ICT-enhanced learning environment” for the students in the study, and to clearly define the existing ecology of the sample classroom in terms of its established conditions for learning.

2.6 Text and texts

2.6.1 Text Text is “a piece of spoken, written or visual communication that constitutes a coherent, identifiable unit....any language event” according to the glossary of English in the New Zealand Curriculum (Ministry of Education, 1994 : 142). This very broad view of text is qualified by Misson (1998 : 18) : “texts are very complex entities subject to all sorts of constraints while open to all sorts of indeterminacy and instability”.

2.6.2 Texts Texts of all kinds are the content and process basis of literacy programmes (Ministry of Education, 1994 : 16, 17 and 18). Texts exemplify “the many diverse ways of knowing and of mediating our abstractions of social reality, and through writing, reading and discussion of them we develop, extend and shape our understandings” (Stewart-Dore et al., 1986 : 93).

Use of texts, or “communicative competence”, is a key to any literate activity and is the means whereby teachers may “socialise children into the many literacies necessary to empower them to take charge of their future lives” (Stewart-Dore et al., 1986 : 94).

Texts are also a vehicle for the exploration of content curriculum subjects such as Science, Social Studies and Technology through integration with English processes such as writing, close reading and viewing. Text types need to be modelled, analysed intentionally, and

practised in context so that students develop understanding of their meanings and purposes.

2.6.3 Linear texts Linear media such as books, posters and newspapers are almost always one-dimensional and paper-based. They contain sequenced or clearly-structured text genre such as narrative, reports, explanations, recounts and arguments.

Morris (1986 : 55 - 66) advocated the following as essential activity for work with text in classrooms :

- comprehension strategies for dealing with genres across the content areas
- text analysis to develop information processing strategies
- strategies for recording information visually e.g. tree diagrams and retrieval charts
- recognition and analysis of structures and patterns in text
- planning for writing
- linking parts of writing
- use of peer tutors and collaborative approaches for writing

Since then, reading research focusing on comprehension of “traditional” linear texts has presented further insights into structural processing requirements of linear texts in relation to the kinds of higher-order thinking and metalinguistic processes that foster deep understanding (Fielding and Pearson, 1994 : 4), and many sound approaches for ensuring students’ ability to access linear text strategically have emerged. Some examples of these are Guided Reading and Writing (Ministry of Education, 1996), Reciprocal Reading (Palinscar and Brown, 1989), Modified Guided Silent Reading (Whitehead, 1992), Collaborative Strategic Reading (Klingner & Vaughn, 1999), and the Strategic Comprehension Framework (Dowhower, 1999).

All of these approaches stress the importance of engaged reading, constructivist-type interactions with others, and the ability of students to make explicit their thinking processes and ways they have been able to make sense of what they've read. They are all developed in relation to the demands of linear, print texts and are mentioned here because students processing linear texts appearing within non-linear texts need these specific abilities as part of their work.

At the present time, the activities expounded by Morris (1986, above) still apply to work with linear texts. However now also, new interactive communication and information technologies are presenting text types which are increasingly more complex than the linear, mostly paper-based texts that comprise the basis of traditional literacy activity (Kinzer & Leu, 1997 : 134).

As early as 1985 research found that computer-mediated linear text, which could be literally manipulated in a way that static traditional linear texts could not, consistently increased reading comprehension and encouraged more active cognitive and metacognitive processing of the text (Reinking and Schreiner, 1985 : 536 and 550). This difference in the text "responsiveness" of computer-mediated text and the static nature of traditional texts is a critical one : the development of non-linear computer-mediated text has added extra dimensions of structural and semantic complexity and difference to linear texts, posing the question : how appropriate are the processing strategies used with linear texts, in use with non-linear texts?

2.6.4 Non-linear texts Non-linear computer-mediated texts are usually multi-modal and are expansively structured in a manner that is radiating and comprising interconnected "nodes" of information. So, information can be accessed, connected and presented recursively and in a variety of ways - "across" information, rather than "along" information.

Since computer-mediated multimedia texts and hypertexts such as CD Rom encyclopedias, authoring software and the Internet have become available for students in New Zealand schools it is possible that teachers and students are strategically approaching these very new and different text types in the same way as they approach print text. The potential for this largely unconscious transfer of strategies is supported by Perzyler and Oliver, who found that that less skilled users of multimedia hypertext made poorer choices, chose fewer items, used more screens, searched inefficiently and, most significantly, searched from assumptions conventional to the sequenced, linear properties of print-based text (1992, cited in Oliver, 1994 : 215). This finding is endorsed by Alexander, Kulikowich and Jetton (1994 : 217) and Kinzer and Leu (1997 : 132). So how do students strategically process non-linear text? This is a question the study hopes to answer to some degree.

2.6.5 What is hypertext? Hypertext, the textual focus of the study, is a non-linear text type that is complex in two ways. First, it is multi-modal - that is, a variety of oral written and visual genre is presented as a synthesis of information within each node or connection. This requires systematic and effective decoding strategies across the communicative mediums to gain maximum meaning. Second, it is structured in the expansive manner described in the section above, thus appears to represent an external way to structure information that closely corresponds to mental schema : global-type, synthesising-type thinking is required of users (Sewell, 1990 : 210; Morgan, 1996 : 49 and 50; Dobrin, 1994 : 308).

It is a challenging, rich medium for learning : Swan and Meskill (1997) see what they call “hypermedia” as a “promising alternative to (linear) text” because of its compatibility with student-centred constructivist-type learning experiences, its ability to present multiple representations of knowledge and support diverse learning styles and its

propensity to require teachers to rethink their understandings about the role of text in learning (1997 : 170).

Full and effective access to hypertext involves thinking in a new way that is not linear, in order to engage with the richness of its layers (Smith, 1994 : 276). This presents wide possibilities for creative thinking - what Smith calls "cognitive architecture" - as students shape layers of information closely representing semantic networks which may offer pictures of their inner thinking processes (Smith, 1994 : 269).

The "dashing here and there" nature of hypertext appears to challenge the concept of stable text structure - the careful ordering in a single sequence of linear text - but it does in fact contain clear structures and the key to accessing these is the thinking in a new way described above. This is where one of the greatest issues lies. Students may choose or add their own paths through the text - interaction is extended and control is greater - but it is like the "bridge of a single hair" because on the other hand this may lead to "cognitive overload", confusion and even disorientation in relation to students' abilities and readiness to comprehend the complexity involved in navigating the text (Oliver, 1994 : 212; Johnson-Eilola, 1994 : 210; Sewell, 1990 ; 216).

How do teachers successfully support student work with hypertext? Knowing about the structural and language features of hypertext and its differences from linear text is a starting point, as the following section demonstrates.

2.6.6 Contrasting text-types : Alexander, Kulikowich and Jetton (1994) reviewed sixty six studies, mostly undertaken since 1990, which explored the way content knowledge and motivation affected the processing of linear and non-linear (hypertext) texts. During this review they found that the use of linear and non-linear texts situated students differently within the learning environment and thus affected their interest and their ability to acquire

domain (content) knowledge (1994 : 215). They hinted at social, cognitive and metacognitive benefits for all students in effective use of non-linear texts (1994 : 222).

They also developed some clear points about the contrasts between linear and non-linear texts which must be at the crux of any analysis of strategy development for processing and presenting hypertext. The researcher has summarised these contrasts as presented in the table below :

Table 2.1 : Text-type contrasts

Linear text	Non-linear text
constant, static textual foundation	dynamic, responsive textual foundation (1994 : 215)
static, unable to be physically manipulated	altered at each encounter; unique, self-guided exploration : students can manipulate and modify the text base and changes are immediately and directly available to others (1994 : 216)
favours more individual cognition	encourages more social cognition (1994 : 216)
requires “micro” processing	requires “macro” or global processing - students who become “lost in cyberspace” may not be able to comprehend at the macro level (1994 : 217)
demands readers make own linkages	promotes inter-domain linkages and references such as hotlinks (1994 : 217)
the “artifact” of the text is more permanent therefore lending itself more towards “private”, implicit processing	the text is more dynamic and socially-constructive therefore lending itself to explicit inter-domain references (1994 : 217)
	has the potential to transform students’ interactions with subject matter through the interplay between students, computer-mediated texts and the general learning environment

The above table gives a picture of some of the text-type contrasts that influence the new and unconventional ways of thinking demanded of students using hypertext. That there is a need for more exploration of literacy competencies required by non-linear text-types - and thus teacher formulation of processing strategies - is clear when these contrasts are considered (Wild, 1996; Kinzer & Leu, 1997 : 134; Haas & Neuwirth, 1994 : 330).

2.6.7 Trans-disciplinary findings Leu and Reinking (1996) also comment on the need for further research to produce better understanding of such learning environments where students “actively manipulate the nature of the information they encounter as they

navigate through flexibly structured resources in an attempt to construct meaning” (1996 : 44). They note the lack of systematically-acquired, specific information about the issue.

Their own focus is to consider the possibility of working from established knowledge about reading research to provide proven points for research on non-linear text in socially-interactive reflective computer-enhanced environments. They make six points about reading research which support their position, and connect to centrally-held precepts underpinning this study. The points are :

- observation of student interaction patterns should provide specific insights into the natures of the processes that operate when students interact co-operatively with non-linear computer-mediated texts : this should lead to new theoretical perspectives, the development of frameworks which encompass developmental differences and progressions, and more supportive structures for learning (1996 : 50 and 51)
- the importance of prior knowledge is an important issue in literacy acquisition : computer-mediated texts can respond to individual needs based on prior knowledge and present information through multiple media, compensating for the effects of differences in prior knowledge (Hillinger & Leu, 1994, in Leu & Reinking, 1996 : 52; also discussed in Kinzer & Leu, 1997 : 130)
- strategic knowledge, so critical when processing linear texts, is even more important in processing non-linear texts because it requires more decisions by students about such issues as choice of sources and navigation pathways : Leu and Reinking maintain that strategic processing seems to be “uncontrolled” in many research studies and that specific information about the types of strategic knowledge required to exploit the information structures of hypertext is needed (1996 : 56 and 57)
- the centrality of interest and motivation in reading acquisition and its effect on “locus of control” in learners and the link to hypertext-enhanced learning (1996 : 58 and 59)

- the interconnectedness of reading and writing processes and the links to forms of print text that are found within the socially-interactive computer-mediated mediums such as bulletin boards and email (Leu, 1994, in Leu & Reinking, 1996 : 62)
- the ways in which learning can be supported in literacy environments : the possibilities for socially-mediated responses to computer-mediated communications and information to increase, especially for students who find interaction difficult, needs further study (1996 : 65)

In the development of this section about text and texts, issues related to hypertext use by students have been outlined and contextualised in the wider setting of text use. The relationship of hypertext to information literacy acquisition is discussed in the next section.

2.6.8 Evidence about strategic approaches to use of hypertext and other non-linear computer-mediated texts In view of the above comments, it is now important to consider some of the available research about particular strategies that might foster effective use of hypertext and other non-linear texts. Searches have revealed little about studies of hypertext use in a classroom context, such as the present study attempts, however the following review outlines some findings.

The properties of interactivity, responsiveness and student control appear to be prevailing elements of non-linear text that constituted some of the benefits to learning in the following studies of Wild (1995), Miller, Blackstock and Miller (1994), Matthew (1997) and James (1999).

Wild's studies with seven and eight year old students finds that there were motivational differences in reluctant learners when using interactive CD Rom "storybooks" and traditional linear texts, and some of the trialled "storybooks" improved students'

comprehension and vocabulary, especially when visual cues were used to build on already-existing mental models (1995 : 2 and 3). However he emphasises the need for more evidence of the potential of this type of text (1995 : 3).

Miller, Blackstock and Miller (1994), observing four eight year old students using similar software to Wild's study, and using a repeated reading strategy with "book" texts, find that miscues reduced dramatically in both cases. They find that the interactive features within the "stories" of the non-linear texts assisted comprehension and that the "help" features also assisted the rate of improvement. They identify such issues as the importance of the need for teachers to monitor the reading process as they would with traditional texts, and the means of assessing comprehension of such texts.

Matthew (1997) cites Miller et. al.'s study as one of the sources of information underlying her own study of thirty seven pairs of eight year old students using CD Rom "story books" (1996 : 263). She responds to their question of assessment by using what she calls the "unconventional assessment methods" of story retelling and open ended questioning that were in accord with the non-traditional structure of the texts.

She finds significant differences in reading comprehension, particularly through the assessment of story retellings, and concludes that such texts have the potential to increase reading comprehension when assessed through appropriate criteria and supported by appropriate teacher monitoring and intervention (1997 : 266).

She lists the reasons affecting improved comprehension as the multi-sensory nature of the text and learning experiences, the possibilities for interaction with text, the active nature of text processing required, and the opportunities to respond in a personal, unstructured way to text (1997 : 268).

She identifies the issues of teacher role when students are working with non-linear texts, and the complementary classroom use of linear and non-linear texts. She calls for more study of the effects of non-linear texts on motivation and second language acquisition.

James' study (1999) of four students of varied ages using CD Rom narratives inspects the tension that these texts can create for students when the expectations provided by the "safe" structure of linear narrative is disrupted by interactive text features.

James sees this as a subtle change in the tone of the narrative which signals "strangeness" when the reader takes control of the narrative and fills gaps by interacting with images and "hotspots" (1999 : 50). She sees this as a voluntary decision where students "allowed" themselves to be diverted into "continuous movement to and from linear and interactive modes" and because the strong narrative gave a clear sense of direction the reader could confidently release the potential for interactivity (1999 : 54).

She notes that students adapted quickly to the text and were able to explore some of the illusions set up by traditional narratives through the multi-media mediated release of metafictional elements of the text. She concludes by stating that the evidence of her study is that the software encourages students to become active and reflexive users of text (1999 : 62).

The studies above are of interest for their perspectives on comprehension, assessment and responsive elements in learning in relation to non-linear texts. However a drawback in relation to the present study is that the genre used was narrative (fiction), whereas the texts used in this study are non-fiction. Therefore the way in which comprehension occurs will be less dependent on external structures such as narrative with its accompanying inference in human experience, and more dependent on students' inquiry questions.

Studies focusing on factual text are mentioned by Todd (1998) and Kinzer and Leu (1997). Kinzer and Leu discuss the recent *Reporter Project* which investigated the effects of technologies such as video and multi media authoring on information literacy acquisition of twelve year old students in classroom settings over two years in the USA. The study

found that students became more literate in communication of their knowledge than a control group that didn't use the technologies, and that they made significant improvements in the areas of identification of main ideas and supporting detail, cause and effect relationships and cohesion in written language (1997 : 128).

Kinzer and Leu also cite the *Hypermedia Design Project* which investigated the potential of hypermedia to assist students' lack of prior knowledge of a topic when dealing with complex, dense information. The project found that hypermedia could assist richer understanding of complex information through multiple immediate sources of information (1997 : 130).

The Classroom Integration Project (cited by Kinzer and Leu, 1997 : 131 - 133) where software was designed responsively "on the spot", demonstrated the need for software to reflect the teaching and learning needs of teachers and students. Kinzer and Leu reiterate the urgency for more information about the kinds of strategic knowledge required by users of new text types.

Todd (1998) describes five Australian studies (unobtainable by the researcher) that focus on the explicit development of information-handling abilities and he concludes that these studies indicate positive impact on student learning and learning environments. He cites a sixth study (McNicholas and Todd, 1996), focusing on the use of Internet resources, as highlighting the following very urgent issues : research question design, knowledge of search processes, development of effective search terms, and selection of relevant information from vast sources (1998 : 30).

The latter studies relating to factual information handling and presenting have some conceptual relationship to the present study, although none have been conducted in New

Zealand. They also appear to raise some of the issues implied in the research questions of this study.

2.6.9 *Get on with it!* Langford (1998) states that there is a sense of urgency that educational processes do equip students and teachers with the ability to deal effectively with the huge banks of information now available in varied forms. That is, students and teachers need to be “information literate” (and this implies the higher-order thinking processes referred to above), and Langford expresses concern at the apparent disunity of educational practice and approach to the issue (1998 : 68). This view is reinforced by Todd (1998 : 28 and 29).

In conclusion to this section, Spiro and Jehng (1990) enthuse about the suitability of non-linear media to convey complex content. They maintain that students need to develop strong abilities to restructure their existing and acquired knowledge in response to the deepening of conceptual content. They label this ability “cognitive flexibility” (1990 : 164) and maintain that the “criss-crossing of conceptual landscapes” required by in-depth processing of non-linear texts creates “highly interconnected web-like structures that permit greater flexibility in the ways that knowledge can be assembled for use in comprehension or problem solving...highly adaptive schema” (1990 : 169). Of course students rarely acquire these skills by chance and this brings the circle round to teachers and their teaching, which will be the final consideration in this chapter.

2.7 Teachers thinking in new ways

2.7.1 *Teachers and new technologies* The most critical factor in any teaching and learning setting is the teacher, and this brief final section is concerned with issues surrounding the possibilities for teachers to think in new ways inspired by the thoughtful integration of information and communication technologies into learning opportunities across curricula.

Many teachers in New Zealand are still afraid of or indifferent to the new opportunities for self and professional development offered by new technologies, and remain frozen at this point. Mason (1996) discusses the personal and cultural aspects of this dilemma, with reference to self-efficacy issues (1996 : 13 - 15). There are many other points on a continuum of teaching development of ICT proficiency beside the “frozen moment”, and Leu (1997 : 65) advocates that teachers break down such barriers through the “embracing” of new opportunities for one’s own new literacy and the concept of “continually becoming literate”, thus advancing through the continuum. Many New Zealand teachers are welcoming the new technologies and the transformations to learning and teaching that such technologies encourage.

2.7.2 What is a proficient computer-using teacher like? Brown (1995a) considers many perspectives of this question in a study of thirty six New Zealand teachers which reduced to eleven and then two teachers as finer specifics were investigated. Among his findings is that proficient computer-using teachers were confident of their own abilities in this area (1995a : 179), and that the field was a highly subjective and personal one (1995a : 172). Although there were few evident patterns in the ways teachers integrated software into the learning environment, indicating a diversity of practice, a learner-centred philosophy was common to these teachers (1995a : 179).

Brown makes a strong statement about the necessity for teachers to become empowered through contemporary theory with the “conceptual tools” for reflecting on and articulating their own practices (1995a : 189, and also Sprague & Dede, 1999 : 6), thus assisting them to generate appropriate and creative innovations - “new models of teaching and learning” - inspired by new ICT-mediated texts (Ryba & Brown, 1998 : 1; Brown, 1998 : 7).

Brown calls for classroom-based research developing closer links to practice (1995a : 189) in order to challenge teachers' conceptions of teaching and learning, and to help teachers develop their own capabilities, knowledge and understanding grounded in theory (1995b : 13; 1998 : 7-9) in an emerging field of education that requires "a unique blend of expertise in teaching pedagogy and domain specific knowledge about the computer itself" (1995a : 187).

Ryba and Brown (1998 : 5-7) reiterate that teachers need to be able to create a "learning culture" that gives attention to both social and instructional practices. To do this teachers need to be aware of current thinking about communities of practice which form an "intellectual collective", with the attendant social skills of working together and the social and cognitive skills of negotiating meaning from text. Identifying and providing opportunities for engagement at the point of learning (zone of proximal development) and consciously assisting students with a strategic approach to learning is equally important. Finally teachers need to use the skills of informed critical reflection of their own and others' practice so that professional momentum is maintained.

One implication of the above is the need for teacher education and as with so many of the other issues discussed in this chapter, there appears to be a wide diversity in how this is happening. The teaching processes designed for this research study were the result of several years of thinking and practice in this field and hopefully exemplify some of the applications of theory for others to think about.

2.8 : Summary

This literature review has attempted to deconstruct the myriad of interwoven threads that constitute the parameters of this research study. Attention has focused on conceptual material, relevant literature, and issues surrounding the ideas.

The review has outlined the influences of tradition, language and linear and non-linear text on teaching and learning in New Zealand primary schools. It has also highlighted some of the semantic and conceptual conflicts and current thinking about literacy and literacy learning.

The research focus of information literacy acquisition has been developed in terms of learning theory and practice and the links to linear and non-linear texts, language and literacy mentioned above. Research about non-linear texts and information text processing has been described and linked to this study.

The role of teachers in establishing a “learning culture” conducive to the acquisition of information literacy has been briefly developed.

In the following chapter some theoretical perspectives are discussed and developed in order to conceptualise the process of this study and to define the inquiry focus.

Chapter Three : Conceptualisation of the Research Process

"How we go about doing educational research is very much shaped by what we think educational research is" Clark, 1997 : 3.

3.1 Introduction

This chapter outlines the main research aim and the research objectives. Theoretical frameworks and research perspectives are discussed with reference to the study. A diagram of the theoretical framework is presented. A research perspective is selected and justified.

3.2 Research Aim

The main aim of the research is : *to identify the implications for teaching and learning of hypertext in relation to information literacy acquisition in older primary school children.*

The processes that will achieve this aim are :

- a systematic analysis of the ecology of the selected learning environment and its relationship to particular activity involving use of hypertext
- creation of a hypertextual learning environment
- analysis of the hypertextual environment in working form

3.3 Research Objectives

The following objectives link closely to the research questions in chapter four, and reflect the process of the study.

- to observe a selected classroom programme in terms of a socially-interactive reflective ICT-enhanced learning environment, in order that the specific context of hypertext can be embedded in overall conditions for learning
- to investigate students' perceptions of learning, and information literacy in particular, as critical aspects of the study
- to identify key features of literate activity where hypertext is a context

- to ascertain the effectiveness of interactive teaching strategies which support student learning when hypertext is used

3.4 Defining a Theoretical Framework for the Study

The researcher believes that, in order to develop a sound theoretical framework and come to a clear appreciation of requisite methodological elements for the study, it is important to conceptualise and define understandings from several dimensions, and attempt to articulate relationships between them. Accordingly, the dimensions examined are philosophical perspectives, research perspectives, and learning perspectives.

3.4.1 Philosophical Perspectives There are many views of what constitutes educational research and its related methodologies and practices. Clark (1997 : 3) reiterates the importance of careful weighing up of the philosophical assumptions, strengths and weaknesses of different types of inquiry by researchers, in order to make an informed justification of one's selected research perspective.

Philosophical issues underpin all research perspectives. Questions that relate to the human condition can be identified as certain assumptions within perspectives. These assumptions can relate to views of what constitutes truth, knowledge, values and the human state. They may be "big" questions such as :

- are humans purely physical beings or is there a higher "metaphysical" state?
- what does "true" and "not true" mean, objectively?
- are there values involved in inquiry - if so, what are they and how do they enter into the inquiry?
- what is the human state?
- what is knowledge?
- what is objectively true?

(Clark, 1997 : 3-4)

In examining research perspectives in the light of these “big ideas”, the researcher had to focus on the basic philosophical constructs that encapsulate the ideas, in order to grasp the philosophical implications for the theoretical framework selected. So it was important think about the distinctions between :

- ontology - “our theories about what there is in the world” (Clark, 1997 : 3)
- epistemology - “our theories about our knowledge of what there is in the world” (Clark, 1997 : 3)
- axiology - “our theories about what and how we should value the things in the world including our knowledge and ourselves” (Clark, 1997 : 4)

This piece of research draws on aspects of several traditions - interpretivism, critical theory and naturalism - in its philosophical and methodological underpinnings. However the selected traditions have developed from and grafted onto one another as part of an evolutionary process cumulating in naturalism. Therefore the following discussion of these philosophical issues will be an inclusive one.

3.4.2 Philosophical foundation of this study

The ontological framework (understanding about the nature of reality) adopted for this study is that of relativism, that the external world is an entity, but that it is a “web of belief” that can be expressed in different ways, with perceptions of participants contributing to the construction of a cross-perceptual framework of ideas and phenomena realising the research aim. The “web of beliefs” needs to be articulated in a manner that is coherent without making absolute judgments. The expression of the philosophical “reality” of the study rests on the researcher’s responsibility to present a comprehensive and interconnected whole picture that enables the audience to construct their own clear picture of the research and to make connections and conclusions of their own.

The epistemological position (theory of knowledge) assumed is consistent with the ontological framework in that it views knowledge as a transactional “natural phenomenon” : knowledge created is a result of the interaction between the participants, and “reality” (or the known) and the knower are interdependent. Given this openness, the researcher can only approximate “truth”. However it is possible to bring order to a seemingly undefined whole through precise and systematic articulation and justification of a particular “perceived reality”. There is thus implied a constructivist rationality which is not prescriptive but dependent on the ecological circumstances of the study (that is, the world views of the participants, the researcher, and the socio-cultural conditions).

The axiological stance (theories about values) assumed is a hermeneutic one, consistent with the “multiple reality” world view of the ontological framework in that it views values as part of the “human face” of naturalist research ethos, not only as an integral part of its objective of revealing the phenomena of social and cultural activity but also as part of its own accountability to society, in this instance education. This stance assumes a responsibility to actively intervene to raise awareness : that values are an innate aspect of the human condition, partly a subjective response to circumstances and partly an essential element in the way groups of humans function. Further to this is a belief in the concepts of justice, avoidance of harm to others, succour, and honesty, as elements basic to the existence of social groups (Clark, 1997 : 95-96), which drives both the ethical considerations and the research process of this study.

With these concepts as clear reference points, the researcher aims to explore sensitively and systematically the consequences of the particular setting, and the effects that these consequences might have on others. It is expected that these values are also developed within the interaction of participants and researcher so that all are empowered through their enhanced perceptions of the conditions. The intention of the research is

emancipatory : the non-absolute view of knowledge allows for adaptation and innovation of approach which is balanced by the drive for accountability in terms of humanistic values. In this way, values mediate and shape the inquiry and the discoveries.

This is the philosophical foundation of the study. From here it is necessary to examine and develop research perspectives.

3.4.3 Research perspectives There is little research about hypertext and its implications for information literacy acquisition, and still less research conducted in a classroom context such as this study attempts. Much of the text-based research reviewed in Chapter two focused exclusively on aspects of literacy such as comprehension (Matthew, 1997), reading acquisition (Wild, 1995), and literary texts (Swann and Meskill, 1996). The ecological conditions for learning were not represented as having a bearing on results. Consistent with philosophical views stated above and the importance of authenticity (see also 3.4.5), the intrinsic importance of the functioning of the whole learning community and shared constructions of meaning requires links to research traditions that are open, reflexive, and inclusive. Therefore an ecological-constructivist approach has been selected as a guiding paradigm.

3.4.4 Relationships between elements of the research process In the following table the researcher has attempted to synthesise some of the important features of relevant research perspectives - interpretivism, critical theory, and naturalism - and link them to philosophy, an ecological-constructivist research perspective, and methodology. The purpose is to make visually explicit some of the complexity of elements that inform an ecological-constructivist research perspective, their inter-related links, and to anticipate the methodological implications that will be developed in Chapter four.

Table 3.1 Elements of the research process

Research Perspective	Philosophical Elements	Links to Ecological-Constructivist Paradigm	Links to Methodology
Interpretivist "It is through the intelligent apprehension of the qualitative world that we make sense" Eisner, 1991, p21.	*The world may be known in multiple ways (ontology). *Reality is a personally constructed experience (epistemology). *An ethical perspective is set in place by looking behind behaviour to perception and motivation (axiology). *Language is used as a means of describing the world.	->A particular reality is constructed by the researcher. ->"Knowledge is <u>made</u> not simply discovered" (Eisner, 1991, p7). ->Individual subjective meanings are grasped as closely as possible in order to construct meaning clearly. ->Text is crafted so that meaning is expressed as well as stated.	->an ethnographic approach may be selected ->The researcher must be able to make a strong case for interpretation, using reasons, examples, judgements. ->The researcher forms empathetic relationships with participants and is sometimes an observer-participant in order to gather "rich, context-bound information" (Creswell, 1994, p7) ->A range of ways of recording experience is used.
Critical Theory "Domination reaches into the inner recesses of the psyche" (Giroux, 1981, p128)	*The world may be known in multiple ways (Habermas' metatheory) (ontology). *An emancipatory "cognitive interest" operationally shapes objectives, forms, concepts (Clark, 1997, p46, diagram) (epistemology). *The need to free individuals or groups from their ideological dependence guides the research in a practical manner ("betterment"). *Language is consciously used to mediate empowerment (communicative competence)	->Considers philosophical, socio-cultural, political and psychological elements. ->Knowledge is developed through the active construction and reconstruction of theory and experience and rational discussion. ->Self-awareness, self-responsibility and understanding of conditions are fostered, with practical future action aimed for. ->"Diverse voices" are listened to; the research process is demystified through the participants' shared ownership and responsibility.	->The research must be situated <u>within</u> the classroom ecology. ->The process is inductive. ->The process involves the trialling of new approaches, and a socially-interactive, reflective element. ->Data-gathering methods chosen reflect a range of perceptions, actions and attitudes.
Naturalist "an overarching theory to explain and predict our experience" (Clark, 1997, p69).	*The world may be seen through many conceptual networks of experience in which theories are unified through an evolving theoretical web (Clark, 1997, p66) (ontology). *Sensory evidence is the source of meaning (epistemology). *Evaluative thinking is critical to a balanced perspective (axiology). *Language is used to explain and refine theories.	->A particular situated context is explored and examined in order to postulate theories. ->Meaning is constructed through the making of practical judgements. ->A range of sources of evidence are critically evaluated. ->Language has explanatory power.	->Theories are developed during the research. ->The simultaneous shaping of a range of factors is considered. ->An open attitude to factors that shape conditions is evident ->Evidence is coherently discussed.

The above synthesis of research perspectives provides a base from which to consider the following section on learning perspectives.

3.4.5 *Learning Perspectives and their relationship to research* An ecological-constructivist paradigm translates easily into an analysis of learning perspectives implicit in the study.

First, setting up appropriate conditions for learning is deemed crucial to acquisition of literacy in New Zealand schools (Ministry of Education, 1992 and 1996) and for this reason the researcher considers it a necessity that the hypertextual environment in this study be contextualised within the class setting.

Brown's diagram (1995a : 13) of the ecology of the computer learning environment exemplifies clearly the holistic and dynamic nature of such a setting, and the complex influences that permeate it. This ecological complexity applies in a similar way to the present study.

Further, in explaining the diagram, Brown reiterates the need to understand the relationships and interactions between the components in order to determine the "ecological effects" of computers on learning. Because the components are interdependent the clearest understanding is created by considering a combination of their effects (1995a : 13,14; note also Ryba, 1989, in 2.5, and 1994, in 3.5). Again this thinking applies to the present study and its ecological-constructivist focus in the sense of student-centred approaches to learning : how might students learn within the general class environment and how does hypertextual learning affect this?

Second, just as there are several contributory research traditions implicit in the research perspective of the study, so are there several contributing learning perspectives. These

have been selectively analysed and presented as the five tables following, in order to demonstrate something of the richness and complexity of theory that underlies New Zealand primary school information literacy learning environments and to give substance to the conceptualisation of the research process.

The first four tables outline features of information processing, metacognitive strategy, socio-cultural and constructivist learning perspectives. The fifth table outlines features of an ecological learning perspective. This fifth perspective is perceived by the researcher to be over-arching, and inclusive of the other perspectives. This ecological learning perspective connects directly to an ecological-constructivist research perspective and partly underpins the research design.

Table 3.2 Learning Perspective - Information Processing

Main Characteristics	Principles	Learning Implications	Research Evidence	Research Implications	Research Questions
<p>Focuses on the processes of the cognitive system and the way they are manipulated by the student</p> <p>Organises these processes into specialised aspects of information-handling which can be strategically developed by students</p> <p>Employs specific strategies which optimise the use of the brain's processing resources.</p> <p>Views the teacher as taking "executive control" where needed in order to assist the learner to acquire processing strategies and skills - this function can be filled by other "experts"</p> <p>Emphasises the functional aspects of the language used to process information</p>	<p>The human brain is a system that constructs and manipulates symbols (mental representations) such as schema, concepts, words, numbers, scripts.</p> <p>Symbols can be represented and modified in the light of new experiences</p> <p>The cognitive system is inherently subject to "cognitive overload" so efficiency in processing is essential.</p> <p>The cognitive system is guided by a "central executive" the function of which is to guide and oversee problem-solving</p> <p>Metaknowledge of linguistic structures and conventions is integral to the efficient processing of information</p>	<p>Students acquire knowledge about the specialised requirements of information-handling, and the strategies to use them independently</p> <p>These requirements can be developed for students in categories such as: defining information, locating and retrieving information, selecting information, reading and using information, organising information, presenting information, evaluating process and product.</p> <p>Strategies include ability to map, chunk, discard, closely and critically read information and rearrange information through induction.</p>	<p>Rumelhart & McLelland's model of reading (1981) <u>in</u> McShane, J. (1991) <i>Cognitive Development</i>. Mass: Blackwell</p> <p>Todd, R. & Nicholas, C. (1997) Electronic information and learning organisations <u>in</u> <i>Information online & on disc 97: Proceedings of the Eighth Australasian Information online & on disc conference and exhibition</i> Sydney: Information Science section, Australian Library and Information Association.</p>	<p>1. The precise nature of cognitive behaviours in terms of language is not clear</p> <p>1. Adjustments to thinking and acting help students to confront the contingencies of electronic text: the heart of these interactions with electronic text lies in the linguistic demands of the medium.</p>	<p>How does language development affect students in processing information? What language can be acquired through information-processing activity?</p> <p>How can students best transform the flood of electronic information into knowledge? What is the knowledge of hypertext structure and convention that teachers need in order to effectively guide students to a critical understanding of electronic information handling?</p>

Table 3.3 Learning Perspective - Metacognitive Strategy

Main Characteristics	Principles	Learning Applications	Research Evidence	Research Implications	Research Questions
<p>Requires conscious control and self-regulation of one's thinking processes</p> <p>Is embedded in cognitive development - a product and producer of cognitive development.</p> <p>Involves knowledge of learning: procedural and conditional knowledge as well as self-knowledge, situational knowledge, and strategic knowledge.</p> <p>Requires processes that imply self-determination in learning and problem-solving.</p> <p>Based on a set of skills such as - self-evaluation, reflection, analysis planning, self-regulation, prediction monitoring, self-checking.</p> <p>Fosters self-efficacy.</p>	<p>The nature and quality of learning are determined by the decisions made about the learning.</p> <p>Deep learning is fostered through the systematic search for meaning.</p> <p>Explicit instruction in the purpose, identification and use of particular strategies is essential.</p> <p>The awareness and confidence gained from effective use of metacognitive processes is reflected in the degree of self-determination and enablement.</p> <p>It is necessary to practise the various strategies in order to refine the metacognitive skills.</p> <p>Knowledge about thinking grows from ability to analyse one's own and others' experiences in relation to metacognitive strategy use.</p>	<p>Students can:</p> <p>plan through goal-setting, and select and use appropriate strategies for achieving goals</p> <p>select and access appropriate resources</p> <p>monitor and regulate own progress</p> <p>evaluate and reflect on process and end product</p>	<p>Jones, Alison (1987) What really happens in the classroom? <i>SET 2</i> Wgtn : NZCER</p> <p>Palinscar, A.S. & Brown, A. (1984) Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities <i>Cognition & Instruction, 1.</i> and Kelly, Marie (1995) Reciprocal Teaching-A practical & accessible long-lasting method for improving comprehension. <i>Reading Forum NZ, No.2.</i> N.Z. Reading Association.</p> <p>Tunmer, W.E. & Hoover, W. (1992) Cognitive and Linguistic Factors in Learning to Read in P. Gough, L.Ehri, P.Tremain (eds.) <i>Reading Acquisition</i> Hillsdale: Erlbaum.</p>	<p>1.Students can be assisted (or not) to become active planners and decision makers</p> <p>1.Significant gains in access to meaning in print text with the assistance of specific m/cognitive strategies.</p> <p>1 Students learning to read need to become increasingly aware of their ability to control their own intellectual processes.</p>	<p>How can students be assisted to become active and reflective in the ICT-enhanced environment?</p> <p>How can teachers assist students to acquire specific m/cognitive skills directed at gaining fuller meaning from hypertext?</p> <p>How can teachers enable learners to reflect on the structural features of hypertext?</p>

Table 3.4 Learning Perspective - Socio-cultural

Main Characteristics	Principles	Learning Implications	Research Evidence	Research Implications	Research Questions
<p>Holds that social interactions are essential components of cognitive growth</p> <p>Views as crucial the consistent building of supportive social contexts at every level</p> <p>Engages students in social activities that support their learning and gradually they take over the process, becoming independent learners</p> <p>Uses the idea that working just beyond students' zone of proximal development (ZPD) builds a system that leads to further learning</p> <p>(partly derived from the thinking of Vygotsky, 1978 and Bruner, 1974)</p>	<p>Knowledge is mediated, organised and communicated in the context of social interaction</p> <p>Performance must be assisted till internalisation occurs- students problem-solve with support in the ZPD</p> <p>Cognitive and linguistic skill appears first on a social plane and then on an individual plane</p> <p>The consistent scaffolding of learning processes leads to the development of "self-extending systems" that generate further learning through the use of multiple sources of information</p>	<p>A variety of learning arrangements such as social groups, instructional groups, dyads, peer tutoring is conducive to socio-dialogical learning</p> <p>Co-operative and collaborative learning strategies are developed, including roles and procedures within groups</p> <p>Communication skills are explicitly developed in relation to the language of decision making, including negotiation and compromise</p> <p>Teacher models and facilitates language for explicit purposes</p>	<p>Clements,D. & Nastasi,B. (1988). Social and cognitive interactions in educational computer environments. <i>American Education Research Journal</i>, 25, 87-106.</p> <p>Leu,D. (1996) Sarah's Secret: Exploring literacy in multimedia environments. <i>The Reading Teacher</i> Vol.5, No.2,162-165.</p> <p>Medcalfe, J. (1995). Co-operative Learning and Peer tutoring: Strategies for Inclusive Education. <i>NZ Reading Forum</i>, No 2. NZ Reading Association.</p>	<p>1. Computer environments require students to communicate with one another in order to make meaning.</p> <p>1.The social construction of meaning is natural and frequent in such settings.</p> <p>2.The quality of the planned learning experiences is a key factor in literacy acquisition.</p> <p>1.Students benefit from such strategies in terms of both social and academic development.</p>	<p>What demands does hypertext make on students in terms of socially-interactive learning processes?</p> <p>How can teachers ensure that information literacy learning experiences are intensive, and foster critical thinking, rather than surface level "browsing"?</p> <p>What are ways of arranging learning that will maximise the acquisition of information literacy?</p>

Table 3.5 Learning Perspective - Constructivist

Main Characteristics	Principles	Learning Implications	Research Evidence	Research Implications	Research Questions
<p>Prioritises what learners do, can do, and can do with help</p> <p>Views optimal learners as active meaning-makers who make sense of new information on the basis of prior knowledge</p> <p>Acknowledges multidimensional influences -cognition, motivation and self-concept - as forces that help students actively shape processes</p> <p>Uses guided and reciprocal learning approaches which reveal the potential of the student</p>	<p>Students' strengths and how they learn is the focus for teachers</p> <p>Students build onto already-existing knowledge and construct their own individual representations of knowledge</p> <p>A strategic approach "moves on all fronts" (Clay, 1992) Students question and regulate their own abilities</p> <p>The teacher mediates learning</p>	<p>The teacher is responsive to the manifested needs of students: instructional interventions are closely focused on these</p> <p>Learning experiences are designed so that students are actively engaged and individual learning styles are recognised</p> <p>Independent and co-operative learning is valued</p> <p>A variety of scaffolded approaches offers students opportunities to engage in literate activity in a supportive environment</p>	<p>Kinzer, C. & Leu, D. (1997) The Challenge of Change : Exploring Literacy and learning in electronic environments <i>Language Arts</i>, Vol.74,February 1997, 126-135.</p> <p>Wolfe,C. (1995) Homespun Hypertext- constructing text as a tool for teaching critical thinking <i>Teaching of Psychology</i>, Vol.22,No.1, 29-33.</p>	<p>1.Use of hypertext can assist the construction of a mental frame for understanding linguistic components of story (Young Children's Literacy Project).</p> <p>2.Use of hypertext can assist the construction of mental models of information and assist comprehension when prior knowledge is low (Hypermedia Design project).</p> <p>1.Construction of hypertext assists critical thinking processes.</p>	<p>What are new forms of strategic knowledge required to construct understanding related to information literacy?</p> <p>What interchanges of meaning take place and how does this construction of meaning in an ICT rich environment differ from conventional classrooms?</p> <p>How does the non-linear nature of hypertext influence students' constructions of meaning?</p>

Table 3.6 Learning Perspective - Ecological

Main Characteristics	Principles	Implications for learning	Research Evidence	Research Implications	Research Questions
<p>Subsumes other learning perspectives.</p> <p>Imparts an organic and spontaneous quality to learning environments</p> <p>At the same time, learning is most carefully orchestrated by the teacher, acting as a guide and facilitator</p> <p>Creates conditions for a socially-interactive, reflective learning environment where the growth of teacher-independent thinkers is promoted</p>	<p>The ICT-enhanced classroom is a dynamic micro-community of learners.</p> <p>Elements which foster effective learning and teaching interact to produce the dynamics of the environment.</p> <p>Adaptive practices adopted by teachers generate the transformations in learning in the ICT enhanced environment.</p>	<p>A positive, interactive learning community is established and maintained.</p> <p>Thinking skills including reflection are developed in a systematic fashion.</p> <p>The needs of students are identified and are the specific focus for planning and assessment.</p>	<p>Ryba, K. (1994). <i>An Ecological Model for Analysing Social and Cognitive Interactions in the Computer Environment</i> Albany: Massey University.</p>	<p>1. Research focuses on analysis of the interaction between the learning elements and the responses and actions of the members of the community at given points of time.</p>	<p>How is this community of learners established and maintained?</p> <p>How can the transactions between elements of the learning environment be organised for analysis and reflection?</p>

3.5 Rationale for Selection of Research Perspective

How does one align the philosophical and methodological concepts and the situational demands of the learning perspectives in justifying an ecological-constructivist research perspective? The following outline contains several points which justify this position.

- Throughout the dimensions of the research process outlined above there is a thematic consistency of constructivist holism which can be translated into the practical area through its implications for methodology and its compatibility with learning perspectives, particularly the ecological learning perspective
- There is often “a range of positions sometimes located on more than one dimension” and “selection among these positions ought often to depend on the purposes and circumstances of the research rather than being derived from methodological or philosophical commitments” Hammersley (1992 : 51). An ecological-constructivist perspective allows such flexibility within the research design and process and permits the researcher to work within a learning environment reflecting aspects of current literacy practices to attempt to achieve the objectives of the research.
- The importance of the transactional adaptations learners and teachers make and the need to merge these with “the social, political and cultural factors in which the learning environment is embedded” (Ryba, 1989 : 219) is a critical factor of any conditions for learning. Ryba’s ecological approach for analysing social and cognitive interactions in the computer environment (1989 : 227) reflects an ecological-constructivist research perspective through its focus on possible change and effects, naturalistic observation, and analysis of social and cognitive interactions between students and teacher. It is a collaborative adaptation of this approach that has formed the design of this study (see 4.2). The focus on systematic collection of data that is both general (of the whole environment) and specific (of groups and individuals using hypertext) should enable a

substantially-informed analysis and construction of the conditions for learning and their inter-related effects.

- An ecological-constructivist approach to the research should also contribute to the bridging of the gap between theory and practice since the research activity is of necessity situated, contextualised and to a degree “created” out of the perceived conditions. Theoretical positions brought to the research process may be trialled and theory modified, constructed or reconstructed during the process.
- An ecological-constructivist perspective infers the following methodological features that theoretically inform the research design and this is further evidence of the appropriateness of this perspective :

the process is an inductive one

the simultaneous shaping of a range of factors occurs

the categories for analysis emerge during the research

the research is context bound

theories are developed during the research

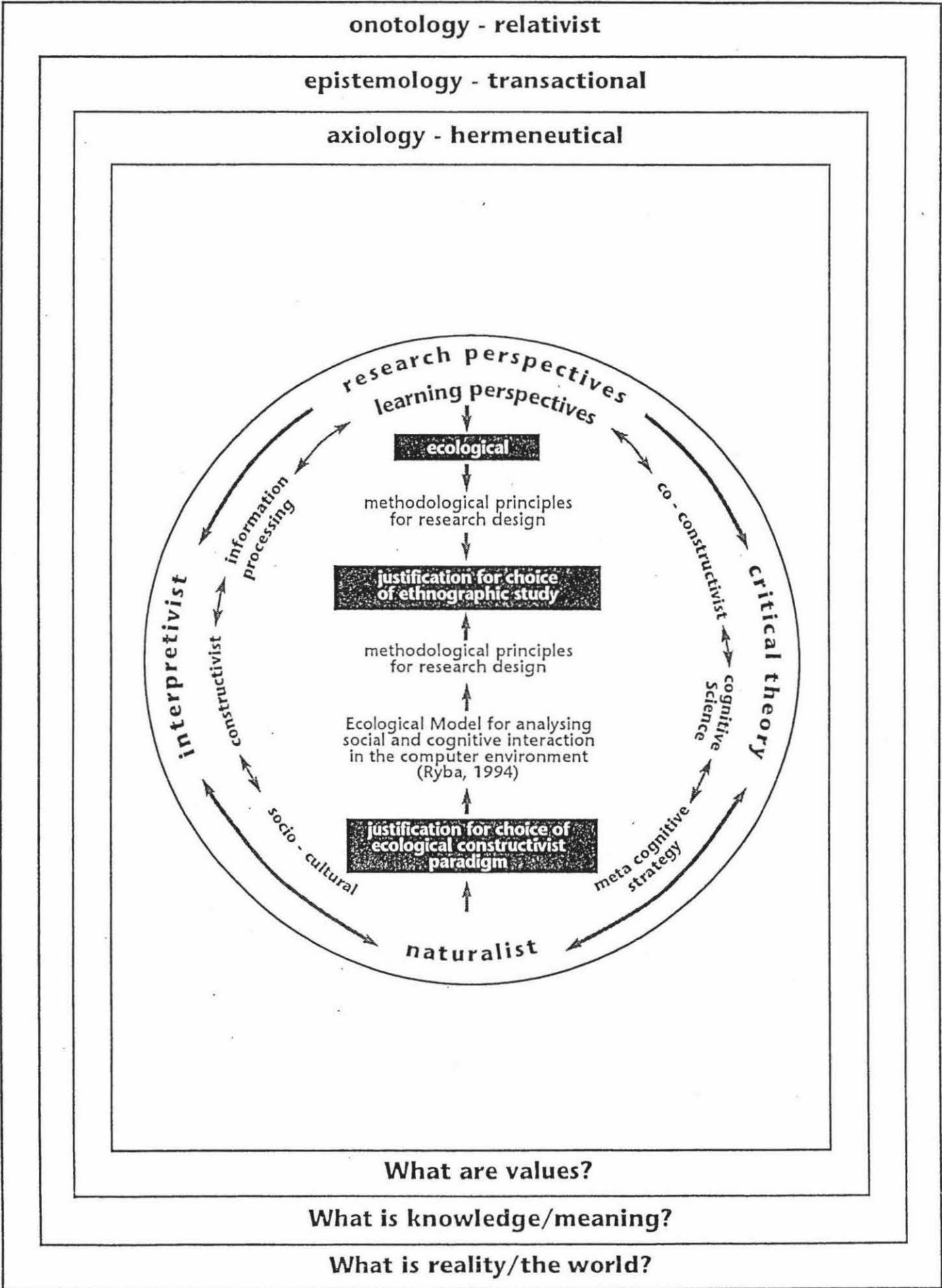
the evidence is specific and verifiable

(Creswell, 1994 : 5)

3.6 Visual summary

The following diagram (Figure 3.1) visually conceptualises and summarises the researcher’s thinking about the components of the research and their inter-relatedness.

Figure 3.1 Conceptualisation of the research process:
a schematic diagram of components and relationships



3.7 Summary

This chapter has endeavoured to conceptualise the research process by identifying a philosophical basis of the study and linking this to research and learning perspectives. Current thinking that views effective information and communication technology enhanced learning as integral to a socially-interactive, reflective total learning environment has been cited in order to justify an ecological-constructivist paradigm as the selected research perspective.

In the next chapter the methodology, research design, and procedures of the study are outlined.

Chapter Four : Methodology

“the ecological perspective...provides a context within which various elements of theory and practice can be brought together and tested in real life situations” Ryba, 1994 : 151.

4.1 Introduction

This chapter contains an account of the overall methodological approach to the research, including a description and justification of the research design. It lists the research questions and links them explicitly to the strategies used to collect data and other information. It describes the participants in the research, ethical issues, the methods of collecting information and the chronological process of the research study.

4.2 Research Design

The research design is an ethnographic case study of a primary school learning environment. The main intention of the design is to facilitate the achievement of the research objectives within an ecological constructivist paradigm as outlined in chapter three. One of the main dimensions of the design is its evolving nature which means that some of its specific features cannot be anticipated in detail until the ecology of the learning environment, the learning needs and strategic development of the participants, and the means of contextualising the research activity in the class programme are ascertained.

The research design covers three broad phases. These are described in the next subsections of this chapter. The design is also illustrated by Figure 4.2 *Ecological Analysis of the Collective ZPD*, which is based on a model developed by Ryba, Selby and Kruger (1999). The collective ZPD model is an extension of the original work of Vygotsky (1978) concerning the concept of “zone of proximal development” in which students interacting with more capable peers can carry out jointly, cognitive processes that are more advanced than would be possible independently. Through the development of this model an “intellectual collective” is formed. To establish and observe the functioning of this “intellectual collective” is the key to the research aim.

4.2.1 Phase one of the research design, the “class zone of current functioning” The first phase of the research design involves the collection of information about the learning environment, the “class zone of current functioning”. The data collecting methods are as follows:

Observations of class sessions yield holistic baseline information about the learning environment. An interview with the class teacher adds information about learning approaches, and English programmes in particular. Observations that focus on pairs of children working with hypertext seek information about strategies used in this setting, and identify emergent themes. Interviews with all children participating in the research investigate attitudes to learning, problem-solving, working with peers, metacognition and hypertext knowledge.

The information collected during this first phase enables the researcher to build a picture of the learning environment, to identify some emerging themes, and to prepare intervention strategies for the second phase.

4.2.2 Phase two of the research design, the “collective zone of proximal development”

This phase is an intervention strategy where a “collective zone of proximal development” is established. The strategy consists of a series of guided experiences informed by the observations of phase one, recorded as lesson plans (see 5.3.1a, 5.3.1b, 5.3.1c), and facilitated by the researcher in the role of a participant observer. The aim of this intervention is to directly train peer tutors in different areas of strategic competence in readiness for the third phase of the research. The processes in this phase establish the “intellectual collective referred to above.

4.2.3 Phase three of the research design, the “class zone of future functioning”

The design of the final phase of the research firstly involves observation of the “intellectual collective” and, secondly, use of some of the data collecting methods involved in the first phase to compare evidence in order to identify development in students’ abilities, thinking and attitudes.

The peer tutors are cross-paired so that their strategic strengths are dispersed. Two multimedia projects, contextualised into the class programme, are carried out. Observations of these projects are recorded and the information analysed in relation to emerging themes.

When the projects are completed, randomly-selected students are interviewed in order to investigate attitudes to problem-solving, working with peers, cognition, metacognition, and hypertext. An interview with the class teacher seeks a further perspective about the students' work with hypertext, and related issues.

This final phase is to enable a systematic analysis of the elements of the "class zone of future functioning", the transformed learning environment created by the establishment of the "intellectual collective" and the strategic work with hypertexts. This phase also provides further information for the researcher to use when identifying recommendations for the use of hypertext to assist information literacy acquisition.

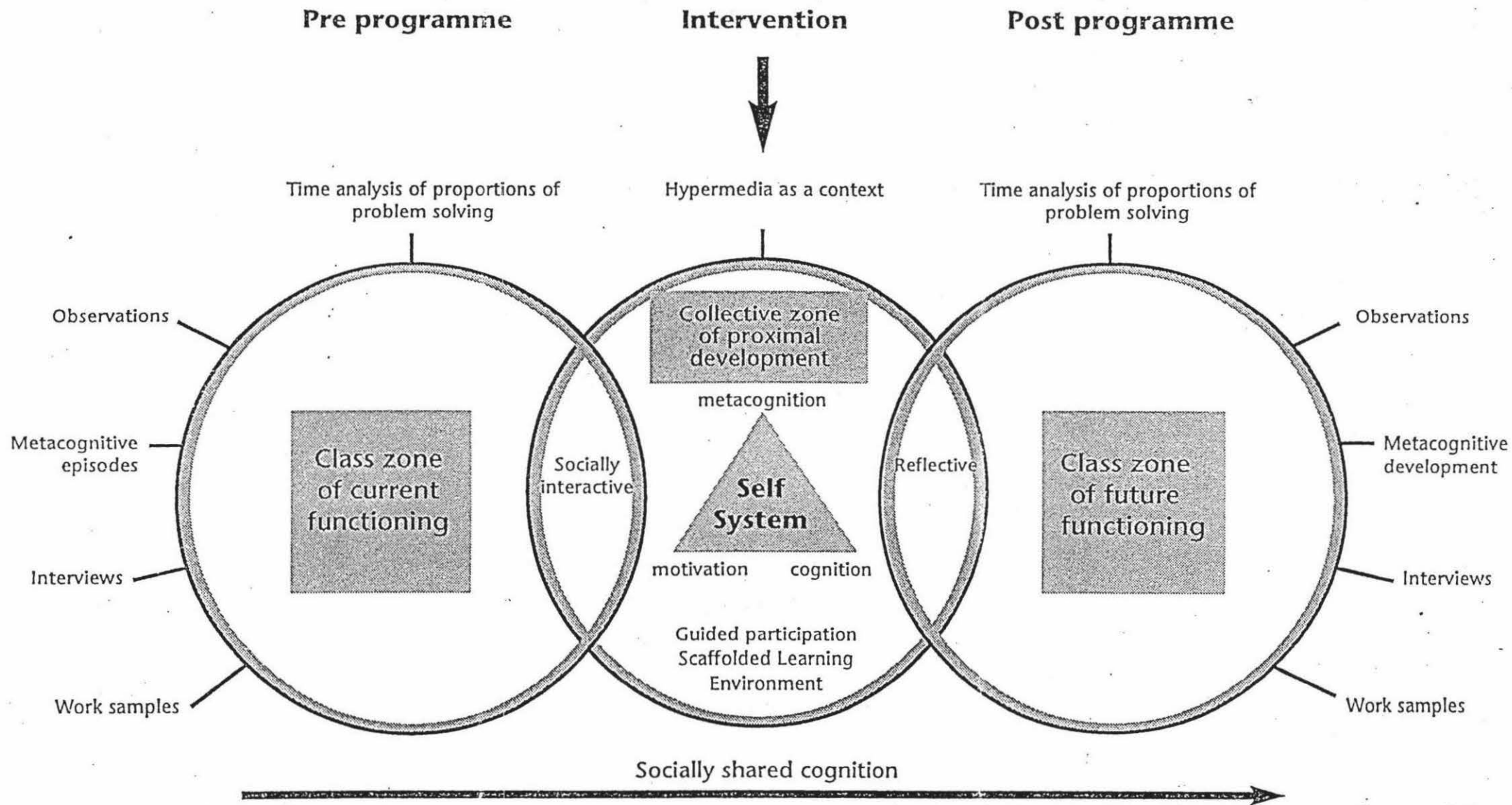


Figure 4.2 Ecological Analysis of the collective ZPD

in collaboration with
Dr. K.A. Ryba
22.9.98

4.3 Justification of Research Design

This design is compatible both in spirit and pragmatically with the ecological constructivist paradigm because of its evolving ethnographic character. As a case study it strives to make sense of a particular reality and allows opportunities for the researcher to attempt to sensitively and thoroughly examine both the case and its participants. It also contains elements of interpretivist theory in its descriptive character, and critical theory in its emancipatory intention, as outlined in the previous chapter.

The ecological analysis adopted for this study focuses attention on interactions between learners, teachers and text as relevant and dynamic evidence in literacy research. It requires through its research questions an integrated approach to information-processing which allows the examination and analysis of the culture of the total learning environment and specific aspects of some parts of that culture in order to focus on key themes which reveal some possible responses to the research questions.

The design is also consistent with contemporary approaches to literacy acquisition - while acknowledging the importance of an holistic approach to information literacy acquisition which encourages the development of students' independent thinking and self-management strategies, it equally acknowledges the importance of systematic and strategic approaches by teachers for assessing and assisting information literacy acquisition.

The design embeds innovative teaching practices and sound beliefs about literacy learning and teaching in its design. It has integrity in its dedication to the embedding of experience into the learning context rather than in working in schematic isolation.

4.4 Research Questions

This research study sought to investigate the following questions :

Research question 1 : How do classroom organisations and interaction patterns influence students' information literacy acquisition when hypertext is a context?

Research question 2 : What perceptions of learning and information literacy do students have and what bearing might this have on their work with hypertext?

Research question 3 : What are key features of literate activity where hypertext is a learning context?

Research question 4 : What interactive teaching strategies are effective for successful scaffolding of information literacy acquisition when students are using hypertext?

4.5 Participants in the research

4.5.1 The school The participant school was a decile three primary school on Auckland’s North Shore. This school was selected from a choice of three schools because its ICT policy aims most closely met criteria devised by the researcher. The Principal, Board of Trustees, and teachers of the selected school endorsed and welcomed the research study.

School policy criteria set by the researcher were as follows :

- The school must have a policy of ICT integration into learning programmes
- The school encourages active professional development of teachers in ICT
- The school has a diverse population of learners

4.5.2 The students The student participants were twenty four of twenty seven members of a Year five and six class (three students did not have permission to participate). The following tables provide some statistics about the students :

Table 4.1 : Number and gender breakdown (whole class)

<i>Year and gender</i>	<i>Number</i>
Year 5 boys	2
Year 5 girls	5
Year 6 boys	9
Year 6 girls	11

Table 4.2 : Cultural heritages

<i>Ethnicity</i>	<i>Number</i>	<i>First language</i>
Australian	1	English
Chinese	3	Mandarin, 2; Cantonese, 1
German	1	German
Indian (Fiji)	1	Hindi
Iraqi	1	Arabic
Maori	6	English
NZ Pakeha	9	English
Filipino	3	Tagalog
Samoan	1	Samoan
Slav (NZ born)	1	English

Table4.3:Readingages

<i>Reading Age Band</i>	<i>Number</i>	<i>Number ESL</i>
7-8	2	1
8-9	3	1
9-10	4	2
10-11	4	3
11-12	2	0
12-14	5	1
14+	8	2

Table 4.4 : Writing stages

<i>Early</i>	<i>Fluent</i>	<i>Highly fluent</i>
9	9	10

4.5.3 The teacher The class teacher was a male in his second year of teaching. He had volunteered to participate in the research, and appeared to meet the criteria set by the researcher to an acceptable degree. (The researcher did not make the final choice of teacher, having been advised by the Research Ethics Committee that the school principal

should do this.) The process of selection was duly negotiated jointly between volunteer teachers and the school Principal and then decided in consultation with the researcher.

Criteria set for teacher selection were as follows :

- The teacher holds a philosophy of teaching that promotes a socially-interactive, reflective learning environment
- The teacher uses inquiry approaches to information literacy acquisition which foster active self-management and independent thinking
- The teacher promotes a positive social-emotional climate
- The teacher is receptive to the possible roles that ICT may play in enhancing information literacy acquisition
- The teacher is willing to participate in the study and accommodate any minor adjustments to class processes
- The teacher is tolerant of change

The teacher selected was a very positive and alert person who had developed strong interpersonal relationships with his students. They respected him and he rarely raised his voice. His curriculum strengths were Mathematics, Physical Education and Science. His teaching presentation was engaging and he had a sense of humour. His classroom had a happy orderly atmosphere. He was very interested in the development of interactive information and communication technologies and was endeavouring to develop his understanding and practice of the integration of ICT into learning programmes. He was at an early stage of his own development with ICT philosophy and practice and was mostly experimenting with the school network that had recently been installed. Like the rest of the school staff he had recently undertaken a school-based Infolink course about information literacy and the use of ICT within this.

He met all criteria for the study to a suitable degree except for the first. There were some areas of his practice which did not meet the first criterion to a high degree, and which were not immediately evident. He and the researcher discussed his practice quite fully in an informal manner throughout the study and he appeared to the researcher to be trying to

establish socially interactive reflective practices but was still developing his knowledge, understanding and ability in this area. This perception is borne out later in the study (5.2.1, graphs and 5.2.5 summary of class zone of current functioning).

4.5.4 The researcher

The researcher was periodically involved as a participant observer and was also required to act in a teaching role when the intervention strategy was developed in phase two of the study. During observations, if the researcher deemed that children required guidance or if they appealed for help, she intervened in the interests of their learning.

4.6 Data Collection

In keeping with its ethnographic character this study required an eclectic range of data and information collection methods in order to gain a variety of perspectives on the emergent themes of the study. The data collection methods were :

4.6.1 Interview questionnaire 1 - students This questionnaire had seven sections and nineteen questions. It was designed for use at the outset of the study, to meet the purpose of collecting information about students' attitudes to learning, and their perceptions of metacognition, learning approaches, sociodialogical patterns, and the role of language, computers and hypertext in the classroom (Appendix A, item 1).

4.6.2 Interview questionnaire 2 - teacher This questionnaire had six sections and twelve questions. It was designed for administration at the outset of the study, to meet the purpose of collecting information about learning approaches used and ways of working with text used in the class programme (Appendix A, item 2).

4.6.3 Observation format 1 This format was designed for the researcher's observation of whole class teaching sessions in the initial phase of the study. Its purpose was to enable the chronological and holistic recording of information about the role of the teacher,

learning arrangements. and interactive, reflective, metacognitive and problem-solving episodes (Appendix A, item 3).

4.6.4 Observation format 2 This format was designed for use throughout the study (Appendix A, item 4). It was used for recording interactions and actions when students were working with hypertext. The format chronologically tracked spoken language and dialogue, action and teacher talk. The researcher recorded students' actions and body language on the format sheet at the time of the observation and later recorded speech in the appropriate columns, transcribing from audiotape and videotape. These were later typed for use in analysis (Appendix A, item 6, Appendix C, item 3).

4.6.5 Audiotape Spoken language interactions were recorded on audiotape whenever the students were involved in hypertext activity observed by the researcher. Twelve sixty minute cassettes were used over the duration of the study.

4.6.6 Videotape Particular aspects of the study, such as assembling the hyperlinks for the Hyperstudio presentation, were recorded on videotape. The moving images linked to live sound provided a fascinating source of information which correlated with the information on the audiotapes.

4.6.7 Retrieval chart 1 This was a framework for students' recording of information during the initial phase of the study. The purpose of the chart was to assist students to list what they were looking for, note what they found, and to provide information of this for the researcher (Appendix A, item 5).

4.6.8 Retrieval chart 2 This was a trial framework that was used while peer tutors were being trained. It was also used during phase three of the research. It had two sections, one which assisted students to record their key search terms and to track their search, and one which assisted them to record information from oral, written and visual sources and to record possible hyperlinks, while engaging in the trial reciprocal strategy devised by the researcher. It provided evidence about students' abilities to record relevant information appropriately (Appendix B, item 1).

4.6.9 Retrieval chart 3 This was a modified retrieval chart which simplified the search and recording process for students. Its purpose was to facilitate the collection of

information from different sources, given the skill and rapidity of access developed by some students after using the trialled materials. It also provided evidence about the quality and relevance of information recorded (Appendix C, item 1).

4.6.10 Planning sheet/storyboard This was a format used by students to record the preparation for their multimedia presentations in phases two and three of the study. It contained an area for the screen plan, an area to record information notes, and an area for notes on possible sound effects. This format provided information about students' abilities to transform materials for presentation (Appendix B, item 2).

4.6.11 Interview questionnaire 3 - students This questionnaire had seven sections and fourteen questions. It was designed for use at the end of phase three of the study with randomly selected students, for the purpose of ascertaining attitudes to learning and perceptions of sociodialogical learning, inquiry learning, metacognition and hypertext (Appendix C, item 2).

4.6.12 Interview questionnaire 4 - teacher This questionnaire had five sections and five questions. It was designed to collect information at the end of phase three of the study about the teacher's perceptions of the research activity, issues about using hypertext, and changes in his own thinking (Appendix C, item 3).

4.7 How information-gathering strategies were linked to research questions

The following table explicitly links the particular strategies used to gain information to the relevant research questions, providing a visual analysis of linked processes.

Table 4.5 : Links between information-gathering strategies and research questions

Research Question	Information-gathering strategies
1. How do classroom organisations and interaction patterns influence student information literacy acquisition when hypertext is a context?	<p>-the classroom ecology was observed with a focus on the conditions for learning, such as teacher talk/intervention, learning arrangements, strategic knowledge demonstrated, significant dialogue, approaches to literacy used, content and resources</p> <p>-the teacher interview(2) asked the teacher to define his organisation for cooperative learning, problem-solving, independent learning, and his approach to a balanced literacy programme</p> <p>-the connected learning experiences with hypertext were contextualised into the class programmes and were transcribed and analysed with respect to dialogue and activity</p>
2. What perceptions of learning and literacy might students have and what bearing might these perceptions have on their work with hypertext?	<p>-students were asked in the interview(1) to comment on</p> <ul style="list-style-type: none"> (i) their attitude to schoolwork (ii) how others might help them to learn (iii) how language, cognition and metacognition might help them to learn (iv) how computers might help them to learn (v) what differences they might have noticed between hypertext and paper-based text <p>-students were asked in the interview(2) to comment on</p> <ul style="list-style-type: none"> (i) their attitudes to working on the computer for their research projects (ii) how others had helped them to learn during their research projects (iii) what they had found out about problem-solving during their research projects (iv) how they had used cognitive skills during the research (v) what they had learnt about hypertext and its structural features (vi) what they had learnt about learning (metacognition) <p>-interactions between students, teacher and hypertext were transcribed and analysed</p>
3. What are key features of literate activity where hypertext is a context?	<p>-the whole class ecology was observed and described in relation to literate activity</p> <p>-the interactions between students, teacher and hypertext were observed over a period of time, and transcribed and analysed in relation to literate activity</p>
4. What interactive teaching strategies are effective for successful scaffolding of information literacy acquisition when students are using hypertext?	<p>-a series of connected experiences that integrated hypertext use into an information literacy/thematic context was planned, developed and observed</p> <p>-focused mini-lessons to assist the acquisition of information-accessing strategies specifically for use with hypertext were planned and developed</p> <p>-three retrieval charts for use with hypertext were trialled and evaluated</p> <p>-a storyboard planner for use with multimedia was trialled and evaluated</p> <p>-visual frameworks showing hypertext links and structures and multimedia structures were trialled and evaluated</p> <p>-teacher models of multimedia text and text plans were trialled and evaluated</p> <p>-interview(3) asked students to reflect on their learning experiences</p>

4.8 Chronology and description of data collection and intervention methods

4.8.1 Preliminary proceedings

- The study received ethical approval from the Research Ethics Committee of the Auckland College of Education and was approved by the Principal, Staff, and Board of Trustees of the selected school.
- The researcher informed the school staff about the research and there was a general discussion. The Principal then negotiated the selection of the participating teacher and class with volunteer teachers.
- The researcher obtained the informed consent of the class teacher.
- The researcher obtained informed consent and the students' parents and caregivers were invited to a discussion about the study process (Appendix D, items 1 and 2).
- The researcher was introduced to the class, explained about the research and answered many questions from the students.
- A workplan for the implementation for the study was negotiated with the class teacher and approved by the Principal (Appendix D, item 3).

4.8.2 The process of phase one - ascertaining the “class zone of current functioning” This period of the study focused on the first phase of the research model (Figure 4.1)

Observation of whole class sessions

These took place at the outset of the study over a period of two weeks. Eight sessions were observed. These observations helped the researcher to set the scene holistically, to determine the general conditions for learning that were operating in the classroom, and to get to know the students. The researcher and the teacher determined together the timing and frequency of the observations, varying the sessions to include a range of curriculum areas.

The observation format covered what the researcher considered to be seven key aspects in literacy learning environments. These were (i)the session process, (ii)the learning arrangements, (iii)balanced approaches to literacy, (iv)strategic knowledge demonstrated, (v)teacher talk and intervention, (vi)significant dialogue, (vii)content and resources (Appendix A, item 3).

The researcher sat in a predetermined area to observe whole class sessions and the follow-up activity. The sessions were later evaluated in terms of the purpose of describing the ecology of the classroom - the "class zone of current functioning". From the material recorded in these observations, graphs were constructed to concretise trends in the areas of teacher talk, scaffolded language approaches, strategic knowledge modelled or developed by the teacher, and learning arrangements (5.2.1, Figures 5.1, 5.2, 5.3, 5.4.). A table detailing types of dialogue randomly observed was also constructed (Table 5.1).

Interviews with students

These took place at the outset of the study, concurrently with the observations of the whole class, and the timing of these was also negotiated with the class teacher. All twenty four students with permission were interviewed over a period of one and a half weeks. The interviews, apart from gaining information about students' attitudes and perceptions, provided a very useful opportunity for the researcher to begin to build a relationship with students for her later participant-observer teaching role in phase two. The interview questionnaire had eight main sections. These sought perceptions of (i)attitude/motivation, (ii) attitude/metacognition, (iii) sociodialogical patterns, (iv) role of language and computer in learning, (v) inquiry skills, (vi) problem-solving skills, (vii) cognition and metacognition, (viii) hypertext and paper-based text differences (Appendix A, item1). Each interview took approximately twenty minutes. Each student was fully introduced to the procedure and told that they could choose to participate or not, and that they could withdraw at any time.

The information from the questionnaire was collated under question headings, with similar responses grouped together. This information was tabled and each section

commented on by the researcher in terms of indicators of trends related to the research questions and the “class zone of current functioning”.

Interview with teacher

This was conducted at the beginning of the study at an agreed time.

The interview questionnaire had six main sections. These sections sought information about (i) how the teacher organised for learning through talk, (ii) how the teacher organised for cooperative activity, (iii) how the teacher organised for problem-solving activity, (iv) how the teacher organised for independent learning activity, (v) how the teacher approached the research process, (vi) what approaches were used to develop learning about oral, written and visual text (Appendix A, item 2).

The information from the interview was tabled and used as material for describing the classroom ecology.

Observations of students working with hypertext

When the above sections were completed sixteen students were paired in consultation with the class teacher, and learning experiences related to Flight - the current study topic of the class - were facilitated by the researcher. The process involved introducing the pairs of children to a sub-topic and describing the activity. The activity was to formulate questions and search for information about them on the computer, using the CD-ROM encyclopedia Encarta 96 (TM). Simple retrieval charts were provided (Appendix A, item 5), and their function described by the researcher. The pairs of students worked on the class computer, and within the class programme. The researcher then observed and recorded the interactions of the students with each other and the hypertext, using audiotape and a tracking sheet (Appendix A, item 4). The researcher intervened only when appealed to except in the case of one pair who needed intensive support. The observations took approximately one week to complete, over broken periods of time. Each pair “session” took approximately twenty minutes.

The information was transcribed (Appendix A, item 6), coded and analysed and some emergent themes identified (5.2.5). This process provided additional information

about students' socially interactive and cognitive abilities, and provided information about the class "zone of current functioning" in relation to the use of hypertext.

4.8.3 The process of phase 2 : establishing a "collective zone of proximal development" This period of the study focused on the second phase of the research model (Figure 4.1).

When the first phase of the research was completed, the researcher, in consultation with the class teacher, selected two groups of eight students to be directly trained in particular strategies for accessing hypertext, and a group of six students to work with authoring software. The aim of this training was to establish an "intellectual collective" - the "collective zone of proximal development" - where students could support and teach each other from their own strengths and abilities. This training took two weeks and was contextualised into the class study topic which was now Farming in New Zealand.

Peer tutors : training in hypertextual search strategies

Eight students were paired and taken through a series of experiences which required them to do the following (i) identify and use key search terms, (ii) formulate a search plan, (iii) use and know the function of particular search tools - pinpointer, word, category, hotlinks, related articles, expand picture, (iv) reflect on the text features of the CD-ROM encyclopedia Encarta 96 (TM) (5.3.1a, Figure 5.6).

The task itself was to locate relevant materials for a question they had formulated. After modelling of a search by the researcher, each pair recorded their question then brainstormed key search terms on a retrieval chart (Appendix B, item 1). They then carried out their searches. After searching they collaboratively constructed a metacognitive chart for accessing information through Encarta 96 (TM) with the researcher. The researcher did not formally observe these activities but was involved as a participant.

Peer tutors : training in reciprocal hypertextual information strategies

Eight students were paired, and participated in a series of learning experiences which required them to do the following (i) cooperatively negotiate text meanings, (ii) access randomly-arranged information systematically, (iii) explain the function of hotlinks in hypertext (5.3.1b, Figure 5.7).

The researcher modelled the reciprocal strategy and introduced the reciprocal strategy reference chart (Figure 5.8). The students formulated their question and, with the relevant article ready, worked through the process, including exploring hotlinks. The researcher did not formally observe these activities and was involved as a participant.

Peer tutors : training in use of authoring software

The students had no experience of multimedia authoring so six children carried out a topic-based project that was an expression of their experiences on the farm visit. The purpose was to gain some experience with planning and authoring a multimedia project that could be shared later. The project required them to be able to do the following (i) cooperatively negotiate multimedia structures, (ii) adapt information to the multimedia medium, (iii) explore the uses of multimedia tools (5.3.1c, Figure 5.9).

The researcher introduced the Kid Pix (TM) software through a model plan and presentation that she had made, and the text features and organisation of the text were discussed. Some of the tools were also introduced through the students' questioning. The children cooperatively planned the total presentation. They then worked in pairs to plan and author parts of the presentation using the planning sheet/storyboard (Appendix B, item 2). The researcher modelled how to link the separate parts at the end of the activity, so that students could try for themselves in future.

4.8.4 The process of phase 3 : identifying the class "zone of future functioning"

This period of the study focused on the third phase of the research model (Figure 4.1).

Project 1 : Integrating the strategies

Eight students were selected from across the groups of peer tutors in phase two above, so that "expertise" was distributed across the pairs. The component parts of a

multimedia presentation were jointly decided upon by the eight students and each pair chose a topic. They then researched the topic using hypertext and other text information, recording their findings on a retrieval chart (Appendix B, item 1). Next they planned their part of the presentation using a planning sheet/storyboard (Appendix B, item 2), and finally they authored their Kid Pix (TM) presentations. They were able to link the separate parts of the presentation at the end. The researcher observed the interactions of all stages of this process using audiotape, videotape, and the tracking chart (Appendix A, item 4) to record information. The researcher intervened only if necessary. The information was transcribed (Appendix C, item 5), coded and analysed in relation to the themes that emerged from phase one of the study.

Project 2 : Integrating hypertextual strategies and reflecting on the structure of hypertext

Seven students, two pairs and one trio, were selected from across the groups of peer tutors for a project involving extension material. Again the students' expertise was disseminated across the groups to maximise the potential of the "intellectual collective".

The project topic was bee farming, related to the current study topic, but requiring active schematic connections to be made in order to manipulate already developed conceptual information. The software used for the presentation was Hyperstudio (TM), which required hypertextual thinking for its structuring.

The researcher assembled the model she had made for her Hyperstudio (TM) project on dairy farming and discussed how it was organised, using the terms "hypercards", "hyperstacks", and "hyperlinks" where relevant. The students and the researcher then jointly constructed a structural plan for the bee farming project, making three stacks using card and strips of card for links. Each group then used a simplified retrieval chart (Appendix C, item 1) in order to brainstorm questions and record the relevant information for their stack, using hypertext and other text information sources. Each group then planned each card in detail and authored their stack using the Hyperstudio (TM) software. Some hyperlinks were added at the end to the plan, but time did not

allow for the links to be added to the presentation, though authored cards were linked sequentially.

The researcher observed the whole process from the beginning, intervening when necessary. The interactions of the students were taped, videotaped, and recorded on the tracking chart (Appendix A, item 4). The information was transcribed (Appendix C, item 5), coded, and analysed in relation to the themes of the study that had emerged from phase one of the study (5.2.5). The researcher then summarised some points that indicated the potential of this activity for future learning - the “class zone of future functioning” (5.4.7). These two projects took approximately two weeks.

Interviews with students

At the end of the research activity, nine randomly-selected children were interviewed. The questionnaire had seven sections and fourteen questions, and sought information about students’ perceptions of the following (i) attitudes to the research activity, (ii) working with others, (iii) inquiry learning, (iv) problem-solving processes, (v) knowledge and use of hypertext, (vi) cognitive skills, (vii) metacognition (Appendix C, item 2).

The information from the questionnaire was collated and tabled. Each section was commented on by the researcher in terms of trends related to the research questions, changes in student perception during the research, and the class “zone of future functioning”.

Interview with teacher

The class teacher was interviewed at the end on the research. This was an extremely brief interview due to lack of time (see 7.3.3). The questionnaire had five sections and five questions, and sought information about the following (i) the effects of the activity on students’ information literacy development, (ii) comments on changes observed, (iii) benefits in terms of particular children, (iv) issues about hypertext, (v) any changes in own thinking as a result of the activity (Appendix C, item 3).

The information from the questionnaire was tabled but was not used to support discussion of themes because it was so minimal (Appendix C, item 4).

All the processes above were described, analysed and discussed in relation to themes in section three of chapter five (5.3.1; 5.3.2).

4.9 Ethical considerations

The following issues were considered when planning and carrying out this research study :

4.9.1 Informed consent The class teacher's consent to participate in the study was obtained after a discussion covering the process of the study in relation to programmes of work in the classroom, his rights and role in relation to the research, how his teaching role would be represented in the observations, confidentiality issues, access to all the researcher's records, information-gathering tools, consultation procedure, the researcher's role in the classroom, and procedures for planning and liaising with the teacher.

Substitute consent for the students in the study was sought from the caregivers of participating students so that they were protected by the mature assent of their adult family. An information sheet explaining the purpose of the research was included with the consent form and parents were invited to discuss the research with the researcher (Appendix D, items 1 and 2).

4.9.2 Rights The teacher and the students and their caregivers were informed verbally of their rights within the research activity, and of their right to withdraw at any point. Students were given full explanations of activity in relation to their learning and what the researcher was studying and also the ways in which the researcher was gathering information.

4.9.3 Confidentiality Confidentiality of identity was ensured through the non-use of proper names in the data files and the reporting of findings.

4.9.4 Risks (i)emotional - the researcher is a very experienced registered teacher who that ensured honest and trusting relationships with participants were developed before and during the study.

(ii)time and student learning - the study was planned to integrate the content of current class topic work. The process occurred in a natural manner as part of the daily programme, relevant to ongoing student learning, and located within the classroom.

4.9.5 Benefits The emancipatory nature of the research design ensured that students received experience in accessing and using hypertext in authentic contexts. The class teacher received knowledge and experience of hypertext as a medium for learning, and the possibility of contributing this to the ICT professional development of the school staff.

4.10 Summary

This chapter has detailed the methodological approach of the study. It has described and justified the design of the study and demonstrated the ways that the research strategies linked to the research questions. Full descriptions of the participants, data collection methods and the procedure of the study have been presented and ethical issues have been outlined.

The next chapter reports the results of the study.

Chapter Five : Results

"...electronic contexts for literacy, because they are powerful, complex, and continually changing, will be even more dependent upon social learning strategies than traditional literacy contexts" Leu, 1997 : 65.

5.1 Introduction

This chapter contains the results of the study in three sections corresponding to the phases of the research design. It is organised according to the theoretical framework *Ecological Analysis of the collective ZPD* adopted for the purpose of the study (4.2, Figure 4.1).

The first section of this chapter contains analysed information from observations of the whole class programme prior to the intervention. Data and information were collated and analysed from interviews with class members and the class teacher, as well as observations from the hypertext paired activity. Gathering this baseline information provided a picture of the "class zone of current functioning", including emergent themes.

Part two of this chapter contains an informal evaluation of the intervention phase of the research. The aim of this section is to document the creation of the class "collective zone of proximal development" which occurred through the intervention process.

The third section contains analysed observations of the two authoring projects in relation to emergent themes and in relation to children's development during the research, collated and analysed interviews with class members and the class teacher. These results provide a description of the post-programme outcomes with a view to predicting the "class zone of future functioning".

5.2 : Section One

Analysis of the class zone of current functioning

Content summary, section one

The current conditions for learning are observed and analysed in relation to "best teaching practice". Students are interviewed and responses analysed. The teacher is interviewed and responses analysed. Paired activity with hypertext is observed and analysed. Findings are summarised and significant themes are listed.

5.2.1 Observation of class sessions The observation format comprised five main sections which the researcher considered pivotal to the development of positive conditions for

learning : teacher talk, scaffolded language approaches, strategic knowledge modelled/developed by the teacher, learning arrangements, and informal observations of students' dialogue recorded during activity within the observations (Appendix A, item 3). Once the eight observations were completed these sections were broken down into a series of smaller components based on what the researcher considered "best teaching practice". The incidence of each element was tallied and graphed as a percentage. Figures 5.1, 5.2, 5.3, and 5.4 (below) indicate the weightings of each element in the sessions observed, and are followed by a summary statement.

Summary comment on Figure 5.1 : Teacher talk

The instances of teacher talk that were analysed all occurred during approximately fifteen minute episodes when the teacher was working with the whole class, within the eight observations. The tone set through the teacher's talk was positive and energetic, and students appeared attentive and positive in response to this. The greatest proportion of teacher talk was given to functional talk : expository or explanatory talk predominated, followed by questioning (18%) and directive talk. Together with time reminders (3%) these elements comprised 74% of the teacher discourse.

Aspects of teacher talk pertaining to cognitive and metacognitive processing (questioning aside) occurred infrequently and made up a minor proportion of the discourse (11.5%).

Close analysis of questions and statements (not recorded) would reveal a focus on thinking at the surface level, rather than inferential or application levels.

These results indicate a trend towards a lack of emphasis on the modelling and extrapolation of cognitive and metacognitive processes, and, through the predomination of expository language, less opportunity for students to express and respond than a more "process-oriented" talk environment would offer.

Summary comment on Figure 5.2 : Scaffolded language approaches

These results were obtained by recording the approaches used on the observation sheet. A range of approaches to scaffolded learning was indicated in the analysis and there was a fairly even balance between the categories. However it was of interest to note that modelling of processes (interactive) and demonstration of processes (expository) were, respectively, at the lowest and highest ends of the percentage range. This may relate to the degree of teacher dependence that emerged generally from the observations of the class. In contrast it is also interesting to note the comparative incidence of inquiry-based activity - if both categories are combined this comprises the highest percentage of approaches. This incidence supports the importance placed on inquiry learning by the teacher, expressed by him in the interview.

Figure 5.1 Teacher Talk

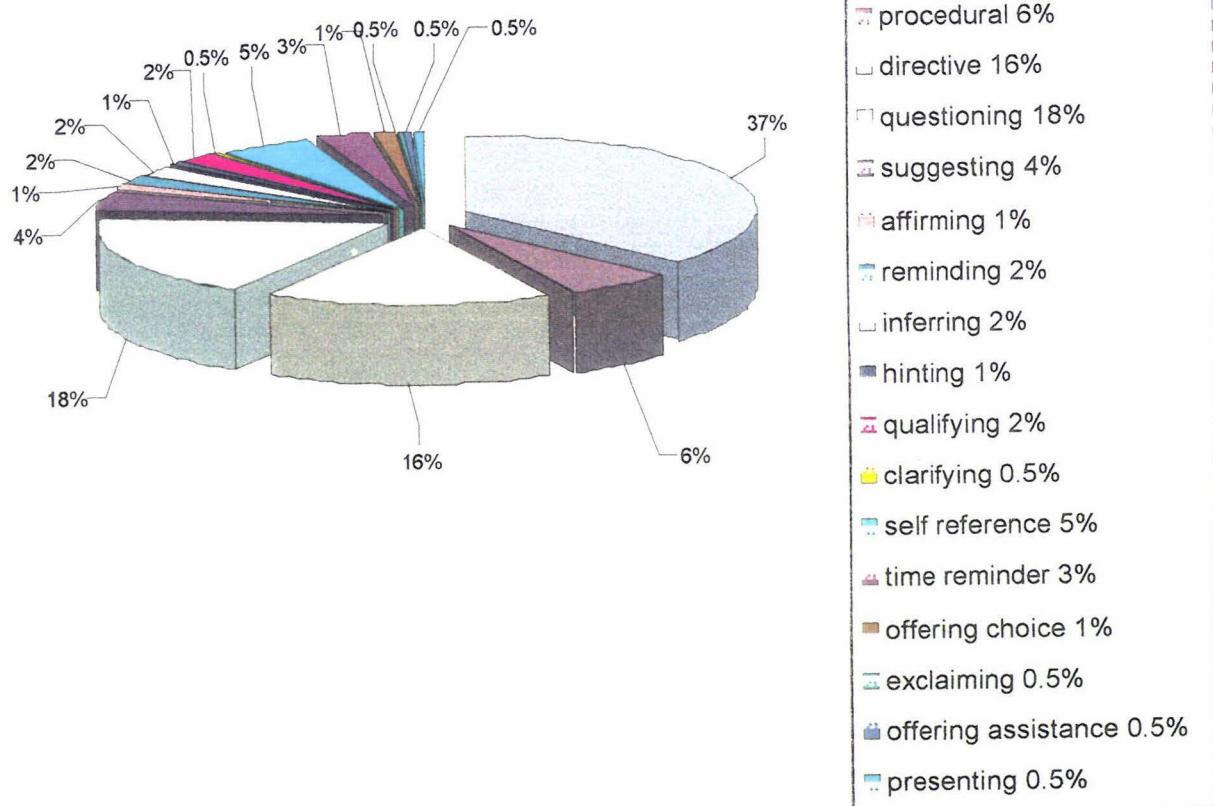


Figure 5.2 Scaffolded language approaches used by teacher

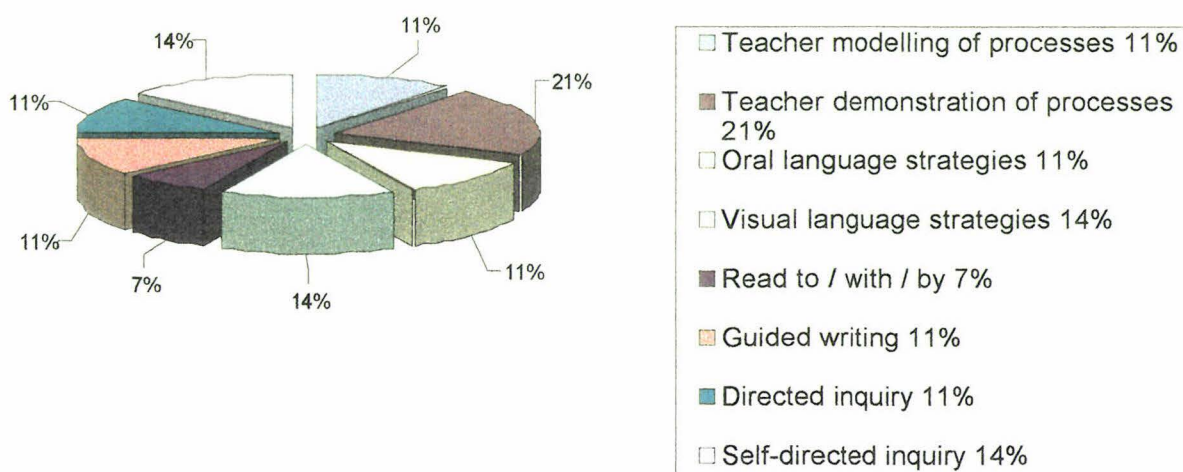


Figure 5.3 Strategic knowledge developed / modelled by teacher

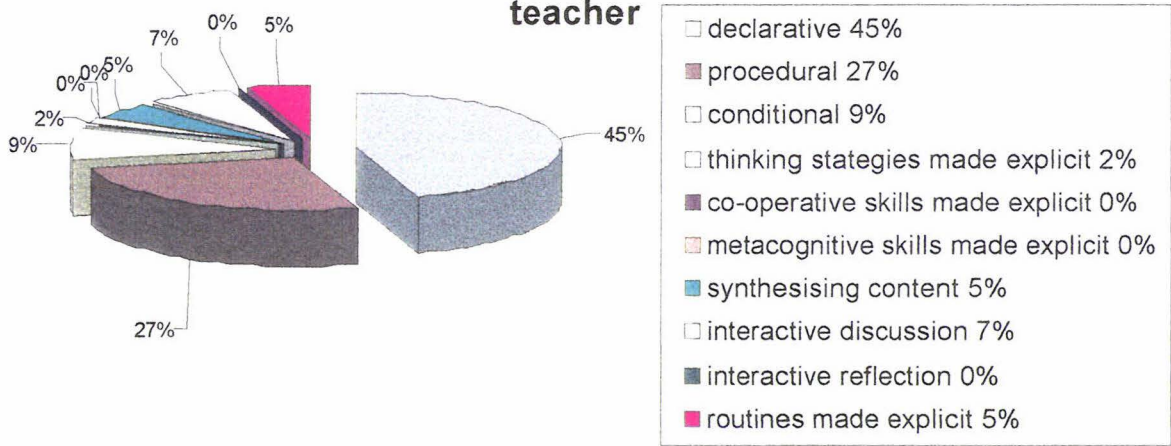
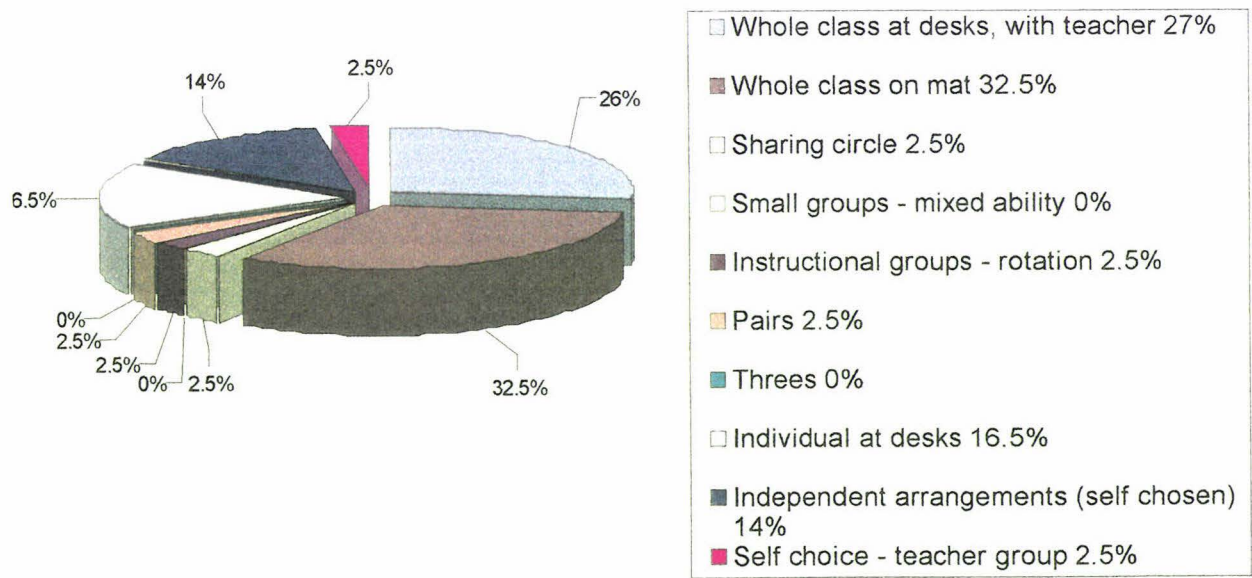


Figure 5.4 Learning arrangements



Summary comment on Figure 5.3 : Strategic knowledge modelled/developed by the teacher

This information was gained by the analysis of teacher talk and interactions recorded in the observations. By far the greatest proportion of strategic knowledge incidents related to the use of declarative and procedural knowledge (73%). If these were further analysed it would reveal that the majority of these instances were “told” rather than extrapolated or developed and made explicit. There was a comparatively small percentage of activity relating to cognitive or metacognitive strategy use or acquisition (23%) and there was no evidence in the observations of direct or intentional development of this area. There appeared therefore to be little emphasis on the explicit development of this area of learning.

Summary comment on Figure 5.4 : Learning arrangements

Learning arrangements were recorded on the observation sheets. These arrangements covered a range of organisations for learning, to suit learning contexts. The class worked as a whole unit most of the time (62%), whether they were at desks or gathered on the mat for shared/motivation-type activity. 16% of the time this motivation was followed by individual work at desks. 35.5% of the remainder of the time was spent in instructional or mixed ability groups or independent self-chosen activity. 2.5% of the time students could choose to work with the teacher on activity they needed further help with. The main opportunities for socially interactive activity occurred during the 35.5% time mentioned above, and the teacher encouraged this social interaction. Incidental problem-solving and self-responsibility were encouraged and praised. No peer tutoring or formal strategies for peer work in the ZPD were apparent. It could be speculated that the high incidence of teacher-controlled activity (whole class work) lessened opportunities for learners to develop active shared cognition.

Table 5.1 : Random observed dialogue

When	12/10	12/10	12/10	21/10	21/10	21/10	28/10	29/10	
Who	Whole class sharing	Small group with T	Whole class	T with student	Indep. group 6 students	Student to self then T	3 students	3 students	
What	O.L. strategy	Maths	Shared reading	Design/ test flyers	->	->	Design parachute	Design posters	Total episodes
Approx. time taken	20 min.	5 min.	10 min.	2 min.	5 min.	5 min.	10 min.	5 min.	
retelling	19	0	0	0	0	0	0	0	19
T talk	1	10	6	7	1	3	2	0	30
discuss	0	1	1	0	0	0	0	0	2
negotiate	0	0	0	0	0	1	3	0	4
respond	0	10	8	6	0	0	8	3	35
state	0	8	3	2	8	9	9	18	56
process question	0	0	0	0	4	3	3	0	10
personal	0	0	0	0	3	0	4	0	7
request	0	0	0	0	3	0	1	0	4
direct	0	0	0	0	1	0	4	0	5
affirm	0	0	0	0	0	0	0	3	3
problem solving	0	0	0	0	1	1	2	0	4
metacog episodes	0	0	0	0	0	0	0	0	0

Summary

The data from this table came from a series of random observations within the general observations, while students worked independently and the teacher moved among them. Because each setting had many variables and valid correlations were difficult to establish, it was decided not to convert incidences into percentages. What the tallied data did reveal was a preponderance of “surface level” talk (56 incidences), concerning actions being carried out rather than discussing what was being learned. There was no “wondering” or

questioning related to learning recorded. There were four very brief problem solving episodes which demonstrated shared cognition. The metacognitive episode category was empty. Assuming these observed episodes were fairly representative of students' dialogue, there was a marked absence of higher level thinking and application, and reflection.

5.2.2 Student interview results

1a. Tell me what you enjoy about schoolwork	Σ Maths (17 responses) Σ Art (8) Σ Sports and/or PE (6) Σ Language/English (5) Σ Handwriting, Science (4) Σ Maori, Reading, Making things, Working on the computer (2) Σ Wordstudy, Story writing (3) Σ Learning new things (1)
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Some students gave several responses. With only five exceptions, the question was interpreted in relation to what subject they enjoyed and did best. This could indicate a perception of learning as “doing a subject” rather than an awareness of the importance of learning processes which the question was searching for. Maths, Physical Education and Sport, and Art were the most preferred subjects, perhaps reflecting the teacher’s interests.

1b. Tell me why you enjoy it	Σ Fun, chance to learn new things. Σ Real good, something to do. Σ Gets your handwriting neat, makes you work faster. Σ I like using my brain, it's fun. Σ Sports is fun and I'm really good at maths. Σ I like writing and I like learning times tables and that. Σ 'Cause you can make things and the number games are for learning. Σ Maths you can learn lots of “times” and how to divide; reading you can learn more words you don't know. Σ Maths is good because if I grow up I could get in the Casino and be a good dealer Σ I like hockey because you're always learning new things about it. Σ Sometimes I'm quite good at Art, and Science is just fun. Σ I can learn divisions and I can do the 12 times table. Σ Maths is fun and Art, you get to draw. Σ I'm good at Maths - it's fun. Σ It's educational and might put me ahead in my grades. Σ Because if you do schoolwork you get lots more friends and you learn more. Σ Because I've learnt it; it's really easy for me. Σ Cause there's nothing to do if you don't go to school. Σ don't know - I've got to do it - I might as well enjoy it as be miserable. Σ Because it's fun (2) Σ I enjoy how people used to comment to me so I got more encouragement. Σ Not sure.
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Students generally perceived schoolwork as “fun” and many expressed positive attitudes (19), and/or cited particular achievements (4). Responses were all definite except for one

“not sure” and generally related back to the first question. This appears to be an indicator of the positive tone set and maintained by the class teacher.

2a. How successful at learning are you?	Σ Very successful (2) Σ Successful (10) Σ Quite successful (6) Σ “A bit” successful (1) Σ Not very successful (2) Σ Not successful (1) Σ Not sure (2)
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Self-perceptions of learning success were mostly positive and confident (19), with five students feeling that they were not sure or not successful. Positive and honest feedback from the class teacher and consistent self and peer assessments may have contributed to these perceptions.

2b. What helps you to learn?	Σ Don't know(5) Σ Paper next to my book. Σ Mum, Dad, and Mr. O.(teacher) Σ My brain. my mum and Mr. O. Σ People telling me to do it and all that. Σ When people at the desks aren't going goo goo ga ga - I can't concentrate. Σ Sometimes Mr. O. tells me or I learn. Σ Mr. O. helps me if I don't know what to do. Σ When the class is really quiet. Σ When I'm concentrating and there's not much noise around. Σ Maths and wordstudy. Σ *Being on my own. Σ Studying a lot and learning a lot from the teacher. Σ My friends and my teacher. Σ My mum and Dad help me with spelling and times tables. Sometimes my brother helps me with home work. Σ When they explain... Σ If I'm interested and have a quiet place to work by myself. Σ If it's too noisy I can't concentrate. Σ Reading and maths.
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A range of responses included three “don't knows”. Some responses (7) included reference to assistance from adults or friends (1). Six responses expressed a desire for a quiet environment so they could concentrate, or work on their own (2). There was no reference to metacognitive processes, although two responses cited maths and reading/wordstudy as helping them to learn. These responses could indicate a non-emphasis on reflection and explicit discussion of “how we learn”.

3a. How do other people in the room help you to learn?	Σ By telling/discussing/explaining/brainstorming (13) Σ By giving clues (3) Σ By being quiet (3) Σ By lending their brain (1) Σ They don't (1) Σ Don't know (2)
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Most of the responses related the question to interactive cognitive activities (eg brainstorming) and gave examples of these. Three responses interpreted “help” as leaving

them alone to work by themselves. Two responses were unsure and one negative. These perceptions may be a reflection of the fact that social and instructional groupings are commonly used in this classroom.

3b. When do you work in groups and why?	Σ	<i>When</i>
	Σ	Maths (13)
	Σ	Projects/Topic work/Learning Centre (11)
	Σ	Language/Reading (7)
	Σ	Word study (6)
	Σ	Art, Sports, Computer (1)
	Σ	<i>Why</i>
	Σ	Teach us to work with others (8)
	Σ	Work at our level (3)
	Σ	So we can learn faster (3)
	Σ	In case someone's not too sure (2)
	Σ	So we can learn and go to a higher group (1)
	Σ	Some of us don't know how to read (1)
	Σ	No response (5)

As in question one the interpretation was made in relation to subject areas rather than processes by all of the students. All except five students were able to give reasons for working in groups. These reasons varied from socially-interactive ideas (10) to hierarchically-based notions of achievement (8). The latter inferences may partly reflect the imminence of “intermediate school” and the frequent references made by the teacher to this when discussing attitude, work habits and behaviour.

3c. What is helpful about group work?	Σ	Working with/helping other people (9).
	Σ	You don't feel let down that you're not brainy (1)
	Σ	You're learning at your level (1).
	Σ	I something's too hard they can help (4).
	Σ	Making friends (1).
	Σ	Learning different things from other people (1).
	Σ	It's quicker/easier (2).
	Σ	So you don't have to use your brain (1).
	Σ	Learn more (1).
	Σ	More interesting (1).
	Σ	Don't know (4).

Most students (16) responded positively in relation to the cooperative and collaborative nature of group work and a range of reasons for helpfulness were given. However four students made no response and some responses eg “making friends” and “so you don’t have to use your brain” reflected incomplete grasp of the purpose of group activity. This may have been because there was no evident focus on the meta level of cooperative and collaborative activity, and no evidence of guide charts or systematic development of these learning skills.

4a. How does talking help you to learn?	<ul style="list-style-type: none"> Σ You can combine your ideas with others (1). Σ If it's someone else and it's something I don't understand then I can take it in - if it's me talking I can say something I didn't know I understood (1). Σ Get confidence (1) Σ Tell you what to do (1). Σ If you don't know something then you'll learn it (5). Σ We have to talk and think about what we're doing (1) Σ If you never use talking you'd have to be at another school (1). Σ Don't know (9).
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Many students were unsure of this question. Responses were varied with several insightful ones, however nine students did not respond and several responses were light. It was clear that the students were unused to articulating the functions of language for learning and one explanation could be that there was a lack of focus on the meta level of language in their experience.

4b. How does listening help you to learn?	<ul style="list-style-type: none"> Σ Other people tell you (2). Σ If you don't hear you can't learn(1) Σ I'll know what to do (8) Σ You'll get further that you are (1). Σ It's the most important thing (1). Σ By the answers from the teacher (1). Σ You get information (1). Σ I can't think of anything I've learnt by listening (1). Σ Don't know (7).
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Many students appeared not to be sure what the question was asking, almost as if they took this area for granted, and the responses were varied, all brief, several lacking insight, as well as several "don't knows". Again a lack of focus on the meta level of language seemed likely.

4c. How does reading help you to learn?	<ul style="list-style-type: none"> Σ Teaches you more information (3). Σ You read more confidently (1). Σ Teaches me big/new words (7). Σ Teaches me spelling (7). Σ Teaches me to sound out (1). Σ You can read the stuff on the board (1). Σ It keeps your mind working (1) Σ Takes me to a higher level (1). Σ Teaches you to read better (2). Σ Don't know (4).
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This question was confidently answered. All responses indicated perceptions of reading at the mechanical level, as a "doing" activity, and there were four "don't knows".. This data may reflect a link to student's perceptions of what the purpose of reading is - to "get it right" rather than to enjoy and catalyse deeper thinking and comprehension.

4d. How does writing help you to learn?	<ul style="list-style-type: none"> Σ You learn more new/big words (5). Σ You learn spelling (5). Σ By writing more (2). Σ Makes me want to learn (1). Σ You're spelling and reading the stuff you write down - that's 3 things rolled into one (1). Σ When you need information (2). Σ Neater/better handwriting (6) Σ Being creative (2). Σ More confidence (1).
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All students answered confidently, if briefly. Two students saw writing as an opportunity to be "creative". For the majority however, as in the previous question, the responses indicated a mechanical -type perception of the writing process as a set of discrete skills. It would be reasonable to propose that this information could point to an emphasis on isolated skills, eg spelling, rather than process and content in the class programme. A further reason for this may have been the compartmentalised nature of the timetable.

5a. What are thinking skills?	<ul style="list-style-type: none"> Σ Not sure (2) Σ Don't know (8). Σ If you've lost something you have to think where you left it. Σ You think up new things. You still have things in your head locked safe away - you can remember. Σ Thinking, cause if you don't think your brain will just go to sleep. Σ Skills to do with thinking. If it's maths and I finish in 6 seconds, maths thinking skills. Spelling thinking skills. Probably different parts of it you have special skills. My uncle's woodcarving skill is so big it squashes down his spelling skills. Σ To help you think. Σ Concentrate, think, using the brain. Σ How we listen and thinking about it. Σ You have to listen to the teacher or you wouldn't get on in life. Σ It's how you think and what you think. Σ I think they're about listening and learning about what you're supposed to do. Σ Using your brain. Concentration. Listening carefully. Thinking of a solution.
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Nine students made no clear response and the remainder were varied, with some students really trying to pin down what they thought thinking skills were, and others giving more rote or conventional responses. This information could indicate that cognitive strategies are not habitually made explicit in the classroom.

5b. How do you use them? (thinking skills)	<ul style="list-style-type: none"> Σ Don't know (6) Σ Trying to think what I was trying to make. Σ It helps me with my listening skills and my info. Σ We use them daily...when it's morning tea, our brains get pumping. Σ I might ask the teacher for harder work. They help you think about questions. Σ I use them to remember how to cook. I've got these little safes in my head and a pin number. Σ Just sometimes I think about them but sometimes I tell (ask) Mr.O how to do it. Σ You have to if you're really good at 1 thing then you keep on doing it - my uncle needs to think on his spelling so it can grow big. Σ Always think - what do you do? - then think - I know. Σ By thinking (3). Σ You can use your brain instead of asking the teacher. You think of what to do next. Σ I use it whenever I can because I need to think about it with the info. and labels. Σ You just sit up and listen and be quiet. Σ If I have a problem I use my thinking skills. Σ By thinking about what you're doing and using your own words. Σ Being quiet, blocking everything else out.
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Apart from six "don't knows", most responses tried hard to work out their processes of thinking. Responses ranged from a simple single action to detailed interpretations with qualifications given to illustrate points made. There appeared to be no uniform ideas about the application of thinking skills which could again indicate that these strategies had not been made explicit.

6a. When you do a research project what are some of the important things to help you get it done?	<ul style="list-style-type: none"> Σ Don't know (3) Σ You have to work and research things, sometimes draw our project. Σ Just try to make myself go in it. Σ The info. and the reading and all of it. Σ To find lots of info. but to help me learn. Working together, making new friends. Σ Read books; get info. off each other. Σ Working with other people. Σ If you don't finish on time you have to do it at lunchtimes. If it's quiet I can get on with it. If people are talking about other things I get this urge to talk. Σ Do the how to work it up - how you control it. Σ To be neat; to do good colours. Σ I have to be really quick at writing; if we're in groups we have to share out all the jobs and do it as quickly and as well as we can. If you're in a group you shouldn't waste time arguing. Σ What to write, like which is the most popular volcano, find it out, know how to draw things. Σ If the group is working and not mucking around. Σ Doing it tidy otherwise we get low marks; we got to get heaps of information. Σ Basically the writing and the pictures afterwards. People think it's the first thing you should do. Σ If I need some more help; share things we need to do. Σ Co-operate with friends, do the research, pictures and diagrams and presentation. Σ Have information, know how to do it, know what you're doing, listen to the teacher. It helps if you've got good presentation then you'll get better marks. Σ Using my mind. Think up words of my own without looking onto the book. And having my friends help me. Σ Just do it. Σ Listening for what you have to do and clues that give an idea of how to do it. Your info. - you need to make sure you've got the details.
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Most responses referred to aspects of the research process such as actions (eg read, find information, present), expectations (eg neatness, speed, collaborative behaviours, "good

marks”) and collaboration (e.g. group processes). No responses referred to effective accessing of information and ability to interpret and recompose information. This could be explained by an emphasis on product and “standards” rather than strategies for deeper processing. However the phrasing of the question may have influenced the responses.

<p>6b. What sort of stages might you go through?</p>	<ul style="list-style-type: none"> Σ Don't know (4) Σ Take one thing at a time. Do the hardest things first then it won't take very long. Σ Some of the things are draft copy, colour, diagrams and pictures. Σ First I start with hard ones so I can finish with easy ones. Σ Getting your topic, do research, presentation borders, get colours, pictures. Σ To keep the presentation good - plan out where it is, do the heading, look in books. You start writing info. in your own words. Σ Drawing; figure out where to do writing; try and make it look good. Σ Planning what you're going to do; if you're going to put colour on each thing which one you're going to do first. Make sure your presentation is neat. Σ Writing, some pictures. I'm doing my third one now. Σ Plan it out really; it helps you to finish it quicker. then we get information from books. Mr. O gets heaps of books. Σ The way I do it - with Flight - by myself, 4 background boxes and one middle box. so far it's fitting quite well. I need to write every single thing that helps me. I have to think what's needed and what's not needed. Σ Plan it first ; you don't do it on your good copy. Draw the pictures and put some borders on it. Σ First I do a picture and some information. After that I put the title. I do a timeline like the Wright Brothers. Σ Write it down on paper, copy off the paper. Σ Find the info., research and that. Finish it and put borders. Σ Plan it out first. If we want a border we have to draw that. We do the heading and write information. Draw little pictures, colour in border. Σ Planning it out, just writing and trying to not waste your time. Get all your work finished. Not worry about the art - but the info. is the most important. Σ I just go to the library and get some books and read about the subject and I write it on a piece of paper then I bring it to school. Σ I do number 5 on Flight; from 5 to 1 to 3 to 4 to 2. Σ Do borders, do heading, go and do research, do diagrams.
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Responses indicated a low awareness that there could be a specific research process to follow. However many students were aware that there were particular aspects such as deciding on a topic, searching for information, and in particular planning and completing presentations. Such issues as access and effective processing of information were not raised. A majority of responses focused on the product or its presentation. This would indicate that students may be unaccustomed to metacognitive strategy guidance in relation to inquiry-based learning, and discussing their research in these terms.

<p>7. If you have to solve a problem as part of your work how do you go about it, when you're working by yourself and when you're working with others?</p>	<ul style="list-style-type: none"> Σ Don't know (2) Σ I try and figure it out for about 20 minutes then I go to Mr. O. and ask for clues. Sometimes I ask others. We always have ideas; we just try and solve it - just keep thinking about it, depending on how hard the question is. Σ I don't tell the teacher. I try to get my eraser out. Σ If I'm at home I ask Mum; if I'm at school I ask a person who's not busy, or Mr. O. We just discuss. Σ If it's maths I'd probably times it or plus it. I try to use my head. If I can't I ask Mr. O. If I'm working with the others I would work together to split out bits and help the others if I finished first. Σ If we can't find it in a book we should ask someone else; if they don't know we can just ask the teacher. Σ Just go and ask the teacher to see what it means and ask other people if they know what it means or look it up in a dictionary. Σ I just go to Mr. O. "can you please help me?". When we work together we usually know what to do. Σ I just think how to do it. Sometimes I go to Mr. O. We get information from the library, 1 by 1 or sometimes 3. Σ Sometimes ask Mr. O.; sometimes it's your mates or your friends or groups. If Mr. O's busy I ask my group mates and ask anyone in the group if they know what to do. Σ *I just combine everything; if you divide it into half you write down what it has to do with it. If I'm in trouble with a word spell I spell it how I think and underline or get a dictionary. If it's art I use a pencil rubber. I'm not the fastest person. Σ Normally I ask Mr. O. to do some of it. We normally all get together and then look around for clues in books. I ask Mr. O. Ask the class. Σ You could ask someone else. Try and get them to work with me. You could think about what the problem is - if it was a maths problem you could say what were digits involved then you could work it out. Σ I just ask a friend. We just go to Mr. O. Σ I usually ask my friends and look it up in the books. We think up some things. Σ Get suggestions from other friends and teacher. Σ Ask the teacher then I would know. Try and work it out together. Σ Sometimes I go and read books and see if the answer's there; mostly I ask the teacher. Σ If it's maths, if like 64 divided by 8, what's 8 times 8 is 64. We discuss it and we try to figure it out together to see if it works. Σ I put my hand up and ask Mr. O. or I ask the person next to me. Σ Try and solve it by asking other people; sometimes I think about it. Σ If it's by myself, think and if it's too hard come back later or ask the teacher. If it's with others ask them then try and work together if they don't know.
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Most students offered their own strategies for problem solving. Many spoke of self-responsibility in this area. Many also spoke of "asking" others including the teacher. No responses referred to a systematic approach to problem solving, indicating that this may not be promoted as a strategy.

8a. How does using the computer help you to learn?	<ul style="list-style-type: none"> Σ I haven't been on it much. If you write a story you learn where the letters are. Σ We play games. Σ We only play games - we learn how to build on it, something 2000...we have groups. Σ it's computer skills - if you want a job it's easier to learn at this age even if it's playing games. Σ You learn what to press. Σ You learn different skills like typing, you can look up Encarta for your homework. Σ ..like when you grow up you need to use the computer and you already learned it at school. Σ *It can help to play games with options and you can type things. Σ I just play games. Σ There is a game called Treasure Maths Storm...it helps maths, it's fun. Σ I know how to get the games. The Internet helps know about stuff like when Edmund Hillary climbed that mountain and stuff. Σ When I play the games it helps me push the keys more then I can type faster. Σ That computer helped me by writing a story, maybe some projects. Σ I have tutor in Philippines tell me how to do computer, like a picture on the computer or letters. Σ You start getting faster and faster on the keyboard. Σ When I've got an encyclopedia. Σ If I'm writing a story and I'm making mistakes I can go to the spell check. I use Encarta at home to get information.I find research, not by playing games. I discover quite a bit, like the Titanic. Σ Type a lot faster, do my work if I'm tired of writing. Σ It's when it turns on I can look at the words, it helps very much. Σ Mostly play games, maths. Σ Don't know (2).
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Most responses referred to “playing games”, writing, or using information from CDROM or Internet as ways of learning. Most responses endeavoured to link the activities to their perceptions of learning itself, and some responses indicated awareness of the value of “computer skills” for later life. The responses were indicative of positive attitudes to computer-based learning, a lack of experience (only eight of twenty three students had a computer at home), and a limited knowledge of the potential of computers to assist learning

8b. Have you used hypertext on the computer? (CD-ROM, Internet or Hyperstudio (TM)?)	<ul style="list-style-type: none"> Σ Yes (10). Σ A little bit (1). Σ Not sure (1). Σ Once (1). Σ No (10). <p>(8 children named Encarta as the text they had used.)</p>
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No students were familiar with the term “hypertext” but twelve could identify with one or more of the examples given (CD-ROM, Internet, Hyperstudio (TM)). Eleven students could not relate to the term. It is evident that discussion of text types in the classroom did not extend to hypertext.

8c. What did you notice about the difference in using this from using books?	<ul style="list-style-type: none"> Σ Don't know (5). Σ In CD-ROMs there's quite a lot more big words - except dictionaries or books for adults. The computer might explain it better. In books you get into the index, in Encarta you get into like an index then you type it in and it just highlights the words. Σ The books take a long time. On the CD it tells you where to go. Σ More fun, you learn more skills by getting into it. It's quicker and exciting. Σ I think it's more information on CD-ROM. You can print it out. Σ A little more information. Σ It's easy..it has the options you can choose. You have to look it up in a book. Σ Computer is more faster. Σ It's easier than finding a book because you can find it quicker. Most of the information is just there instead of turning the pages you just click on "down" arrow.The book is much better because you use a whole lot more. You don't really read the computer. Σ A book is different...it could be hard...you have to find the page. Computers you just type it and go to Internet. Cool you can type any names like Michael Jordan. Σ You just type like what means volcano and it will become faster - if you look on the book it will take you much longer. Σ I think it's easier - you've got a mouse and you just go to the index in a book. The computer is faster; you just click on anything and copy it down. Σ With the computer you don't have to use your brain, you don't have to find it - with reading you have to find it. Σ The computer might not have all the information. Last week I was looking up Chad - it only had the lake. But the book had the country. They might have different answers. It's easier to search on the computer. Σ It's easier to find in a computer because you don't have to turn the pages. You learn more because I stop at interesting things and read them too. Fun too. Σ The encyclopedia is hard to find. Sometimes you don't find it. You just have to read the books. They're hard too. Σ Encarta is better. My Encarts just reads the information to me. Σ Quicker. I look up the sides in books.
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Although there were five "don't know" responses most students were thoughtful in their responses, and positive about hypertext experiences. Their general perception was that hypertexts (CD-ROM and Internet texts only) were quicker and easier to access than books ("with the computer you don't have to use your brain"!). Three responses mentioned access issues related to a "sea of information".

5.2.3 Teacher interview results

1. How do you organise for children to learn through talk?	I get them to work in groups and in pairs on task work and research. I sometimes pair the able with the less able. They do library work; they research and find information and have to discuss issues, ideas, new words. They always share experiences and work results.
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This response focused on negotiating meaning and the importance of sharing during information processing. The type of activity and contexts for talk were described. The question was also searching for reference to co-operative strategies, metacognitive strategies and reflective processing, and explicit teaching to facilitate these, however these were not referred to.

2. How do you organise for children to learn through co-operative activity?	Mostly through research. They present together and I really try to encourage different people to work together, especially boys with girls.
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The issues of gender, support in information literacy activity, and joint construction of meaning were mentioned, without covering how these were achieved. The teacher may have taken this view of the question because it was near the end of the year and he had established patterns for this organisation at the beginning of the year. It could also be an indicator of a “top-level” or literal approach to co-operative learning.

3. How do you organise for problem-solving approaches to learning?	Mostly in the maths programme; again I team the able with the less able. They can also do this in Science and Technology.
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The response mostly mentioned when problem-solving was used rather than how. The strategies for problem-solving and the associated cognitive and metacognitive processes were not referred to. This may indicate that there was not a systematic approach to problem-solving activity that made these skills explicit.

4. How do you organise for independent learning within the class structure?	I make a feature of the Learning Centres for the different topic studies like the Flight one we’re doing at the moment. And I like to work towards independence in the reading programme too especially, going from a format to real independence.
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Two areas of organisation were mentioned. Learning Centres which were teacher-directed and compulsory, with criteria set and grades given, were a whole class activity. The reading “real independence” referred to was when children became self-directed in selecting and exploring texts. It is of interest that again not the how but the what was described. This could point to a teaching approach that was directive rather than consciously fostering the development of teacher-independent thinkers through provision of access to strategic approaches to learning.

5. What approaches do you use when children are doing research? How do you organise for this?	I basically provide some information, point them in the direction of the books and resources and I really encourage them to look further and get extra information. It’s great to get the whole class going. I organise by giving pointers about things they need to find out and a lot of it can be directed through the Learning Centre of the time.
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The teacher was enthusiastic about this question and described his own approach to this rather than reference to any model such as Action Learning. He reiterated the importance of extending students' independence and encouraging active attitudes to inquiry. His "giving pointers" comment was a reference to a common characteristic of his teaching style - to withhold and progressively or partially disclose information to stimulate thinking. His approach again relied on a teacher-directed structure such as setting up the research for learners. He made no reference to information literacy processes which underpin student research, or to guided teaching to deepen students' ability to access and process information texts, or to reflective processes. This may reflect a developing understanding of these aspects.

<p>6. What approach do you take to working on text?</p> <p>1.oral (speaking) 2.oral (listening) 3.written (writing) 4.written (reading) 5.visual (viewing) 6.visual (presenting)</p>	<p>1.(speaking)We do mainly formal speeches and impromptu talks and use poetry texts for reading aloud, giving readings.</p> <p>2.(listening)Focused listening is our main aim and asking questions is a very important part of that. When they're listening to text it's mainly the feedback angle and the answering of questions that's emphasised.</p> <p>3.(writing)It's really important to provide structures for a variety of genre and cover fact and fiction and the 3 strands.</p> <p>4.(reading) It's mostly tied to the theme study and often research-based materials are used. Of course the journals are used too, and I do use SRA.</p> <p>5.(viewing) Well, we view plenty of videos in the course of our theme studies, and the study of body language in drama and role play is very important too.</p> <p>6. (presenting) They produce using a variety of media and forms such as brochures, charts booklets.</p>
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Speaking : main text types were referred to rather than mentioning processes developed.

Listening : there was an emphasis on listening and concentration, with questions and feedback also a strong focus.

Writing : the functional approach to text was reiterated, along with the need to cover a variety of content. The writing process, metacognitive implications, close reading of models of writing and writing for information literacy purposes were not referred to.

Reading : the content of the programme was mentioned; comprehension strategies and reading for information literacy purposes were not mentioned.

Viewing : drama and video as communication media were listed but no reference was made to access to visual information.

Presenting : again media and forms were listed but processes were not referred to.

Summary note : Throughout the interview the teacher interpreted the questions at the literal level of thinking, focusing on content rather than process., with little reference to the English curriculum strands of exploring language, thinking critically and processing information. This tendency may have reflected less awareness of the importance of the meta level of learning and that the development of a "socially-interactive, reflective environment" was weighted more to the socially interactive aspect than explicit development of metacognitive and cognitive skills and strategies (see also 4.5.3).

5.2.4 : Observation of hypertext paired activity

The plan below details the process of this final activity of section one of the results of the study. It is followed by analyses of the transcripts of eight episodes of paired activity.

Figure 5.5 : Hypertext observation process

<p>Plan : Working with hypertext to locate and process information</p> <p>Context : Flight</p> <p>Setting : pairs</p> <p>Achievement Objective : “gather, select, record, interpret and present coherent, structured information from a variety of sources, <u>using different technologies</u> and explaining the processes used” ENZC, Written Language, Processing Information, Level 3</p> <p>Learning Outcomes :</p> <ol style="list-style-type: none">1. identify questions related to a given topic2. use known search strategies to identify information3. record and review relevant information <p>Session Process :</p> <p><u>1. Introduction/preparation for information search</u></p> <p>I'm going to watch you working today, and the tape recorder will record what you're saying, to help me to think about your learning. Is that OK?</p> <p>You're going to work together at the computer using the Encarta encyclopedia to see what information you can find in there about a topic to do with your study of flight.</p> <p>So first, if you wanted to make a hot air balloon (or find out about helicopters/kites) what might be some of the questions you'd ask? Can you write them down on this sheet as you talk about them.</p> <p>Now that you've got some ideas we'll go to the computer. When you find information that fits your questions don't forget to note it down on the other part of the sheet. Right, away you go on the computer! Remember to talk to each other for help. If you get stuck I can help you....a bit, just a clue! But try and work it out yourself first.</p> <p><u>2. Pairs work at computer</u></p> <p><u>3. Informal review</u> - what they did in terms of information found, and searching strategies.</p> <p>What have you found out about looking for information on this CD?</p>

Pair A : JSK and JV

During this episode JSK and JV (both female) worked cooperatively and located a variety of information related to their search. JV, a very active learner, habitually “thought aloud” and led the process, often interacting with JSK to support her statements. JSK, whose first language was Korean, was the more verbally passive of the two, but her contributions were always thoughtful and relevant, confirming her concentration on the search.

JV had a very systematic approach to the task, setting it up quickly (“OK we’ve got to look for ...”, “I’ll type it”). The pair had no evident strategy for locating relevant articles beyond entering their own key term “air balloons” and went through several red herrings (six) before they found the relevant article “accidentally” through a hotlink. Once the

article was located they used visual and print information fairly effectively, going back and forth between images and print text till they had located the specific information they needed. JV very quickly skimmed and scanned the text to extract relevant information, and consistently referred back to the objective (“we can answer one already”... “we can find some more...”, “we’ve got to find...”). JSK was very alert throughout and contributed but didn’t initiate action at any point.

Both students appeared keen to construct and refine meanings, and negotiated shared meaning of ideas related to why hot air balloons might mostly travel in summer, and the shape and size of balloons.

Both students used a variety of language processes, though JV appeared far more active in her outward demonstrations of cognitive activity than JSK. Interactive language processes used included confirming, selecting, speculating, querying, disagreeing, inferring, justifying, analogising, explaining, instructing, comparing, negotiating, refining.

There was little use of text-related terminology or “metalinguage” related to the text. The only instances recorded were “caption” and “expand” (both JV). The researcher used the terms “scroll” and “file”.

Summary The pair worked positively together and searched successfully once the relevant article had been located. Systematic strategies for accessing hypertext were not evident, nor was a language for discussing the text.

Pair B : M and N

This pair worked cooperatively through the task after an initial disagreement and both appeared highly motivated to search for their information. Neither student appeared physically or verbally subordinate or dominant but there was a series of mini episodes where one or the other took the initiative. Both contributed to a rich negotiation of language meanings and ideas within the task and were mutually supportive and affirming. Both students were active about what they wanted to pursue and verbal directions went

both ways, often quite peremptorily!. Neither reacted negatively to this however, and it lent an air of energy to the episode.

N (male) appeared to process internally quite often and then verbalise “end product” thoughts, while M (female) processed more outwardly. Despite this difference there was little cognitive confusion in their interchanges and M often seemed to grasp intuitively N’s implicit meanings.

M began the negotiation of the task in a business-like manner. However N didn’t agree on how to access the index. They were able to compromise and eventually located an article through “category”, then “sub-category” and scrolling alphabetically. From reading the article aloud they identified key information, recording as they went. M was definitely working at the meta level (“that tells you what you’d need for it”, “so you would need....”, “that’s just telling you....”) and initiated a further informed search beyond the article to extend some of their thinking. N approached the task in an apparently literal manner, working closely to the text, yet was adventurous in search options and keen to divert to hotlinks out of curiosity. There were no apparent systematic strategies to locate either article or information though strategies were generated, negotiated and used. Both students appeared fascinated by the information and dwelt on several aspects unrelated to their task until they were satisfied.

There were several incidences of these students negotiating meanings and process. They negotiated how to find their article and how to find information within the article, giving reasons for their opinions and supporting one another. They also discussed and negotiated meanings related to the images they viewed : types of kite tails and kite shapes.

Both students demonstrated a range of cognitive activity in their dialogue, with M apparently the more active thinker. This activity included defending a position, agreeing, disagreeing, speculating, identifying key concepts, discarding a course of action, describing, affirming, directing, elaborating, recounting, questioning relevance, predicting, instructing.

Text-related terminology was not frequently used and a lack of the needed words was clearly demonstrated by M's comment "I know, but...put it on something else that made it go on that thing" when she wanted M to select another category! Terminology recorded was "category", "text", "outline", "expand", "article", some of which were read directly from the screen. The researcher used the terms "text" and "category".

Summary These students were energetic and resourceful in their search, however they lacked successful strategies such as systematic examination of relevant search terms. They showed eagerness to divert from the task as their interest was captured and were easily able to return to the task. They needed to understand the possibilities for confusion that could arise from diversion. They also needed a language for discussing the text.

Episode 3 : T and D

This pair (both female) searched for information to help them make a hot air balloon. They both appeared to be unsure about how to go about the search, trying to search via the Timeline. They worked well collaboratively, however, and interacted to make decisions, to solve problems, and to navigate the information. Both initiated ideas and actions though D was the more active.

Both students were purposeful in wanting to access information and discussed possible choices before acting. After some deliberation they selected the Timeline tool, possibly because of an association with the Montgolfier brothers - they had been discussing them prior to the search. They quickly became aware that this choice wouldn't work, but had no strategy to replace it. They eventually found the relevant article with help from the researcher and skimmed the information, with D referring back to the task as they went ("that's one of our questions"), and visually checking their question list. T was aware of some processes but her references were not confident ("I don't think this could go there", "what could we do now?"). Once the article was found D took the initiative in thinking through the text to select information. T was concentrating on the text but contributed little. After the search was completed the researcher suggested that they check the

Timeline for information about the Montgolfier brothers for their interest. With reminders from the researcher they located this information, needing to be told that keywords entered needed to match letter for letter with the information held. Overall there were no apparent strategies to access information effectively though the students were keen to engage at the metacognitive level and tried ideas.

This pair appeared less effective than some of the other students at building shared meanings but did discuss the shape and size of balloons, using mostly the images with some reference to the print text for their information.

These students also appeared less cognitively active than some of the others, although the brevity of their episode may have had a bearing on this. Processes used included negotiating, appealing, giving a viewpoint, describing, elaborating, making observations, qualifying comments, affirming.

Only one text-related term was used by the students to communicate about the task. This was a reference to the Timeline tool as they pondered choices at the beginning of their search. The researcher used the terms “close” and “Timeline” during the episode, and explained the function of the timeline, the general index, and the need to key in accurately spelt search terms to locate information.

Summary This was a brief episode where the researcher intervened several times to assist the students who hadn’t used hypertext before. The pair needed some strategies to access articles efficiently, though they were able to work through the article itself to extract the information they needed. They stayed closely focused on the print text of the article and didn’t refer to the images or experiment with any hypertext features such as hotlinks, so needed to know about the possibilities for navigating across information sources. They also needed to acquire a language for discussing hypertext.

Pair D : ST and MV

ST and MV were searching for information about helicopters. ST had a low reading age (four years below his chronological age). MV’s reading age was the same as his

chronological age however he was acquiring English (his first language was Tagalog) and often required help with this. The researcher treated this situation as one where her role was that of guide, and she interacted frequently with them to facilitate their process. The list of search terms was made collaboratively with the researcher, and the researcher scribed search terms and findings for the pair. Both students were enthusiastic about the task and were able to jointly negotiate meanings and decisions with the researcher's support. They also initiated ideas and questioned and confirmed each other's ideas.

The pair very quickly accessed the helicopter article and went straight to the images which they discussed in relation to their search terms. The researcher helped with the accession of the print text, and with some metacognitive prompts e.g. "what do we need to know?" "you use (fuselage) for all airplanes" "what about the pictures?" "did we find anything out about.....?". ST was confident using hypertext within this context, and was keen to share his experience - e.g. "if you click on that it tells you....". He frequently used prior knowledge alongside new information to point out features of helicopters and examined each image very closely. He verbalised clearly and quickly using a lot of content information. MV, although sure of his task - "we're looking for engines"- and concentrating, was less talkative and initiated less, mostly questioning and echoing ST's words.

There were three instances of shared cognition, all involving the researcher as well as the students. First the students negotiated their understandings of parts of the helicopter, then discussed types of helicopter and fuel used. The researcher questioned and explained often and the students were focused on the meanings that emerged.

Both ST and MV were cognitively active, with ST initiating more. Processes they demonstrated included suggesting, observing, questioning, explaining, agreeing, elaborating, proposing, predicting, labelling, describing, affirming, giving own point of view, instructing.

This pair made very few references to the hypertext and accessing it. All except one reference to the text were indirect e.g. "maybe we can go on those", "this one..."(using

index), and “if you click onto that one it tells you...”(choosing an image). Towards the end of the activity MV used the term “close” to close a picture. The researcher had already used this term as well as “scroll”.

Summary This episode was a very interesting one. It was also a moving example of the power of ICT to assist learning : ST, usually withdrawn and tacitly labelled the “slow learner” of the class, was in his element and demonstrated his verbal ability and strategic ability with hypertext. ST could use a strategy to locate relevant articles and both students were able to access much information from images. This was a clear example of the support of mixed text to learners with difficulties. Both students needed the help of more able others to process the print text, and they needed a working language for discussing hypertext.

Pair E : M and J

This pair were searching for information about how aircraft worked. They achieved a high coordination of centration throughout the task, prompting, listening, taking turns to the point where they seemed to have an instinctive understanding of each other’s thinking. They appeared to “share” the task without referring to this, passing the initiative back and forth and building on each other’s thoughts.

There was a degree of metacognitive awareness evident in both students’ actions and instructions. They held their objective in mind. They referred to the task and how they were progressing “(we’ve) got size ...and there...”, “yeah we’ve got it all now”. They used strategies efficiently for the search using the Word Search tool and key terms to locate information. Within the article they scrolled through and selected a sub-category to search. They decided with the researcher to limit their search to types of helicopter and passed quickly between print text and images to record the required information. Although they used strategies effectively they needed a more helpful plan to search with, and a wider search may have revealed more needs.

These students were very capable at interpreting images and combining this information with their prior knowledge and information from the print text, in order to extend meanings beyond the requirements of their search. They drew out shared understandings in three episodes related to types of helicopters. In particular they impressively negotiated shared meaning for the term “co-axial tandem rotor” -

“two rotors?”,

“yeah, maybe one goes one way”,

“there must be two there”,

“maybe it’s like one’s going up and the other’s also going down”,

“it’s in the same place”,

“might be going the opposite way”,

(gesticulating) “the top one’s going like that and the other one’s going in the opposite direction”,

“that top one, single rotor”,

”it’s just like the normal”.

They also speculated on other types of rotor movement.

The students demonstrated a variety of thinking processes which included directing, instructing, affirming, explaining, seeking each other’s opinion, appealing speculating, describing, negotiating, demonstrating physically, checking, predicting, suggesting, elaborating, building on one another’s comments.

This pair had little occasion to use the language of hypertext to make choices about their search. The only term used was “article”. The researcher explained the function of the text caption tool.

Summary These two capable learners demonstrated efficiency and focused thinking skills as they worked cooperatively to piece together meanings from the hypertext. They did not use language for discussing hypertext.

Pair F : L and M

This pair (L, female and M, male) were seeking information about hot air balloons, and worked rapidly in tandem despite the newness of the activity. They spent much of the time negotiating a way to the information, following several unfruitful paths before locating a relevant article. Once information was found their processing skills were almost automatic : they located and recorded at great speed needing little interaction, and falling into the roles of recording and reading the screen very naturally. They had an accepting relationship and supported each other positively throughout, with a balance of initiative.

The pair used some metacognitive strategies to solve the problem of locating a relevant article. They were able to locate the search tool, Pinpointer, but lacked a precise key term to enter. When entering “balloons” they somehow ended up with information about the Hindenburg and quickly scrolled through it for information. Realising this was a blind alley they went to the index and began to scroll alphabetically through, hoping, as M explained, to find something about “air”! When the researcher indicated the number of articles to scroll through they realised this was inefficient (“Wow!” exclaimed M) and went back through the index to “balloon” and then to “hot-air balloon”. With great speed and relief they briefly negotiated and recorded the information, searching the article thoroughly together.

These students were quick thinkers and instances of shared cognition were brief. They applied their joint efforts more to problem solving than extending meanings. They did exchange views about balloon weights and M in particular was able at making content suggestions for key search terms when they struck trouble with their search methods.

Both students were cognitively alert and used many processes as evidenced in their talk. These included suggesting, amending, clarifying, explaining, affirming, instructing, predicting, refining, stating, appealing and directing.

The only terminology used by the students was “Find” (the index name), “back”, and “article”. They referred to processes using their own language for terms e.g. “keep going up”, “just go straight down”, and “I’m going here” for scrolling. The researcher used the terms “hotlinks”, and “article”.

Summary This pair were extremely active however lacked successful strategies for accessing specific information. Once information was located they were outstanding in the speed and accuracy with which they located and recorded information. Later in the study (not recorded), they also demonstrated more maturity in interpreting and justifying information than any other pair. The pair did not use terminology to discuss the hypertext features used.

Pair G : H and T

These students H (female, high ability) and T (male, low ability reader) tried hard to locate information about hot air balloons. Neither appeared very at ease with the other though it was probably more unfamiliarity than incompatibility. H had experience with hypertext information sources and, with prompting from the researcher, was able to support T in his use of the text. T, inexperienced but very keen, was excited by results and initiated most of the courses of action. H put herself into a passive role almost deliberately letting T take the initiative even though she was the more astute of the two. There was little spontaneous accord and interaction although they were able to sustain roles such as mouse user and recorder effectively.

Both students were aware of the learning process required and referred back to the task as they went e.g. "information..." , "what they look like", "I have to check on weight". H very ably advised T on search and location strategies at one stage facilitating rather than telling - "the next thing, if you read it you'll find it" (and he did!). There were long pauses while both students pondered on actions and information before sharing , and both read the print information silently, sharing nothing until they had to negotiate the recording of the information.

There were few instances of shared meaning being developed, and this was mostly to do with literal retrieval of information, such as a listing of materials needed, size, colour and shape. T was keen to follow through his idea that wire would be needed for the basket,

but H did not respond. This was a pattern - she was focused on completing the task conventionally, "getting it right", while he was willing to think more divergently.

This pair used fewer cognitive processes in their interchanges possibly because of their less synchronised partnership. Those indicated were appealing, advising, exclaiming (T, with excitement!), enumerating, questioning, qualifying question, directing.

No hypertext terminology was used in spoken interactions although H in particular knew the function of many of the features. The students used their own words to convey the features e.g. "go into the picture with the arrow" (select), "you could just go down and have a look at the picture" (scrolling), and "now it's making it big" (expand). The researcher used the terms "scroll" and "magnifying glass" (for the "expand" feature).

Summary This pair were able to use strategies successfully to locate a relevant article and access needed information. H was ready to realise the possibilities of hypertext for searching across texts, as she was a capable information seeker. T learnt a lot about search strategies from H but would need to practice these in a variety of contexts. Both needed to look more deeply for meanings within text, especially H. Both students also needed a metalanguage for hypertext so that they could use mutually understood terms to discuss and make decisions concerning the text itself.

Pair H - RP and CA

This pair (two females, one - CA - had learning difficulties) entered into the task with vigour, and their interactions were lively and varied. They were able to communicate to work through the requirements of the task to their satisfaction, building up a partnership that was mutually supportive and refreshingly inquiring. Both students contributed fully to the development of their search for information with a balance of initiating and responding. This cooperativeness lent a dynamic air to the episode.

The students were able to work positively using metacognitive strategies to locate and process information, and their interactions reflected their ability to co-construct the process of the task e.g. "is that the end of it?";

“OK so that’s that one..”(RP) - “what’s the next one?”(CA);

“so shall we write that down?”(RP) - “ um...yeah”(CA);

“how do I ..um...?”(RP) - “go to that little box” (CA)

CA had some experience of hypertext so took the initiative in this area and taught RP a great deal about strategic accession to information. RP consistently demanded this assistance. RP was a very active processor of the task itself and tended to initiate more than CA in negotiating meanings although CA was quick to contribute.

These students were outstanding in the way they built up episodes to share and negotiate meaning from the text in a very natural and inquiring manner. Both students moved between text - using it as a springboard - and prior knowledge, to develop their understandings logically. The ideas developed were : how helium worked as a fuel, structural properties of the parachute shape, properties of the parachute material, possibilities of getting burnt by the flame, structural stability features and possibilities if the flame failed. An example, discussing structural stability features of the balloon :

“you know that other picture, this bit here, that might be holding the ribs bits..”(RP)

“it’s a bar”(CA)

“it’s to stable that up”(RP)

“that’s the inside of the parachute”(CA)

“so this is the..um..so this is attached to the basket...”(RP)

“because this is... the parachute’s clipped onto these wire bits, and if it was clipped onto the basket it would break”

CA, the supposed learner with difficulties, contributed fully and thoughtfully.

Both students were cognitively active and very quick to elaborate on meaning or bring a new angle or question to the process. This ability enriched rather than diverted. Cognitive processes evident in the talk were affirming, directing, clarifying, summarising, confirming, thinking-through, questioning, advising, generalising, suggesting, describing, elaborating, appealing, speculating, observing, explaining, exclaiming, directing, agreeing, putting oneself in an imagined reality, joking.

When referring to the text this pair used the terms - “find” (the index), and “quit”. They used their own words when discussing the text - an example of this was “ok we’re going down” (scrolling). The researcher used the terms “article”, “search”, “close” and “print text”.

Summary This pair benefitted from the supportive situation, with both learning about content and process through their search. They needed to extend their variety of search strategies, thinking about how a search across information sources would yield richer information. They demonstrated ability to get deeper meaning from text through questioning and building on surface information, using information from print and images effectively. They needed a metalanguage for use with hypertext.

5.2.5 Summary : class zone of current functioning

This statement attempts to use trends indicated across the data to summarise features which point to characteristics of the class as an ecological entity. Significant themes to emerge are listed in the conclusion at the end of this section.

Learning climate

This was a very easy classroom to be in - the atmosphere was so positive and an air of energy was evident. The young teacher set the tone with his enthusiasm and alertness and keenness for his students to learn successfully.

The groundwork for learning - preparation, routines, behaviour boundaries, social and learning expectations - was clear and very firmly established by the teacher. The students’ respect for the teacher was obvious and there was a clear balance of direction and choice which they were at ease with. There was an air of eager expectation every morning as the class gathered, and the students would often ask “what are we doing today?” This positive tone was reflected in the ease of operation in the observed sessions with the students attentive, industrious and interacting positively. The student interviews also

reflected this positive tone (interview questions 1 and 2), as did the positive attitudes and enjoyment evident in the paired hypertext activity.

A further strength was the cooperative ability of the students. They were used to working in mixed groups, were accepting about who they worked with, and usually interacted courteously and considerately. These strong relationships were reflected in the general class observations, in the interviews where awareness of the value of social cooperative aspects of learning was high (interview questions 4 - 7), and in the paired hypertext activity where students worked with ease together. The teacher also reiterated a strong belief in the value of this dimension in his interview (interview questions 1 - 3).

The teacher's organisation for learning added to the stability of the learning environment - a range of learning arrangements and scaffolded approaches to learning were inclusive of children's learning needs and styles, and language development (Figures 5.4, 5.2). Interactive discussion was encouraged (Table 5.1). A strong emphasis on inquiry learning and independent learning generally was held by the teacher in his interview and was evident in several of the observation sessions (Figure 5.2).

Overall, these social-emotional conditions for learning were very positive.

The nature of learning

When depth of learning was examined there appeared to be some essential areas that were not explicitly developing within the environment. These were - explicit reference to and practice of cognitive, metacognitive and reflective processes. These considered here because of the researcher's belief in their essential presence in a truly socially interactive, reflective learning environment and the need to consider them as variables to be observed within this study.

Contained in these areas :

- lack of awareness about thinking skills and how to use them, as evidenced in the student interviews (interview questions 12 and 13), in the strategic knowledge and

random dialogue observed in the general class observations (Figure 5.3, Table 5.1), and in the infrequency of reference in the transcripts of the paired hypertext activity

- lack of awareness of systematic strategies to problem solve and access information, as evidenced in student interviews (interview questions 13 - 16) and in the paired hypertext activity. There was also no evidence of this in the teacher interview or class observations
- lack of evidence that deliberate reflective thinking was modelled or developed in the students. (No instances of this were recorded or informally observed during the entire period.)
- lack of evidence that access to text was a feature of English programmes : a structural (genre-based) approach to writing was indicated in the teacher interview but little awareness of text or access to text was indicated in class observations, student interviews (interview questions 8 - 11, 14, 15, 17 and 19), and a language for discussing hypertext was minimal in the hypertext paired activity

The above comments apply to the apparent depth of learning observed within the current conditions for learning. These comments appear to be reinforced by the incidence and nature of the teacher talk (Figure 5.1, Table 5.1) and certain features of the learning arrangements (Figure 5.4). The paired activity with hypertext strongly indicated students' potential for deeper learning because they were engaged in activity designed to elicit social, cognitive, and metacognitive interaction. The results of this activity were immediate and satisfying : the students "came to life" after the apparent lower-level engagement observed in previous general class activity (5.2.1).

Computer use and hypertext

Although the class and teacher could be said to meet the criteria for the study, they were at this point near the beginning of a continuum of development of integration of ICT into the learning environment, as was the school in its professional development in this area (see also 4.5). The computer was used - rostered mostly for maths or word processing

activity and networked to library resources and used as an information source. Students had apparently little opportunity to access hypertext in the form of CD-ROM encyclopedias, Internet, or authoring programmes, although the first two resources were available on the network. Student interviews revealed a lack of awareness and experience both at home and at school for knowing about how computers could help learning, and the nature of hypertext (interview questions 17 and 18). There were some indications of awareness of differences between print and electronic text, mostly that electronic text was quicker and easier to access (interview question 19). Generally this area appeared undeveloped and this was supported by the paired hypertext activity results.

5.2.6 Conclusion to 5.2

From this analysis of the “class zone of current functioning” emerged the following themes which appear to have significance and relevance to the research objectives and questions.

- the impact of a balanced socially-interactive reflective learning environment on depth of learning
- metacognitive skills, knowledge and practice and accessing hypertext
- cognitive abilities and practice and accessing hypertext
- shared cognition processes and accessing hypertext
- access to text, in particular hypertext, and the acquisition of a meta-language for hypertext

These themes will be revisited in sections two and three of this chapter.

5.3 SectionTwo

Formation of a collective zone of proximal development : peer tutor training in navigating and accessing information from hypertext, and in constructing multimedia presentations

Content summary, section two

Students are directly trained in navigating hypertext, a reciprocal strategy for accessing hypertextual information, and multimedia authoring. Student learning processes are briefly described. Findings are summarised in relation to significant themes and the establishment of the “collective zone of proximal development”.

5.3.1 Results of the training

The creation of a socially interactive and reflective learning environment provided the context for a “collective zone of proximal development”. The researcher’s role within the classroom environment was that of a participant observer. Students were directly trained in strategies with which they could support their peers in future activity.

The results are briefly described (5.3.1a, 5.3.1b and 5.3.1c) and then summarised in terms of emerging themes (5.3.2).

5.3.1a Hypertextual search strategies training process

Four pairs of peer tutors were trained through the following process.

Figure 5.6 : Hypertextual search strategy training process

Current study context : Farming in NZ
Achievement Objective : <u>gather</u> , <u>select</u> , record, interpret and present coherent, structured information from a variety of sources, <u>using different technologies</u> and <u>explaining the processes</u> used
Learning outcomes :
<ul style="list-style-type: none">• identify and use key search terms• formulate a search plan• use the following tools - pinpointer, word and category icons, hotlinks, related articles, picture->expand
Learning experiences :
<u>1.Introduce the session</u>

We're going to learn about some of the features of our electronic encyclopedia so that you can use it more quickly and effectively. Next week you'll use it with another partner to search for more information about farming, and you'll help your partner to use it too.

2. Set up the thinking process

What do you need to know before you go to the computer? Discuss and list; brainstorm some key words and phrases for Farming topic, related to a chosen question.

3. Teacher modelling of search

What are some tools -like a book has an index- on the CD encyclopedia, that make our search easier? Demonstrate and discuss, using the context of farming in general.

4. Children practice and explore with some teacher support

Let's search for some of the topics you've brainstormed. Underline words you think would be the best.

5. Reflect

How did we get on with our search? Any problems? What was easy? So, what's important? Let's list some of the things to remember (compile chart).

6. Close

How is this CD text different from a book about farming?

Summary The learning experiences above worked effectively for the four pairs of students who were trained in hypertextual search strategies. Each pair was able to formulate questions and define some search terms with guidance of the researcher in her participant-observer role. They followed the strategies successfully to find articles related to their search. After the search each pair and the researcher co-constructed a list of procedures for accessing articles. The researcher scribed these as they were negotiated. This was a useful way to help the students to articulate their learning and for the researcher to model the use of the language of hypertext. The students spoke positively about their experiences at the end of the training.

5.3.1b Reciprocal strategy training process

Three pairs of peer tutors were trained through the following process.

Figure 5.7 : Reciprocal strategy training process

A reciprocal strategy for accessing non-linear information (hypertext)

Current study context : Farming in NZ

Achievement Objective : "gather, select, record, interpret and present coherent, structured information from a variety of sources, using different technologies and explaining the processes used" ENZC, Written Language, Processing Information, Level 3

Learning Outcomes :

- 1.cooperatively negotiate text meanings
- 2.access randomly-arranged information systematically
- 3.explain the function of Hotlinks in hypertext

Introduction : I'm going to work with you today on ways of getting the information you need from hypertexts

like the Encarta electronic encyclopedia you have in your classroom.

Setting up the thinking process : If you're finding information from an Encarta article is it like a book? How? How not? So what skills might we have to use to be efficient when we sort out exactly the information we need?

Is it important to have a really clear question? Why?

Is it important to keep looking back at our question as we go? Why?

Is it important to record notes as we go? Why?

Teacher modelling of process : I'm going to show you a way of working together that's quick and helps you to get what you need - 2 or 3 heads should be better than one!

First you need a dictionary to clarify any tricky words - there can be quite a few in Encarta. An atlas can be helpful sometimes too but we won't need one today.

Now, one person is the questioner and the recorder - that's me this time - and one is the screen reader and the mouse user....that's you two.

Then together we have to decide which information to use.

Say this is your question - "Why can sheep survive cold conditions that other farm animals can't?" (It's not as easy as it looks!) And say that this is your topic article on Encarta - Sheep - you've found it. This is what we do.....

First, the question iscan you read it please?.....

Now - can you expand the picture for me, and read the visuals first please? Can you try the sound too please?

What can we record? Do we agree?

Next, please can you skim and scan the print and read aloud what you think might be important - I'll read too.

What can we record? Do we agree?

Are there any hotlinks that look as if they might have some information about our question? (Do you know what they are for? If you don't we'll look at one and then you can tell me)

What can we record? Do we agree?

Now we've got quite a few bits of information - we have to summarise it now and it needs to be an answer to our question. This is really important. You help me and I'll do the writing in the search plan.

Setting up the exploration and practice : Now you'll do your own search. Don't be disappointed if you can't find much information because this does happen sometimes. I'm going to watch and tape record What's your question?

Figure 5.8 : Reciprocal strategy reference chart

1.Our question is - (read)

2.Read the picture (say it aloud)

What is the information that is important to us? (talk about it)

3.Read the print (skim and scan, saying bits aloud)

What is the information that is important to us? (talk about it)

4.Listen to the sound

What is the information that is important to us? (talk about it)

5.Are there any hotlinks or related articles to check? (talk about it)

6.What will our summary say? (talk about it and decide)

Summary The researcher again took a participant observer role to guide the three pairs of students in the use of the reciprocal strategy (Figure 5.8) for accessing information

systematically from hypertext. After jointly negotiating an information search the students undertook their own search using the lower half of the search plan to record information found and then to summarise it in their own words at the end of the search plan.

The pairs of students had varying results with their searches and this was partly because of the type of question posed - some “answers” had to be extrapolated from the information. Students needed help with this, appearing to be unaccustomed to interpreting information effectively, and indeed feeling free to do so.

The way that the activity was planned required students to work together and it was here that the first evidence of active metacognition and instances of shared cognition in depth began to develop in two of the pairs. This has not been recorded in detail but the following notes summarise the processes.

Pair E : M/A and CA

Their questions : how old can a bull get? what are the uses of cattle?

This pair had two questions, both requiring fairly literal information to answer. They searched for the information concurrently, going to “Cattle” where they found most of their information from the print text. They chose to access the related article “Milk” to cross-check information. They were unable to find anything about the longevity of bulls but recorded the uses of cattle in a simple list which they adapted their summary to. They did little speculating and little conjecturing from the visual information. They followed the reciprocal procedure fairly closely and this appeared to assist the efficiency of their process.

Their summary : Cattle are used for meat, milk, leather, glue, gelatin, bull fighting, sacrifice, breeding, butter.

Pair F : JV and H

Their questions : Hens - are there different breeds? what is the main breed for farming?

This pair had to work hard for their information because it wasn't all there in the literal sense. They found a very useful article which named and had photos of different breeds of poultry and they were able to use both images and print text effectively. They decided that the breeds named would probably be the ones used for farming. They also used the related articles tool to get information about Rhode Island Reds and White Leghorns so found some specifics which were useful to them. They worked very efficiently as a team, with JV taking the initiative in following the reciprocal procedure and helping H, who lacked confidence. The researcher had to discuss the idea of interpreting the information and making their own decisions using what they had found out to help them when the information didn't exactly answer their question. JV in particular was very struck with this concept and they both considered their information carefully before presenting a reasoned decision based on egg size, age of beginning to lay, and prices.

Their summary : "There are some different breeds - White Plymouth Rock, White Cornish, Rhode Island Red, White Leghorn. The main breed is White Leghorn because they lay early, lay large eggs, and their eggs cost the lowest."

Pair G : L and MR

Their question : what's the best kind of farm dog?

These students were very active in their search and used the "Dogs" article to access initial information, a list of breeds that were sheepdogs. They used the reciprocal strategy to start with, but because they were able to move quickly back and forth between information sources, soon rejected its systematic assistance. They found the most relevant information solely in the visual information, which had labelled photos of different types of sheep dog. They searched diligently through the print text and accessed through hotlinks "Dog trials" and "Dog family" but were unable to locate any definite print information. The researcher asked them what they thought they should do about which was the best dog and they said that maybe they could decide themselves by looking at the images. The researcher was somewhat taken aback by their choice - the

Welsh Corgi - when they had also listed “Belgian sheepdog, Border Collie sheepdog, German Shepherd, Old English sheepdog”. However their reasons were logical and they were very satisfied with their decision (see summary).

Summary : We think the Welsh Corgi is a good sheepdog because it can be nippy and bite sheep and round up cattle. (When the researcher asked did they think the Welsh Corgi might be a bit small for cattle they said “no, because it can go under them and round them up quickly that way”!)

5.3.1c Authoring strategies training process

Two pairs of students were trained through the following process.

Figure 5.9 : Authoring strategies - training process

<p>To familiarise children with the process and structural features of slideshow authoring Current study context : Farming in NZ Achievement Objective : “gather, select, record, interpret and <u>present coherent, structured</u> information from a variety of sources, <u>using different technologies</u> and explaining the processes used” ENZC, Written Language, Processing Information, Level 3 Learning Outcomes : 1.cooperatively negotiate multimedia structures 2.adapt information to multimedia medium 3.explore uses of multimedia tools Introduction : We’re going to use a new way of presenting information today and it’s going to be a group effort. You’re going to make what’s called a slideshow, with software called Kid Pix. It’ll be about your visit to Shakespeare Park Farm. Then you’ll be able to help others to work with Kid Pix. Before you go to the computer you have to do lots of planning so you can just concentrate on your presentation when you’re at the computer. Setting up the thinking, and modelling the text type : Before you start, look at my model plan for my slides. I made a storyboard about Beefalo - I bet you don’t know what they are! But I go quite often to a farm where there are beefalo because my daughter’s husband breeds them. So, have a look, each slide has a job to do and it all fits together at the end. What are my slides about? They’re messy aren’t they because I just sketch and make notes but it shows my thinking and organising of my information. Where did I get my information? How have I presented the information? Why have I used different colours? What do you think the sound box is for? Now , let’s have a look at my model slideshow on the computer - it was fun to make! Is it different from my plan? How? Why? What do you think of it? Making opportunities to show a few of the basic tools - paint, draw, undo, line, eraser, type text : Ask me some questions about how I made my slideshow, or tell us all if you know how I did different bits. Setting up the experience : Now here’s the storyboard you’ll use - but first I want you to decide together, without me, what your 6 slides will be called and who will do what - remember you’re working in pairs then you’ll do your plans and your slides. When you’ve all finished I’ll help you assemble the whole slideshow.</p>
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Summary Two pairs of children worked to plan and construct a slideshow about their farm visit using Kid Pix (TM) software. They had almost no experience of multimedia authoring between them but this was no barrier to their effort or enjoyment. The models

that the researcher discussed with them appeared to be very helpful. Their task was designed so that when they came to the computer the prior planning meant that the cognitive load could be concentrated at the level of carrying out and critiquing the authoring process.

The four students worked initially as a group to plan the shape of the slideshow. This was quite a long meeting and the debate about what should be included was vigorous with points of view being strongly put. The facilitator JV both allowed discussion to evolve naturally and intervened if she thought they were off track.

The students then used the storyboard format to plan three slides per pair; this was a straightforward activity for them, though in retrospect it was a lot to ask, as they visibly tired later at the computer.

They were enthusiastic at the computer and the amount of modelling of the use of the tools by the researcher appeared to be enough to give some familiarity but left a great deal open to discover - a good balance.

To introduce a reflective element the researcher asked them to discuss each other's plans and slides after they were completed and they readily undertook this. The discussions were positively critical (i.e. suggesting changes) and also realistically affirming (Appendix D, item 4). Most of the comments were at the surface level which was to be expected in an initial process however some creative options were put forward, indicating a sense of purpose and audience : for example, "you need to point out that that is the hole and continue the fence...about the farmer with the sheep, it needs to look like the way he holds it". It was interesting to observe the students wrestling with authoring and making adaptations to their plan as they came to have more understanding of the new medium.

The processes of each pair are briefly discussed below.

Pair H - JV and JB

JV (female) and JB (male) planned three slides - a title slide, one about cattle, and one about sheep. Both were very determined students with original ideas but managed to compromise enough to produce their plans with some interesting ideas for sounds. Both were quite self conscious about visually representing animals and this carried over into the slide show, where their cattle in particular appeared very stylised and formal : they even used the draw line and ellipse tools to make shapes rather than draw them freehand.

They also paid little attention to layout features of their texts such as the relationships between components, and left some large spaces which added a rather contrived air to the slides. Interestingly, by the third slide plan they had relaxed a little into the more visual medium and included speech balloons of a joke the shearer had made, to vary and enrich the information.

When reflecting on their plans with the other pair they had little to say themselves but the others students picked up on the spatial aspects and suggested more “pictures” and “bigger lettering” (Appendix D, item 4).

This pair worked cooperatively to construct their slides and shared the tasks evenly. Most of their interactions focused round the use of the multimedia tools - a new experience. They were quick to critique and affirm each other’s efforts, for example “that’s good for the ears, you might have to draw it freehand...bull’s horns don’t go like that....you’re doing an afro! (JV). Incidences of shared cognition were mostly brief and mostly pertaining to solving problems as the rigour of constructing their slides became intense. They became very tired towards the end of this task and the interactions decreased but they persevered to completion.

Again when reflecting they had little to say except “it’s awesome!” (JV), and this was their overriding feeling of being captured by the magic of multimedia authoring. Their peers’ feedback was fairly brief also, mainly approving and commenting on colour and spatial aspects.

Pair I - MA and L

MA (male) and L (female) were both very able independent thinkers with L bordering on giftedness in English. This made them a rather volatile pair as they were accustomed to leading without challenge in cooperative activity and liked to have “their own way”.

They authored three slides about the farm visit - pigs, the farmer, and dogs. They were more experienced with computers than most of the other students but hadn't used Kid Pix (TM) before. They spent a lot of time debating the contents of their plan and when constructing their slides tended to lose interest if the other was using the mouse. Their slide plans were well-oriented spatially with captions and speech balloons being used to convey information and thought being given to matching sounds with slide content. Both students were relaxed about visual representations and drew fluently.

They reflected on their plans quickly and positively and changed some aspects after hearing feedback from the other pair which advised them how to clarify some of the information (for example “you should put ‘please duck your head’ and ‘dogs are used for guard dogs’ ”) (Appendix D, item 4).

When working at the computer they both at first demonstrated an extreme degree of concentration with incredible attention to detail and editing frequently. MV was very deliberate and unhurried, constructing a highly detailed fence to show one of the pigs escaping through a hole in it, discussing and adjusting a horizon line to his satisfaction, and colouring systematically. L was also meticulous about the way she worked, for example discussing technical features of shearing blades with MA while drawing carefully and adding the brand name. While this was to be commended it also tried each other's patience and they tired dramatically towards the end of the task, hurrying their final slide and neglecting to focus and interact.

Instances of shared cognition were, like the first pair, mostly directed towards solving problems related to the multimedia tools and these interactions were fairly brief. When reflecting on their product they were positive and uncritical (L : “it's really cool”) : in actuality their reflection was inextricably bound in their construction process as they continually adapted and discussed their first two slides to perfection. It was difficult for

them to stand back and reflect in their exhaustion. The other pair, also tired, were somewhat more critical - “too many dogs” complained JB, and JV thought “more information” about dogs was needed though she acknowledged the pig as “really awesome” (Appendix D, item 4).

5.3.2 Summary : formation of the collective zone of proximal development

This phase of the research sought to establish an “intellectual collective” - a varied community of “experts” - who could support each other in an informed manner in aspects of learning, thus enabling and enriching their cooperative learning processes. This was the “collective zone of proximal development”. How did this collective ZPD operate in relation to the themes emerging from phase one of the study?

(i)the impact of a socially interactive reflective learning environment on depth of learning

This phase of the study set up conditions for learning in a manner that endeavoured to balance up the part of the learning environment described in the first phase of the results as a lack of awareness of cognitive and metacognitive dimensions of learning (5.2.5). In this second phase the nature of students’ active engagement with learning and the researcher’s guidance did generate deeper shared cognitive and metacognitive activity. A socially interactive, reflective environment was fostered through cooperative activity off and on the computer, where instances of shared cognition were necessary in order to access, process and present information, and the beginnings of reflective activity were deliberately modelled and nurtured by the researcher.

(ii)metacognitive skills, knowledge and practice and accessing hypertext

(iii)cognitive abilities and practice and accessing hypertext

In this phase of the study, the learning experiences designed by the researcher connected experience, thinking, and reflection through interaction and structured approaches to

strategic accession of hypertext. Although the researcher was able to work only once with each pair of students it appeared that strategies for accessing hypertext were adequately established through researcher modelling of processes, and guided student exploration of hypertext. When students were questioned they appeared confident to support others if required.

The activities engaged students' cognitive and metacognitive abilities, including reflection, thus fostering active thinking and learning. There were many instances of cognition and metacognition across the three training activities : because the researcher was functioning in a participant/observer role she was able to build on these contextually with students to extend practice and understandings, for example introducing and explaining text-related terminology, drawing attention to functions of hypertext and introducing reflection at a very basic level (Figures 5.6, 5.7, 5.9).

(iv) Shared cognition processes and hypertext

As mentioned above there was evidence of shared cognition occurring in a range of contexts. These contexts depended on the nature of the activity. The navigation activity gave evidence of students' negotiations of the clustering and categorisation of information, selection and implementation of appropriate search strategies, inspection of article titles for relevance, and summarisation of their process.

The reciprocal strategy for accessing an article for information gave evidence of students' constructions of meaning from text using oral, visual and written information, interpretations of meaning, selection of relevant search strategies, and summarising of information.

The multimedia authoring gave evidence of students' joint sequencing of information, adapting written information to a medium requiring visual and aural elements alongside print text, and negotiating aspects of the new experience of slide construction.

(v)access to text, in particular hypertext, and the acquisition of a metalanguage for using hypertext

The processes related to this theme were critical to the findings of the study : the first phase of the study yielded evidence that awareness of text and language for discussing text was minimal in the classroom (5.2.5). By explicitly introducing strategies for accessing hypertext and explicitly modelling and exploring the terminology of hypertext in this second phase of the study the researcher hoped that students would be enabled to gain deeper meaning from text in an effective manner.

There was initial evidence of the beginnings of this in the ease with which students navigated the hypertext using the strategies modelled and they began to use terms appropriately. The students using the reciprocal strategy appeared to be efficient at working through the information using the strategy, and some gained insights into the interpretation of information that they had not previously demonstrated (for example L and MR).

They also began to use the language of the text. The students who authored presentations using Kid Pix (TM) gained very valuable experience in organising and adapting text to a new medium, using the terminology required by the situation. In each training activity there were instances of the language of text and hypertext being used and this was a definite departure from most of the observed activities in the first phase of the study.

5.3.3 Conclusion to 5.3

Overall, the activities which established the collective zone of proximal development very successfully prepared students to extend their expertise into other contexts in collaboration with experts in other areas. The collective capacity for reflection was, as noted above, slight but established and ready to develop. The next section will detail the general growth of capacity in the students following this intervention strategy.

5.4 Section Three

Analysis of the class zone of future functioning

Content summary, section three

Student activity in two information literacy based projects is described and analysed in depth in relation to significant themes arising from phase one of the study. A visual analysis of researcher interventions related to students' strategic work on text, is presented. Students are interviewed for the second time and responses are analysed. The class teacher is interviewed. A general assessment of the class "zone of future functioning" (Figure 4.1) is presented in relation to the significant themes.

5.4.1 Integrating text strategies : Project 1 The four pairs of students undertook a multimedia project related to different aspects of farm management (see 4.8.4 for the process).

Pair A : KT/W and MR

This pair of students (both male) chose to investigate shearing as their topic. They thought of some unusual key words for their search and were also able to identify general topics to try. They tried a word search for "wool and sheep" which took them to the Sheep article. They scanned the whole article unsuccessfully, considering then rejecting what they called "unrelated articles" (related articles) and the hotlink to what they called "animal history" (Animal Husbandry). They found little specific information and didn't persevere, going to the books which were more useful. They were able to note their information concisely on the search plan.

After discussion with the researcher (acting as a participant observer) they negotiated a screen plan in a collaborative manner, making some varied suggestions for presentations, such as organising their text under "who, what, where, why" categories, and considering a bar graph and rainbow effects. They were very aware of the spatial properties of their plan and frequently gestured to the paper to describe layout while they planned. They enjoyed working on the slide itself, frequently exclaiming and laughing in delight.

For KT/W who had previously informed the researcher that he was "dumb at the computer" it was a particularly beneficial experience which completely absorbed him. It was interesting to note that once confronted with the potential of the multimedia tools, these students freely adapted their plan to include more shapes and colours and were keen to experiment with presentation.

Social interaction

These students worked in a very cooperative way throughout their process with a good balance of initiating ideas and negotiation; in fact at times they seemed to have symbiotic ease as they worked - drawing out suggestions, experimenting, and helping each other. They were natural in negotiating shared meanings and had a deeper approach to getting meaning than some of the other students. At the beginning MR appeared the more confident but KT/W quickly asserted his part through thoughtful contributions.

While at the computer MR (used to working at his home computer) tended to dominate possession of the mouse and had to be reminded to share. KT/W (almost no experience with computers) asked MR for help several times while working with Kid Pix but took a leading role in the information search, assisting MR several times.

Metacognition

The pair were most metacognitively aware in the sense of having an idea of what had to be done. They made frequent reference to action to be taken, for example "oh you're... delete, go to that top one, I think... oh yeah" (KT/W, directing MR to word search tool). They were able to plan actions and articulate these for example : "yeah..and we could have a pile of - um sheep stuff there or - have it in colours and have all the - um - sheep fur over there or something"(MR, suggesting visual content and describing spatial elements in planning the slide).

They monitored their process and content in the sense of maintaining concentration and negotiating meanings: there was a sense of their awareness of this throughout the whole episode however there was little articulation of this. (For example they visually referred to the reciprocal strategy chart during their search for information but didn't discuss what action to take.)

They did refer explicitly to their own thinking twice ("just trying to think" - KT/W trying to make a decision; "I think so" - MR confirming a hypothesis) and began to reflect in an informal and surface manner on their planning when applied to multimedia and the success of their presentation.

Cognition and shared cognition

A range of cognitive actions was demonstrated through the students' interactions. Some were exploratory and some were at deeper levels, for example clarifying meanings, analysing information, making informed decisions and self monitoring. Episodes of shared cognition were frequent, especially during planning. When brainstorming for their information search they negotiated meanings energetically, for example -

MR : You have to have one of those slides to put the sheep down...slides...

KT/W : Yeah but it might be like the one in the playground - like they have at school.. OK?

MR : Just put "slides" and then put in brackets "for sheep to go down"

KT/W : "for sheep"..one more (suggestion for the brainstorm)..farming?

MR : Races? Race...that they run down to the shearing place...

KT/W : So is it called a race?

MR : Yeah.

This episode is indicative of the students' developing awareness of the impact of word meanings on information searches and the necessity to be specific in key terms used. It also demonstrates clarification processes which were a feature of this pair's interaction : they asked more questions of each other than other pairs.

Access to text/language for discussing text

The students worked confidently but not extensively with the hypertext. They were able to access relevant articles very quickly through the word search tool, and to skim and scan for information. They were quick to realise that the specialised nature of their topic meant that it was only referred to in passing, and soon moved to the paper-based information where they had more luck. They did discuss text features several times but used few specialised terms to do so, preferring their own terms, for example "keep clicking on search, everything's coming down" when using the alphabetical index. They were similarly functional with Kid Pix (TM) with little explicit reference to text features. There were elements of reflection embedded in their process in that they experimented critically with visual effects on the slide but these were not explicitly discussed beyond a surface level , for example :

KT/W : I don't know what to do...green...green...

MR : Grey, or black...

KT/W : Green.

MR : OK just go up to that and just the end of the paint, just the end...

KT/W : Hey!

MR : Nah, try another colour - red...blue?

KT/W : OK, purple, that purple!

General Comment

This pair worked through the task with real enjoyment, and the results of the peer tutoring strategies were evident in the ease with which they searched for information and presented their slide.

Pair B : NB and NH

NB (female) and NH (male) chose the topic of drenching to investigate. They were able to identify several possible key words in their search brainstorm. The only ambiguous one was “worms” and the students didn’t question this at the time. They went straight to the pinpointer tool on the computer and entered two keywords unsuccessfully, getting “Dresden” for “drenching” and “Medford” for “medicine”. NB realised that they weren’t having success, suggested “Home” and NH then suggested a word search which they tried several times unsuccessfully. One of the unsuccessful word searches highlighted the ambiguous nature of the term “worms” when an article for the city of Worms was selected. This caused much hilarity. They eventually located the Sheep article which yielded some information and they were able to access this quickly from the text and record it on the search plan along with information from their farm visit.

They worked together with the researcher, in a participant observer role, to plan the slide, using a variety of ways of conveying information, including procedural text, speech balloons and an annotated definition of their topic. Despite their comparative lack of experience they worked more quickly on their screen than other pairs of students, and with fewer interactions related to issues - it was as if the planning process had very completely prepared them for their screen construction. This didn’t however, preclude experimentation and they were very keen to try new colours and revise shapes and words. They enjoyed their creative work very much and their excitement and concentration was delightful.

Social Interaction

This pair demonstrated sophisticated collaborative and cooperative skills especially in terms of listening to and assisting one another, making suggestions in a positive manner, and considering turn taking within the task. This was particularly interesting considering the observations of the researcher of both these students working with others and not demonstrating these skills. (“Can I steal that (the mouse) off you for a minute?” asked NB sweetly when she saw NH struggling with drawing tools, and she proceeded to show him a hint.).

Gender difference was possibly a strength of the partnership since both had established patterns of competitiveness with others of the same gender. Both students were very motivated by the task itself and so this may also have contributed to the ease of interaction - there were no real points of conflict during the episode and problems were usually attacked jointly. The male student, not usually a confident child, felt "empowered" because he had had some experience of using computers. He was as a result more verbally interactive than in previous observations and was very much more able to refer to his process outwardly, to seek help and to give help appropriately.

The female student, always very outgoing, but a little unsure in this setting, became more confident as the episode progressed and began to interact to regulate progress intuitively. This caused slight disturbance to the coordination of centration at times because she misunderstood N's actions in the light of her own experiences and he was in fact concentrating on something worthwhile but not communicating this clearly, for example :

NH Close...there's something peculiar....

NB Push sheep...don't go too far

NH (highlights an area of text to read) That doesn't matter, we didn't do anything, we just highlighted it...

NB Stop mucking around!

Their greatest problem was hypertextual access to the CD-ROM encyclopedia and this was where communication differences were most clearly evident.

Metacognition

Both students appeared aware of what their task involved in terms of planning and completion, and they were able to monitor their progress to a degree as it evolved. This monitoring usually took the form of interaction, about what one was doing, from the other, though there were some comments which were self references, for example : "Oh I'm thinking of 'buy'!" (NB, in writing instructions). They didn't explicitly organise shared tasks but seemed to fall into a pattern of cooperating in response to situations; for example when NB had the mouse and was entering a piece of print text NH held the plan and read the instructions aloud with a seemingly intuitive understanding of the amount of text NB could deal with as she typed.

Both students made statements of procedural intent throughout e.g. "Now we're going to draw a little cloud" (NB), "You need to delete it and do it there" (NH) and this further indicated the monitoring of the process. Several times one student taught the other a strategy, for example NH instructed NB

strategically on their initial Encarta search. These students were also quick to predict and take risks with all areas of the task, but although they appeared to think about their approximations and take steps to refine them, they didn't often articulate the process to each other. There was little reflective discourse although NH did reflect on his own thinking at one point. However the students were later able to talk reflectively about their experience and about other students' presentations.

Cognition and shared cognition

This pair engaged in a variety of cognitive activity as evidenced by their interactions. Both students showed ability to predict meanings, to categorise and analyse information, and to make decisions on the basis of information options. They were quite active in questioning meanings, and in thinking "aloud", and sought satisfaction in terms of their individual understanding, for example "Wool...wool production...wool manufacturing...so this is all types of labouring of wool..." (NH). They did share cognitive episodes but were less verbal than other pairs in that they seemed not to want to articulate in order to grasp what the other was thinking, when meanings were involved. Thus episodes were not extended. An example was :

NH "the one that starts with p - I keep calling it paracetamol..."

Researcher : "what, the drench..?"

NH "the other thing that starts with p.."

NB "oh, penicillin!"

NH "yeah something like that.."

A review of shared cognition through the transcript indicates that most episodes focused on the process of the task rather than the negotiation of meaning.

Access to text/language for discussing text

These students worked well together to access the hypertext information even though they weren't always in accord with one another's thinking. NH was confident in his strategic direction of the search, and used terminology confidently and appropriately to instruct NB. They were both quick to recognise "blind alleys" (and they went down several), and were able to regroup their search and try other options confidently. They entered a "sea of information" when they used the word search tool to identify articles containing the word "sheep", but were not fazed by the three hundred and thirty four articles which appeared, and soon identified what they wanted. They used the reciprocal strategy effectively to view the visual information and to skim the print text in order to extract specific information, and often

used the appropriate terminology to describe features of the text. Interestingly when they authored their presentation later there were no instances of terminology related to the text features.

General comment

This pair worked with apparent ease to complete the task, and there was some depth of thinking in their strategic search, evidenced more by their actions than their verbal interactions. Their communication focused more on completion of the task than working on meanings. Their enjoyment and satisfaction was enormous.

Pair C : MK and RP

MK (male) and RP (female) investigated different types of feed used on farms. They were quick to think of key words to base their search around, including “herbivores”. They did an extended hypertextual search without finding suitable information. They began by accessing an article about cattle through the Find tool but on exploring a hotlink called “food supply” were led to a dead end because the article was about world food supply. They did realise this and reapplied themselves by trying a word search of “animals and food”. This resulted in a collection of 526 articles which they scrolled down briefly, remarking on African hunting dogs and animal “hasbeenry” (husbandry) before deciding to go back to their original keywords. They scanned articles about herbivores and cattle, and then decided to do another word search. They entered “grazing” and “farms”, which yielded 38 articles. However they were all general articles about specific countries, and their agriculture as a just a part of the information about the country. realising this, the pair gave up and went to the print sources of information.

They then planned their presentation very carefully, considering several ways of conveying their information. They enjoyed constructing the slide and experimented freely with visual effects. This didn’t stop them from completing the slide quite quickly.

Social interaction

This very verbal pair worked effectively and cooperatively, listening to each other’s ideas and putting ideas forward in a balanced manner. They were able to make reasoned collaborative decisions, and had a positive interdependence which manifested in suggestions, affirmations and tolerance of each other’s ideas. They consistently offered help to each other and talked through problems. They were

particularly striking in the way they shared tasks and how they supported each other through the unknown.

They were an interesting pair : MK was impulsive, a somewhat erratic thinker but quick and full of strategies for problem solving. RP was a slower thinker but very logical and insistent on talking through situations to get full clarity. She treated MK in particularly considerate manner, fully acknowledging his ideas and requests and quietly accommodating his impulsiveness without minimising of her own contribution. Together they were able to explore their situation very fully.

Metacognition

This pair were very focused on what the task demanded at all points and when MK veered off occasionally RP would always redirect him quietly. So they were effectual in a mechanical sense. They verbalised actions as they went especially when working at the computer , for example :

MK : Animals and food?

RP : Yeah, animals and food....no no no no you don't have to write "and", delete that - just cause... there's animals...there...

MK : animals....now, "and food"

RP : Now, click on search...

MK : Search....

They were able to visualise both search topics and slide components in planning for their information search and screen presentation but did not foresee any problems they might encounter, such as the general nature of some of their search topics. They analysed the component parts of their screen presentation well and were innovative in thinking of ways to present information visually in their ideas for the food types being in the animals' stomachs and a list of food in print to match with these visuals. They monitored progress like hawks especially when working at the computer, for example :

RP : So that...

MK : No you won't find anything there...shall I do farming?

RP : So go back to the words...

MK : Shall I find... shall I look up farming?

RP : So...come back to the word search....

They seldom reflected explicitly on their thinking or on their process - but one example was when they commented on an aspect of their plan :

MK : Match, match - draw the food and the words to match...

RP : Yeah, in a column... this is going to be hard...it's like a puzzle...

Reflections were at a surface level and all to do with the success or otherwise of their efforts. Sometimes a comment such as "it's about food supply, but it's about the world..(food supply)" (RP, scanning an article), would indicate a possible area for reflection and discussion (in this case about the semantic potential of article names) but this pair never delved deeper or wondered about reasons behind appearances.

Cognition and shared cognition

The students showed through their interactions that they were able to use a variety of cognitive processes such as observing, describing, explaining and instructing strategically. They showed strength in working through the hypertextual maze of CD-ROM encyclopedia articles to establish specific areas for searching and were able to talk through possible options and make decisions, for example :

MK : How many bulls....

RP : So which one would be brilliant?

MK : Here's a sound thing....

RP : Hang on, wait...

MK : "feeding, cattle, common"... I'll go down looking for..."modern breeds"...

RP : Keep on going down...

MK : "dairy cattle"....

RP : 'kay...

MK : "feeding"... "beef cattle"...

RP : Keep on going...

MK : "best breeds"...

RP : aaah...ok...

MK : No, it's not going to tell us...

RP : So we'll go back up, go right back up...

MK : Fine.

Most episodes of shared cognition occurred during negotiation of actions rather than meanings although instances observed during the planning of the slideshow screen were related to the conveying of meaning, for example :

RP : I'll do the animals...

MK : You could do a little thing coming out saying "I like eating..."

RP : Saying something...speech balloon?

MK : Yeah...

RP : How about "I like eating" and just draw what he eats inside his stomach?

MK : Yeah...say "this is what I eat" and do it in his stomach...yeah...

RP : I'll help you do it...

This pair, alert and keen workers, didn't explore the process in depth because they had such a strong focus on achieving the task and didn't question in relation to meanings.

Access to text/language for discussing text

This pair worked very confidently with hypertext and worked intensively to cover a wide number of possibilities for locating information in a very short time. They understood and used the terms "find" and "word search" and were very flexible in going between them to suit their purposes. Once within an article they were very quick to use oral, visual and written information to scan for their topic and interacted in a reciprocal manner to identify, clarify and question the information (although this was rarely made explicit).

They made few references to text features and didn't use terminology related to the text type when planning and constructing their slideshow screen. They did discuss spatial considerations, colour and text frequently, but in very functional terms and without questioning more deeply, for example :

RP : Oh no...it's not, it's not right...

MK : Use that one....

RP : That's better...is this right? Cool!

MK : Let me do one now...I like this colour best....what do you think?

RP : Oh no! How will this go?

General comment

This pair loved their finished slide and thoroughly enjoyed the whole process, in fact MK greeted the researcher every day after this with "When can we do some more work with you?"

Pair D : M/AG and MM

This pair of students (both female) were searching for information about docking and drafting of farm animals. They were quick to compile some very basic keywords on their search plan. They used the

“find” tool to locate an article on sheep then entered “farming” which brought up an article on the town “Farmington”. They didn’t attempt to think why this might be and went to the “word search” tool, entering “docking and drafting”. They found articles that were more about shipping and the dock plant, so changed their word search to “docking and farming”. After scrolling down the list of fourteen articles they decided that none applied to their topic and went to other information sources.

They prepared a detailed plan for their slideshow with a great deal of negotiation. They spent a lot of time organising the spatial aspects of the plan, discussing visual factors and planning to use symbols and visual formats more than words to communicate the information.

A very intense time followed as they constructed their slide together : as they said, they wanted it to be “the best”. This aside, their dialogue was prolific and lengthy as they discussed and fiercely negotiated each little part of their process in detail. They were immensely proud of the finished slide - MM triumphantly pronounced “that looks fantastic!” while M/AG said “I concentrate”.

Social interaction

These students were by far the most verbally active pair and commented in depth at every point on their process. Although MM appeared to initiate most activity M/AG was an extremely alert and observant critic and continually challenged MM to defend her ideas and actions. M/AG also insisted on her own ideas being considered, as MM was inclined to want to go ahead with her own ideas and thoughts. Both students talked freely through what they were doing and communicated and clarified meanings consistently. They found true partnership a difficult undertaking because of the number of compromises they had to make and both became somewhat impatient with the other at times. MM, an impulsive and intuitive student, would both think and act too quickly for M/AG whose more literal and methodical approach demanded explicit clarity, so this caused some irritability.

Overall they in fact worked very well together with MM as a creative force and M/AG as a rational force which brought some balance to the way they managed and developed the task. There were no problems with the division of labour off or at the computer - both were highly motivated to work together and demonstrated considerable cooperative skill.

Metacognition

Both students demonstrated sophisticated awareness of the requirements of the task and their whole dialogue reflected consistent monitoring, predicting and hypothesising in relation to what they were

doing. They explained and justified what they were doing constantly and often referred to “what’s next?” and “now we’ll...” as they worked.

They were very able planners who could foresee a variety of outcomes of their actions, and could suggest, debate and construct possible solutions as they went. This was particularly obvious when they worked on their slide as they had little experience of this medium. Both students constantly questioned and self-questioned as they worked, and assisted each other as well, for example :

MM : Now I’ve just got to do that fly thing...and ... now what am I doing?

M/AG : It’s the drafting...

MM : Oh yes...

M/AG : You’ve got to cancel..

MM : Oh! Oh!

M/AG : Undo, undo...

MM : I didn’t need to go to undo...

M/AG : That one?

MM : No that one...

M/AG : It’s got to be small...It’s too big!

MM : Yes it is...

M/AG : No, You need something that really stands out..it’s too small that first one...

This pair demonstrated greater ability than other pairs to self-reflect and self-evaluate through their actions, however verbal evidence indicated little in-depth articulation of this ability. MM did comment on their finished product : “Does that look great?” (rhetorically)...”even though we fussed around...” and “It’s the best, we had lots of disasters...”.

Cognition and shared cognition

These students showed relative sophistication in their cognitive activity and their building of shared meanings. As discussed above MM was the one who pushed for meaning development in a divergent manner while M/AG acted as a kind of barometer of practicality which was a useful foil. Both students were keen to explore meanings and in doing this were able to describe, observe, explain and make comparisons within the context of their task. They were also able to analyse information and text features in order to identify options and make decisions about the clarity of their message, for example :

MM :I know what we can do... is write “sheep” and then we write “ring on sheep”, “if it hasn’t come off cut it off” and then “hazard-free of flies and insects” and all that...

M/AG : Yeah, but you've got to do something about how to - um - draft, how to draft these things
.....you can't just put the ewes there and the....

MM : I know I know I know... draft will just be "draft" and then write "sorting out sheep"... 'Kay?

M/AG : 'Kay....go...

Episodes of shared cognition mostly related to the process of gathering and presenting the information
but the following example is one of building meaning about docking :

MM : Hazard...

M/AG : (reads from plan) "...free of flies..."

MM : ...of insects...

M/AG : no of flies, cause insects don't go into them only flies do.

MM : but those worm things do and maggots do...

M/AG : Yeah only if you don't drench them...."of flies"

MM : ... "of"...

M/AG : because, only say "insects" when you drench them...

MM : On yeah, true....

The pair were also consistent in both describing and solving problems as they arose and they constantly referred to each other for feedback and opinions, especially during the authoring of the slide. They monitored the screen carefully, checking and cross-checking that they were satisfied with each part and frequently talking through the use of the drawing tools until they were satisfied.

Access to text/language for discussing text

These two students worked quickly and confidently to retrieve information from hypertext and were prepared to problem solve throughout their search process. They used terminology related to the text, such as "article", "find" and "caption". They didn't question some of the things that happened (for example, getting "Farmington" when entering "farming") and so lost opportunity for deeper understanding of the text features. They were able to search using two keywords and again came to the issue of ambiguity of terms (three meanings for the word "dock"). Again they didn't follow this up. They were able to scan visual and print information very quickly to make decisions about what information was contained in the hypertext.

When planning and constructing text they showed outstanding ability to consider and negotiate the spatial elements of the text using some terminology to do so. They explored deeply the whole

construction process in a functional manner again using some terminology such as “ruler” and “undo”, but more frequently used their own terms.

General comment

These students showed high potential for working together to achieve their task. They also demonstrated a high degree of engagement and enjoyment.

5.4.2 Project 2 : integrating hypertextual strategies and reflecting on the structure of hypertext One pair and one group of three undertook an extension study related to their farming topic (see 4.8.4 for the process).

Pair E : MM and H

This pair of students were to make a hypercard about honey as their part of the hyperstack. After collecting information they decided they had enough for two cards, one about honey as a food, and one about what they called “the honey cycle”. They moved between the two CD-ROM encyclopedias with ease, quickly adapting their prior experience of Encarta (TM) searches to the new text, the TVNZ (TM) encyclopedia. They searched successfully for information and, with help from the researcher, extracted a great deal of relevant information and learnt a lot about note taking and summarising. They explored information about pollination, honey as a food for humans and animals, types of honey other than bee honey, chemical composition of honey, honey as energy producer, and influences of types of pollen on the flavour and colour of honey. It was exciting to observe their intent search for meanings, their tenacity, and the growth of understandings about using text.

The plan for their hypercards developed very naturally from their search with the researcher assisting them to categorise information by the strategy of circling in different colours for categories and helping them to name and label the categories. This helped them to order and structure content and allowed them to concentrate on the spatial and visual features of their plan. They were extremely quick and deft in the execution of their hypercards and made adjustments as they went in a natural manner. Even though they had only experienced the approach used by the study twice they demonstrated deep engagement and how quickly learning occurs under certain conditions.

Social interaction

This pair (both female) combined well to work on their task. H, an extremely thoughtful younger student was less voluble than MM but her contributions were extremely valuable and she always listened carefully. She was active in negotiating meaning and tended more to think while MM talked then to contribute a suitable summary or amendment to the discussion point. She was also very quick to anticipate action required on the computer and to suggest this to MM who in her turn listened carefully. MM (as in previous episode) was a quick and creative thinker who liked to initiate but did also listen. Cooperation at the computer wasn't an issue with the mouse freely changing hands and the planning being used to support mouse activity, including spelling words aloud to whoever was entering type text.

Metacognition

This was a very well-organised pair of students. They verbalised their actions clearly as they went, especially when working at the computer. They were also thinking of choices as they went, for example :

MM : We should search for another word..

and later

MM : "Beeswax"...oh no we're not doing that...

and later

H : This might take the whole thing up... (the card)

Thus they monitored and regulated the task ably. The researcher supported the information gathering process quite fully, enabling them to think about ways of analysing and recomposing information. This appeared to assist them to both understand the original text through "translating" it into simpler English and to think of the words they could use themselves to convey meanings to others. Among the dialogue appears evidence of reflection about the task requirements, for example, "We could have this or we could have another big one, or this here and this down here..." (MM), also meanings, for example, "...and light colours equals...equals...high quality...and dark colours equals low!" (H), and also their own thinking, for example, "I heard of that!" (MM). They also questioned the task frequently as a means of self-regulation. They didn't often question text features of the information sources or the hypermedia presentation but demonstrated some awareness of what they were through ease of use.

Cognition and shared cognition

This episode was particularly rich in examples of cognitive activity including shared cognition. There were more instances of questioning, inferring, analogising, clarifying, elaboration, summarising and

playfulness than in other observed episodes. As mentioned above the students were extremely keen to gain meaning from the information texts. This, combined with the intervention of the researcher, seemed to release a degree of strategic understanding of text processing in both students. There were several instances where the students would read text aloud. They might then refine overall meanings through summarising, or select and clarify particular meanings through rewording, or both. For example :

MM : Oh what about this? "Bee honey is an important constituent of the diet of many animals such as bears and badgers and is put to many uses by humans. Other insects such as the honey ant and various aphids manufacture honey-like substances from flowers, from the honeydew of plants or from the sweet secree-tions elaborated (sic)....by other insects." I think we should just write "Bee honey is an important constituent of the diet of many animals such as bears and badgers and is put to many uses by humans."

Researcher : What would you write down in really simple words?

MM : "Bee honey is a very important food for many animals such as bears, badgers and is put to many uses by humans..." "very important food"....

H : ...diet food, diet food...diet food...

MM : diet food for many animals, um, such as bears and badgers...

There were also instances where the students closely followed through information to determine its relevance to a far greater degree than other students. It was as if they wanted to understand the information thoroughly before deciding whether to use it, but they were also genuinely interested in it for its own sake. So they explored concepts such as the "fuel value" of honey and the constituent components of honey quite thoroughly, and clearly tried to come to grips with them.

This whole episode was a very good example of a search that was fruitful in both providing specific information for the students' purposes but also in enriching their schematic connections within the topic because of the deep way they processed a range of information.

Access to text/language for discussing text

This pair of students worked very confidently with hypertext and were quick to adapt strategies to a new text (the TVNZ (TM) CD-ROM encyclopedia). They explored the visual features of texts as well as the print but extracted the majority of their information from the print. As described above they began to show ability to explore, interpret and recompose the text to suit their purposes and were very

focused on meaning. They referred briefly and naturally to text features such as particular search tools and the expand function for images, sometimes using the appropriate terminology.

When authoring their hypercards they spoke mostly about spatial considerations and the transfer of content from their plan. They occasionally used terminology such as “lasso” and “pencil” but were becoming more skilled with the tools so these didn’t come into their talk so much. As with other pairs these students didn’t question or explore text features.

General comment

It was exciting for the researcher to observe this pair because of the shift in focus to getting and presenting meaning and the depth to which they pursued the information. MM later said to the researcher, “You know I’ve really learned something today about honey and how the type of flower affects the colour of the honey - I’ve really learnt about that.”

Group F : L, MK and T (and RP)

This group of three students was to follow the same process as other groups but with the added dimension of a larger grouping. L (female) and MK (male) had participated throughout the study but T (female) had only participated in the first phase of the study because of absence so had not been trained in peer-tutoring strategies. Unfortunately T was absent again part way through this episode and did not get to take part in the hypercard construction. RP took her place.

These students were gathering and questioning information about three topics for three hypercards which would form a stack.. The topics were Bees - types in general, Queen bees, and Worker bees. After compiling some thoughtful questions for their topics the students searched for information from the TVNZ TM) CD-ROM encyclopedia. They worked rapidly to access needed information using the “topic” tool. They were very reliant on the visual text of the article, recording and annotating diagrams as well as written notes. They worked economically, each student taking an information sheet containing topic questions and noting relevant information while they scrolled through the article about bees. They didn’t use any hotlinks or ask to use Encarta (TM). They then searched books for information before preparing their hypercard plans. It was of interest to note the ways they were beginning to use strategies for presenting information visually.

The next day T was absent and RP took her place. The construction of the hypercards took some time while the students worked painstakingly, trying to help each other and frequently erasing parts that didn't meet their approval. RP was rather nervous and needed a lot of support from the others.

Social interaction

These students were able to negotiate and debate their process and to some degree the meanings of the information they were locating and using. The three-way discussion which generated their search questions was immediately interesting because of its depth. The students fell very naturally into roles, with MK and L initiating ideas, questioning and clarifying, and T recording and keeping the others on track with the topics, but also frequently requesting clarification. The researcher didn't intervene at all, which was unusual. During the hypercard construction there were periodic instances of individual students opting out of the talk. This was not evident with the pairs of students. It seemed be that the increased complexity of dynamics between three students made it more difficult to participate in a consistently satisfying manner. However they did attempt to problem solve in an interactive manner throughout and were actively and usually constructively critical of each other's efforts.

Metacognition

The increased number of students seemed to indicate a higher incidence of vigilance towards the process of the task. Students were consistently monitoring themselves and each other, and they demonstrated ability to regulate the task efficiently overall. Increased confidence with strategies seemed to contribute to this efficiency. In particular they were able to explore the questions they wanted to ask in a very interactive manner, insisting on clarity of content and the form of the question itself.

They searched the information with purpose and critiqued it quickly , keeping inside the articles selected and not venturing across the texts to use hotlinks. While they were doing this they were able to keep their questions and predictions in mind and often checked them to match up information, for example,

MK : Cool, cool, "Bees....they're important..."

L : "...to the beehive"- so that might have a bit of information.

T : No, wait, wait, "Bumble Bee"

MK : Worker bee...

L : Worker bee

MK : Let's go close up to the beehive...

L : Go up close, click on “Beehive” first....”the beehive..”

MK : Oh yeah, did we do something about where they live? (looks at notes)

T : I think it was for you (indicates L)

When planning their hypercards they were able to analyse the components of their information and compose a visually interesting and informative plan. They did encounter some problems translating their plans to the card itself, but these were mostly due to inexperience, and they helped each other through this quite ably. Even though all these students had worked with multimedia during the study they indicated a degree of tension and lack of confidence in the Hyperstudio environment, and the researcher had to intervene to positively reinforce their efforts. The main reflecting they did was as they went and it was at a surface level, such as direct comments on their work or asking opinions about actions. There were no “wonderings” or questioning of the text.

Cognition/shared cognition

The three students used many cognitive processes in their interactions. The most lively episode was the formulating of information questions where they continually queried, clarified, categorised, qualified, speculated, summarised and elaborated. They used these processes to tease out and adjust meanings and several times followed this refinement process very effectively, for example,

L : How many flowers do they visit in one trip?

T : Do they get enough pollen?

L : How many times do they go out?

MK : How much honey do they get a day?

L : Yeah, that’s what I was saying - how many times do they go out in one day?

T : How many times do they....?

MK : How many trips do they do?

T : No, how many trips do they take in a day? OK. (writes question)

However during the rest of the process the exploring of meanings was less. They didn’t take any risks, such as exploring hotlinks or divergent topics, in order to seek further information. They focused very closely on information directly relevant to their topics and were very satisfied with what they found. They did use the close-up tool to view images in depth, and used information from the images fairly extensively when planning their cards. When planning and authoring their hypercards they were very sure of what they wanted so were less likely to discuss and mediate meaning : most interactions were functional and supportive. The querying that had vitalised the question forming wasn’t present.

Access to text/language for discussing text

These students were very quick to access hypertext to search for information, despite the fact that the TVNZ (TM) encyclopedia had different search tools. They used a balance of visual and print information very competently and quickly to find some of the information they needed. As mentioned above, they did limit themselves with a lack of experimenting with hotlinks and related articles. There was some use of terms related to text features but these were mostly from MK who could talk very fluently and naturally in this manner when helping others to use the tools. One thing that was interesting about this trio was the amount of “intragroup tutoring” that occurred, and this was mainly where reference to text features was made, for example,

RP : Which one am I doing?

MK : That one there....

L : Not just the bees.

MK : Start here then it'll fit. Yep...you have to do it again.

RP : There! Now...

MK : And that can be a title.

Researcher : Can you save please R?

RP : Nooo...

MK : Go to “file” then “save stack”. Now!

Like other groups these students made only surface reference to text features, only occasionally using the terminology to communicate what they were doing.

General comment :

This was an interesting observation because there did appear to be some main effects caused by the dynamics of a group of three. Effects appeared to be positive and negative. The students enjoyed the experience overall though they were very tired at the end.

5.4.3 : Summary analysis of students' linking across hypertext nodes (stacks)

After the groups of students had constructed their hypercards, L and MM returned to the hypertext plan, to decide on possible hyperlinks. They negotiated these and made the connections physically with string.

MM initiated the three links that were made while L affirmed and gave her opinion on each (Appendix C, item 5). MM justified each of her proposals and also saw more than one possibility in one of them. It was clear that these two students were able to link the conceptual material as well as demonstrate how the hypertext could be organised to do this in their presentation.

5.4.4 : Visual analysis of researcher's interventions in students' work with hypertext

The following visual analysis is of interest in relation to teachers' roles when guiding hypertextual learning processes. The table indicates that the nature of interventions moves from close support of students' functional (surface-level) thinking in section one to support that expects students deeper-level thinking in section three, as students cue the researcher to their readiness for greater cognitive challenge .

Table 5.2 Incidence and nature of interventions in Sections one and three of the study

Nature of intervention	Section one : incidence (5.2.4 only)	Section three : incidence (5.4.1 and 5.4.2)
assist with recording information	1	0
refocus on search	7	5
review search	13	0
translating meaning	10	6
tell search strategies	3	0
talk about nature of hypertext	18	8
extend thinking about meaning	9	4
help with interpretation for recording	0	6
query hypertext strategy	7	0
suggest alternative strategy	0	6
"wondering"/speculating	0	2
presentation	NA	8
use of draw tools	NA	6

NB. Only interventions relating to strategic work on text are tabled.

5.4.5 Student interview results - summary

1a. How do you feel about working on the computer to help you to learn about flight and farming?	<ul style="list-style-type: none"> • Easy, cool. • It's fun; happy to do it, sort of exciting - you don't know what's going to happen. • I found lots of info • Fun and easier and a lot more info. • Enjoyed it. • Very good. I enjoyed it very much.
1b. What did you learn about?	<ul style="list-style-type: none"> • Finding new things about dogs and shearing ; you find things you don't know. • Being patient; taking your time; how to do lots of things on the computer. Lots of information about farming and flight. • Slideshow and Hyperstudio. • It was good - we learnt things like depending on what flower it was, that's the kind of honey and that bees carry pollen on their legs and make it into nectar in their stomach. • How to find information, how to make a picture and how to write on the picture. • The main thing was a bit more about Encarts and slideshows.

Students' feelings about using computers within the learning experiences of the study were all very positive. Their perceptions of what they had learnt were varied : some students emphasised content, others talked about information processes, and others focused on learning about types of software.

2a. How did you feel about working in pairs/threes at the computer?	<ul style="list-style-type: none"> • It's better in pairs - you don't have to use your brain all the time. • I'd rather work by myself so I can do all the fun parts....but it was OK. • Easier and faster, except for when we were losing our screen. • It's a little bit confusing because my partner went too fast. • I dislike it a lot. I like working by myself. • It's easy because some one could read out what you are going to write. • Most of the time it was really good because you help each other if you don't know something. But I like having a turn more at the mouse. • It was fine. I like the ones I was working with and we didn't disagree much about what to do so we got it done quite quickly.
2b. If you were the teacher how would you get children to help each other at the computer?	<ul style="list-style-type: none"> • Tell them it's much better to work together. You have equal turns using the computer; you like do half each. • I'd say how to work in pairs - photocopy a little list and read to them and it would be a long one. • Getting them to take turns to draw and write and to take the best ideas and put them together. • If you don't let that kid help you I'll put you on detention! Well, you should do a bit each - one does a pig, one does a cow, or one gets 5 minutes then the other. • Tell them to use the mouse, how to get to information, or talk to each other, tell them what to do, help them. • If they share something equally they would have something special at the end of the day; if they were naughty they would just get in trouble. • I'd say work together. You'd have a good person to work with. • Well, I think it's more fairer to tell them that it's quicker and fun to work together but you have to learn to share it out. • If I like what they're doing I'd say very good and tell them to show the ones that can't work it out together.

<p>2c.How did talking and listening and sharing jobs help you at the computer?</p>	<ul style="list-style-type: none"> • If you didn't talk you'd get into all sorts of arguments. You talk to know where you stand. You won't know what to do if you don't. Also if you're doing it by yourself it takes longer. • Things I don't know he told me about - and you listen so you can tell where to put the drawings. • There's more ideas to choose from and you don't have to think as much....but I'd probably rather do it by myself. • If we never talked we'd never get anything done. If you don't listen you might do something different. • When she read the things and the harder words I have to listen really carefully for big words so I know how to use them when I'm older, and it helps me to share things with my partner. • You have to talk and you have to listen because you have to talk about what to do to make the perfect screen. It gives me more ideas to put on the screen. They say "just try doing this", or "just imagine" I say "oooh - idea!" • If you didn't listen you'd think they said something else; if you didn't talk you wouldn't know what to say. • Well, if we had to tell things or we didn't know what parts to do ourself and it was good to give each other ideas for things. But if we didn't listen we couldn't do it either. It was ok to share the jobs because you knew you'd get a turn to some of the good things. • You got to put the ideas together and sometimes it was better.
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Most students acknowledged the positive aspects of co-operative groupings, with a few reservations.

Some of the benefits for learning co-operatively at the computer were identified. Responses to question

2b indicated developing awareness of co-operative strategies such as turn-taking, task analysis,

compromising, sharing of ideas and supporting less able others. Students' perceptions of the

communicative benefits of working co-operatively at the computer were varied (2c). Most students

thought that it was necessary to communicate and share. Four students made direct reference to their

actual experiences in the study : these references related to negotiating a multimedia presentation (3) and

accessing information from hypertext (1).

<p>3.You've done some little research projects now, using the computer for parts of that. What are some things you've learnt about researching, on and off the computer?</p>	<ul style="list-style-type: none"> • You find out things and you can keep them in your head for later on in life. You can use them when you need to. You can go to Pinpointer and it goes closer and closer. • Sometimes it can be hard and you might need to start again and check whether the mouse works and it's really good to take notes instead of writing everything. • The computer isn't paper and you've got to do things together and ask the best questions. • I need to make sure I've got everything I need - write all the things, make sure I have things to look for and write down the title you need. I can find research easily with my partner. • When you go to the encyclopedia when you get used to it it's easy. You have to read the article and the pictures give you help. Books and talking help too. I learnt how to make a presentation. You have to take your time and do it carefully. • It's easier on the computer because you can move the mouse; you have to use the index in a book. • You can do some things that are really different to present the info. on the computer, like when we did the sounds and made the slideshows move along, it was cool. And in the encyclopedia we could help each other to look for info and do different jobs because there's so much info. • Well it's like if you do a lot of things to get ready you can find the info. more quicker and if some one else is helping too. You can put the info. onto the screen like pictures and that and not too much writing so the others can see it more quicker.
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Students' perceptions ranged from a simple summary of accession differences between hypertext and print text to accounts of the importance of features of information gathering and presenting processes, such as familiarisation with software, interpreting rather than copying information, asking appropriate questions, and taking time and care. Responses were brief but with a degree of reflection evident.

<p>4a.You had to problem solve a lot, on and off the computer. Tell me about some of the times.</p>	<ul style="list-style-type: none"> • We didn't have any problems, just how to do the sound. • Well the main thing is that it's not like you're drawing with a pencil - it's hard to control. We done our best. • It was mostly to decide who had the mouse and whose turn it was. I pushed her hand away. I said, "When it's your turn you can type it and when it's my turn I can type it". • When we were looking for docking we just couldn't find anything on the encyclopedia so we had to go to the books but there wasn't anything there either, really. So we could remember things from the visit and that was enough to put in. • For problem solving we had to solve our problem about cows and bulls and cattle by working together and sharing all the time. It was quite hard sometimes. • When we did the bees we had to keep looking...."I think I've found something here...maybe here....oh no be quiet, I've found something here...." When you're arguing it's hard to get the exact answer. You have to keep on looking and we discuss what to do. • We couldn't find the best sheepdog exactly. There were lots of sheepdogs. So we were talking about what sheepdog was best, We decided ourselves. • I think the hardest thing was when we did those answers to the food and I didn't get what M. was saying, how to put it on the squares. But when he drew it, I could understand it better. I still don't know if the other kids'll get it without us telling them. • Sometimes when we lost our work that time with the colours on Hyperstudio it was a big problem and I was feeling frustrated too. But when we done it again it was OK and you told us how to be careful because the computer was being a bit silly with the colours so we didn't mind and we saved and saved all the time.
<p>4b.What were some things you learnt about problem solving?</p>	<ul style="list-style-type: none"> • You don't need to get hypo (hyper) and do something stupid - you just work it out. • You ask someone who knows - you try all sorts of things. • To compromise. Not to argue. Not get upset. Work it all out beforehand. • You can find the answer in lots of places. • We learnt how to share. We wrote the things down and then we got onto the file and looked down the file. We have to use the computer. • Keep looking for the answer over and over again. Also to sort out the information to the people and agree which ones go. You give the ones with hard words like "economical" to the better groups. • If you can't find it on the computer you might find it in a book. • Well sometimes you aren't sure how to solve the problem and that's why you ask for other ideas and if you still can't find the information you can really think if you know something from your visit or something. • You have to find a way to agree if it's someone else too - you never agree! We didn't agree about what the screen should look like and then when we drew it better we could see that the parts could fit after all.

The examples of problem solving given by the students (4a) related to work at the computer (3), cooperative issues (2), and information processing (4). Some reflective thinking was evident. The students appeared to have sound understanding of the social implications of problem solving, the need

for flexibility in thinking, and the need to try out a range of ideas and solutions. It would appear that they would be receptive to specific strategies for problem solving in learning.

<p>5a. What do you know about hypertext now?</p>	<ul style="list-style-type: none"> • I know how you can use it to do things, finding out from experience. It's easy searches, it saves you time. • It's easier on the computer but not when you're typing. It's kind of like a book because you have to read, but it's easier to get to the page. • You can paint on it and type text. It's like a page but you can click on different things and go all over the place. • How to use all the gadgets and get the hands and stuff. • You can play around with the things. You can quit, go to file and to names of animals, close windows and make sure it's closed down. If you click on the hot links you can go somewhere else. • It's hard to do (author) because you have to keep over and over again. It's in stacks instead of pages going on and on. You can find things quick if you know what you're doing. • It's writing and pictures and you can colour in; you can click on the red (hot links) and it'll take you to things then you can go back again too just like that! • It's not like a book because you don't have to go one page, two pages, three, and that. You can move everywhere you like and the page can move as well as your eyes to look for what you want. • It's very good to use. It's very quick to find things for you.
<p>5b. What are some of the words you've learnt to use when you're working on hypertext with someone?</p>	<ul style="list-style-type: none"> • "Pinpointer"-categories down the page; it's kinda like a dictionary; "word search" - I can't remember on that screen thing...the cow meat...; "hot links", the ones that are red and you go to other things. • "Find" is the list like for the hot air balloon. • "screen"; "slideshow" - when you take different pictures and put them on the screen and it runs through all the pictures; "hotlinks" - when you click and it takes you to some where else; "enlarge", "maximise", "minimise". • "word search"; "hotlinks" - you click and it's red and it tells more information; "paintbrush" - paints. • "file"; red letters (hot links). • "stack"; "hot links" like the American Kennel Club; "related articles". • "search" - write down a word, click on search; "hotlinks" - red coloured things, if you click on them you find out what you need...if it's dog you'll find out about dogs. • "stacks", when we did the bees we had stacks instead of pages and they all went behind each other on the plan but when we joined them up we could jump over some of them, and on the computer too. On the encyclopedia we could find "related articles" quickly also the "hot links". • the red letters (hot links) are to take you to something more about that word, it's easy to go, you just click it.
<p>5c. What do you think now about hypertext helping you to find and present information?</p>	<ul style="list-style-type: none"> • Good fun, pretty easy, sometimes it doesn't work. • Easy because it's quick sometimes. • When you know what they are they get easier and you know your way round. You click on search and it goes to what you're looking for. You click on the red words (hot links) and go to more info. about the word. On our map the wool shows where we could go (reference to hot link planning during Hyperstudio project). • It's harder to type but it's funner (sic) and more educational and easier to find information and evidence. • Good because now I know more stuff instead of my brother. It helps me to read and has big words. • Fun but hard to get the hang of if you really get stuck; it's a bit useful. Also it was very educating; once you start doing things like that you can do much more things on the computer. If you're very good you can teach other people it. It's very different from a book. I like reading books but when it comes to computers it's really really hard. • Easier because you can click on the red parts, the hotlinks, and you can put "air" and "balloon" in a word search. • It's good because you can find millions of facts if you want to and you can put your own information onto the screen and it can be a part of all the other parts of the stack. • I like it, it's very quick to find if you know what to do and you know what you're looking for.

The students articulated varied concepts of hypertext, many very sound (4a). Some students were able to generalise about and explain features of hypertext such as its expansive and recursive nature, its organisation and its speed of access. However there was very little specialised terminology used to describe text features (4 instances). When questioned directly (4b) all students but one could think of

some specific terms related to hypertext. One used her own definition i.e. “red letters” for “hotlinks”. Students also frequently qualified the terms with a definition (10 instances) and one student used two terms that hadn’t been used in interactions during observed episodes (“maximise” and “minimise”). Students also felt positive about using hypertext after their experiences (4c), saying it was “fun”, “easy” and “quick”. Some students compared hypertext to books and some students (4) offered a thoughtful reply in relation to information processing and presenting.

<p>6a.What thinking skills did you use when you did your research and presentation on the computer?</p>	<ul style="list-style-type: none"> • What words I needed and what key words to use to get the information. I had to decide how to search - there's Ancient History, Exploring, and that - you have to decide. • If you did it too big you have to put the pig there and move it down so it fits. Also reading and understanding. • You have to space out your presentation, you have to decide and organise. You have to decide on sharing turns too, and planning - that's important. • Planning our things first, decide what things to do in the picture text, and then think if you didn't do it right. • Deciding, finding, thinking of words to use, think of info. and look in other places. • Think of how to do it, how to argue, how to make an agreement, decide which colours and how big to make things. • Plan the question, write it down, facts and ideas, think about what to write down, choose your information. • How to get the parts ready and how to find the ways of doing it on the computer. • I had to think about what we had to do and what to find.
<p>6b.Did you use your thinking skills in a different way to help you with hypertext?</p>	<ul style="list-style-type: none"> • Yes, because in a book you just read down a page. But you type it in on the computer and you have those hot marks (hotlinks) and you can go deeper and deeper in till you find the animal or whatever. • Yes, because instead of skimming the pages you had to go to this and go to that. You had to think of words to help us get into what we were looking for. • Yes, because with books you flick the pages and (on the computer) you just press down and it takes you there. • Yes, I imagine what I was going to think then I think of it. • Well when I'm doing it on paper it's sort of the same. You need to find out who's reading and writing. But on the computer you need to find out what jobs to do. • Yes it's easier to find because you don't have to flick through a book, but it's easier with a plan. • I'm not sure because you still have to find the things about your topic and decide what to do and that. • I think you do because you can think about really lots of things that might be important and find them in the related articles quick, so you don't spend all day looking for the facts.

Most students responded to the first question in relation to organising their task. Most students focused on the cognitive skills of decision-making, planning, finding and presenting. One student extended her thinking in relation to social negotiation of a task. Most students saw a distinction between the kind of thinking they did when working with linear texts and when working with hypertexts (6b). Some saw the search process as quicker when using hypertext, some commented on the possibilities for increased depth in searching hypertext for information.

<p>7.How did the work you did with me help you to learn about learning itself?</p>	<ul style="list-style-type: none"> • You learn how to use the computer properly so you can find things like how to slaughter a cow. • It taught me to keep concentrating. • About using different things and specially to use an encyclopedia, and pair work, listening, sharing, and always try your hardest. • It's the teamwork and helping others and getting information quickly. • How to look in other places for information, and being patient with your partner. • I learnt to keep saving and saving and being patient with the computer and my partner and Mrs.M. And working slowly and quickly, like writing quickly and drawing slowly. • Using a word search and using hotspots (hotlinks), and making up your own mind. • How to work with someone and agree instead of just - you have that part and I'll have that part. • I learnt how to find things with using the plan and I can do it. And to think about what I'm doing when I'm using the pencil - it's hard.
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Students commented on a range of benefits to learning from participating in the study. Most students commented on enhanced social aspects of learning, and also information handling and presenting strategies. One student commented in terms of being able to use computers “properly”.

5.4.6 Teacher Interview This interview was conducted under some duress : although the interview had been arranged the teacher was obviously tired and this affected both the length and content of his responses (see also 4.5.3). The researcher decided not to consider the responses in this analysis of results. The responses to the interview are included in the appendix (Appendix C, item 4).

5.4.7 Summary : Class zone of future functioning The third phase of the study sought to extend students’ experiences of hypertext and information literacy processes within the security of a community of experts, and to gain information about students’ and the teacher’s reflective insights into the study in order to make predictions about the “class zone of future functioning”. The themes identified in the first phase of the study are used as categories for summarising this information.

(i)impact of a socially-interactive, reflective learning environment on depth of learning

Learning experiences required students to work cooperatively to negotiate meanings and actions. Students continued to interact in a focused and cooperative manner. Cooperative behaviours such as turn taking, sharing the mouse, reading strategies from search plan to mouse operator, and spelling text aloud to mouse

operator, developed at the computer so that they were very natural patterns of activity. Unlike the first phase of the study there were some instances of reflective activity observed. These were mostly at a surface level and it was also clear through the observations that reflection was implicit in many actions and decisions but it was not articulated. There was evidence of reflective thinking during the authoring of presentations and in the interviews.

Comparison with the first interviews clearly indicated that students were beginning to think more deeply about learning. For example, in the interviews (5.4.5), students showed that they could explicitly describe some general cooperative strategies and that they understood the value of communication in cooperative work. They had clearer ideas about what thinking skills were and could discuss how they could be applied to hypertext. They reflected in some depth about problem-solving from their experiences and then generalised thoughtfully about it. They were also able to discuss information literacy in relation to their experiences and their learning needs.

(ii) metacognitive skills, knowledge, and practice, and accessing hypertext

All students were metacognitively active in organising and developing their learning tasks. Dialogue consistently revealed reference to action and future action, and occasionally past actions. All students monitored their own and others' progress consistently and often predicted and discussed actions. Students were definitely quicker to plan and negotiate tasks and showed increased speed in all aspects of their work at the computers. All groups showed increasing ability and speed in searching for and locating information and recording relevant notes, using the search and reciprocal strategies implemented in the second phase of the study. Students also appeared more easily able to analyse information and creatively recompose it into the verbal and visual elements required of their presentations.

(iii) Cognitive abilities and practice, and accessing hypertext

There was definitely a greater incidence of higher-order thinking in the latter part of the study. Students were challenged to draw on cognitive abilities in every part of the learning experiences and a wide variety of cognitive actions was evident throughout the observations. The actions were revealed through talk and comprised such activity as classifying, analysing, predicting and hypothesising, analogising, summarising, visualising, justifying and inferring.

Thinking at the literal level was also evident in speech actions such as explaining, instructing, describing, listing, and observing. Students reflected on their thinking skills in terms of their experiences (5.4.5; 6a).

They mostly associated thinking skills with metacognitive processes and some used words that described cognitive activity, such as decide, plan, organise, find and think.

Students were also able to access hypertext quite effectively by using the peer-tutored strategies to apply analytical and inferential thinking to the search and to the article text itself. Most students perceived hypertext as needing to be thought about differently from linear text because of its expansive structure (5.4.5; 6b).

(iv) Shared cognition and hypertext

There were many instances of shared cognition throughout the observed episodes. Some instances related to making sense of the task itself or to executing strategies. However there was also an increase in interaction that jointly constructed text meanings, including creating meanings through authored presentations. Many students appeared to be able to be more focused on building joint meaning through analysing and interpreting text.

Many instances of shared cognition occurred through the textual demands of tasks. The demands related to hypertext involved such actions as navigating information sources effectively, accessing information from oral, visual and written sources and from hotlinked sources, and constructing information that was organised in a non-linear manner. Students were able to reflect on the usefulness of shared construction of meanings (5.4.5; 2c) and discussed aspects of joint problem-solving such as communicating, understanding each other's ideas, and compromising (5.4.5; 4a and 4b).

(v) Access to text, in particular hypertext, and the acquisition of a metalanguage for using hypertext

There was a definite increase in text awareness in this phase of the study.

Firstly, implicit knowledge of how to access non-linear text in a structural manner was demonstrated repeatedly in the observations through the increased ease and speed with which students manipulated the text when accessing and processing information. Most students were also able to confidently manipulate the linguistic features of the texts as they transformed information into non-linear verbal/visual genre. Explicit use of terminology to describe text features was quite rare but there were some instances of this compared to no instances in the first phase of the study. Secondly, the students had more explicit knowledge than they had demonstrated in the observations and were able to reflect upon what they knew and how it applied to information literacy learning, during the interviews. Students were able to list many key terms related to text features of hypertext (5.4.5; 5b). Some students also indicated developing

understandings about the expansive nature of hypertext and that hypertext structures were layered rather than linear (5.4.5; 5a). Students also acknowledged the usefulness, fun and benefits of hypertext as a tool to assist information literacy learning (5.4.5; 5c).

5.5 Conclusion to Chapter Five

This chapter has presented the findings of the three sections of the study in summary statements that are structured by significant themes to emerge from the study process.

These findings are informed by data - narrative analyses of student dialogue and action, interview response analyses, and various relevant graphs and tables - which are presented as a prologue and a substantiation to the summaries.

The next chapter will apply these results to a discussion of the research questions in an attempt to extend the findings further.

Chapter Six: Discussion

"..effective integration of technology into the curriculum requires that equal attention be given to both social practices and instructional practices within classroom settings" Ryba and Brown, 1999 : 7.

6.1 Introduction

Chapter Five analysed the results of the study in detail in relation to the themes that emerged from the initial gathering of information (5.2.5). Students' interactions were analysed in order to identify learning patterns that linked to the identified themes, and findings were substantiated through some "triangulation" of evidence from observations and interviews.

This chapter presents a discussion which interprets results of the study in relation to the four questions posed by the study, and again draws on evidence from a range of sources (triangulation) where applicable.

Each question is discussed separately, however there is inevitable overlap of content in some areas, in keeping with the ecological constructivist research perspective underpinning the study.

6.2 The impact of the learning environment on students' cooperative interactions with hypertext

Research question 1 : How do classroom organisations and interaction patterns influence learning when hypertext is a context?

The first phase of the study went to considerable lengths to identify already existing classroom organisations and interaction patterns. The researcher used this information in the second and third phases of the study to create a new micro learning environment that directly empowered students to contribute to the intellectual "collective" of the learning community through their strategic ability to access and process hypertext.

The study found that, in this new micro environment, new organisations and interactive patterns were evident. These can be discussed as six components, identified by the researcher, that were critical to the depth of cognitive activity and intensity of motivation

required to exact optimal engagement with learning in general, and hypertext in particular. These components are listed and substantiated in the next sections.

6.2.1. Component one : the conscious development of a varied “pool” of experts and the careful grouping of students so that expertise could be utilised and that peripheral participation could also be nurtured

The study found that the training of peer tutors for cooperative access to hypertext clearly empowered the learning community and enriched the “intellectual collective”. Students extended their own and others’ zones of proximal learning through interactions and were in turn assisted (Lave and Wenger, 1991). Because of their training in strategic approaches to hypertext, students were generally able to initiate activity in an informed manner and assist peers with some confidence.

Students participating in a peripheral capacity were positively supported, which encouraged further participation (for example 5.4.1, KT/W). Most students acknowledged the value of the cooperative processes and felt their learning was successful (5.4.3). They clearly indicated deeper understanding of the nature of cooperative learning in the final interview (5.4.3; 2a,2b,2c).

This mentoring strategy could easily be organised in a classroom to ensure a spread of experience. It would be important to reflect regularly about the nature of the students’ roles because these would evolve as expertise was disseminated.

The findings of the study in relation to this component is that the researcher’s ideas of training peer tutors across a range of hypertextual strategies, and then regrouping, is a powerful and positive classroom strategy which bears out the ideas about socially-mediated learning in a created learning “culture” (Ryba and Brown, 1998), discussed in Chapter Two.

6.2.2. Component two : the quality and design of learning experiences adapted to hypertextual environments

The impact of the learning experiences designed by the researcher was strong. The challenges embedded in the learning experiences : students’ affective and cognitive

intelligences were immediately engaged because they had to work together, use a new text medium, manipulate field knowledge and problem-solve.

The development of the learning experiences was systematic and acknowledged the importance of students' strategic thinking at every stage (5.3.1; a, b, and c). For example, the planning stage of authoring was emphasised to foster cognitive and physical readiness for the processing and presenting of information which in turn required shared cognitive experiences with hypertext to be negotiated and evaluated. In addition the visual and metacognitive support of retrieval charts and other frameworks assisted students to focus with concentration on their research questions. So in fact the learning experiences acted as a kind of powerful catalyst for transactional learning, and connected with the "intellectual collective" of the micro environment to create synergistic effects (Ryba, Selby and Kruger 1999; Barnitz and Speaker, 1999).

The study found, then, that the ability of teachers to integrate social, cognitive, metacognitive, textual, and curricular content dimensions is critical to developing successful organisation and interactions patterns in the classroom (Brown, 1998).

6.2.3 Component three : the nature and incidence of scaffolding students' work with hypertext by the researcher as a participant observer

As described in Chapter Four, the researcher took on a teacher-type interventionist role during observations where she deemed it necessary. Information from the transcripts of learning activity reiterates the importance of teacher-mediated scaffolding of learning (see Appendix A and C). These interventions varied in nature and intent and were spontaneous responses to learning needs. Table 5.2 presents clear evidence that the nature and frequency of teacher interventions changed as students became more experienced in their cooperative interactions with hypertexts.

During the first phase of the study, there were more teacher interventions because students had less experience with hypertext and needed closer guidance. Also during this phase, the greatest number of interventions related to the nature and function of hypertext, followed by the refocusing and reviewing of searches, extending thinking, and "translating" of meanings.

Later observations show a lower incidence of intervention in all the above categories, but teacher-assisted “translating” of meaning episodes were longer, and several other types of interaction emerged. These interactions were: direct assistance with interpretation of text, queryings of hypertextual strategies to assist the concretisation of these in students’ thinking,, suggestions for hypertextual strategies, and some guidance in presentation decisions and use of text tools. It must be mentioned separately that there were two incidences of teacher “wondering” (making speculative and rhetorical comments or queries) where the intervention deliberately encouraged exploratory, creative thinking., The absence of conjecture was significant factor in the wider learning environment of the study.

These changes in the nature and frequency of interventions presented by the table show that the response of the teacher to the learning needs of the students deliberately shifted them towards deeper learning through closer examination and manipulation of text. This proves the teacher’s awareness that students were ready for the increased responsibility expected by these interventions.

Therefore this study affirms that, as with other text types, effective student access to hypertext must initially be facilitated by teacher scaffolding. The nature of that scaffolding must develop in relation to the teacher’s perceptions of students’ ability to manipulate structural features of hypertext and to construct meaning from hypertext (Mercer and Fisher, 1997; Alexander et al., 1994).

6.2.4 Component four : the importance of varied metacognitive abilities

The study also found that a range of metacognitive abilities was an important factor in developing patterns of successful learning with hpyertext. The ability of students to question and explore content and process was critical for deeper learning (Ryba and Brown, 1998; Mason, 1996).

The strongest metacognitive ability of the students in the study was that of organising the learning tasks : they had a sense of what was required and what came next, and were able in monitoring this.

They developed some ability to navigate hypertext but needed much more practice with this in order to gain a deeper understanding and real working knowledge of text features underpinning successful expansive searching.

Students had more difficulty with manipulating text to process information. They didn't appear to be very skilled at the underlying general ability to "translate" meanings and adapt these into notes, then recompose this information into their own words and verbal/visual presentation. Because of the multiplicity of hypertextual information sources this was a testing area for most students, despite the retrieval and planning frameworks supplied (4.5.8, 4.5.9, 4.5.10).

This inability was heightened if students didn't find a literal "answer" in the text, and were required to actively infer from the information. There were few instances of this occurring successfully and all students needed assistance from the participant observer (for example 5.3.1b; L and MR) simply because they had no idea that this could be a legitimate learning strategy and that their own autonomy could be exercised.

The above comments indicate that there was a hierarchy of metacognitive ability needed in order to successfully access and present hypertext, but that because many of the abilities were underpinned by basic strategies for operating on text, the students in the study experienced varied success.

The following table suggests a hierarchy of basic metacognitive abilities that were observed to be operating in students' interactions and scaffolded experiences with hypertext. The table also briefly indicates some of the kinds of questions students could be encouraged to ask in order to enhance their metacognitive (and cognitive) development when working with hypertext. This would be one of the very important "zones of future learning" for the students in the study : if those students could actively and consistently ask these questions many doors would open in their learning about hypertext.

Table 6.1 Metacognitive abilities and hypertext

Metacognitive abilities	Strategic questions students might ask
• planning	(i)content : what am we finding out about? what are key search terms? (ii)process : which tools will be the most useful for searching for this topic?
• monitoring (throughout)	Where are we up to? Do we need to change anything? Where are we going next?
• searching	The screen is giving us different information from what we expected; why? What can we do about it? How can we think differently about our key words to find "hidden" information? Is there a quicker way/another place to search?
• interpreting	What are these images, sounds, words saying in relation to our search? Which bits can we highlight to think about? Are there bits we don't understand, that might be important? Which words need to be looked up in the dictionary? How might we best say this in our own words? What should we note down on the retrieval chart, and how? Do we need to print anything? If we can't find information that directly answers our question, what parts can be put together for a <u>conjecture</u> ?
• transforming information for audience	How can we organise our information into big categories for our whole presentation? How can we use sound, images and print to convey our information to others on each hypercard? What parts of cards can be hyperlinked to other cards for others to explore? Why those parts?

6.2.5 Component five : the abilities of students to construct meaning through shared cognition

The study found that learning patterns in the classroom were altered by the influences of links between occurrences of meaningful shared cognition, the demands of the learning experiences, and the dynamics of cooperative learning activity. These links increased the active engagement of students (Brown and Ryba, 1996).

Observations early in the first phase of the study, of students working together without direct contact with the class teacher, indicated few and brief incidences of shared cognition and a preponderance of "surface" comment (5.2.1, Table 5.1).

When hypertextual activity was introduced, more substantial episodes of shared cognition were evident throughout all observations including the activity in phase one of the study before the setting up of the micro learning environment (5.2.4). This was because the design of the learning experiences demanded this social and cognitive engagement.

As noted in Chapter Five, incidences of shared cognition varied in nature, depth and success (5.4.7). Like metacognition there appeared to be a hierarchy of ability depending on the situation. Situations could involve actions to be taken, such as the design of a presentation, or co-construction of meaning such as the interpretation of a text, where in-depth language processing was needed to get shared meaning.

Where these cognitive processes challenged students was in the linguistic and cooperative constraints imposed on them. They needed to be able to use the language of clarification, negotiation, and compromise in order to construct shared meanings : as L said “(you have to) think of how to do it, how to argue, how to make an agreement” (5.4.3, 6a). Despite its intuitive nature, some of the episodes of shared cognition were inspiring, especially when meaning rather than action was being processed and negotiated (for example 5.2.4., RP and CA; 5.4.1, MM and M/AG).

It was clear that the students in the study were only beginning to discover strategies for interactions of this nature; for example there were no instances of students saying to others, “I don’t understand that, tell me in a different way”, the kind of talk that would enable sustained and deep-level interaction.

It would have been useful for these students to examine shared cognitive processes thoroughly in discussion with the teacher, and especially in relation to questioning and dialogue processes - how did they negotiate shared meanings? Some of the useful communicative strategies could be made explicit. It would almost certainly impact on class talk as a whole (Fisher, 1997; Lave and Wenger, 1991).

6.2.6 Component six : The potential of reflection to act as a catalyst for the acquisition of a metalanguage for hypertext and for learning in general

The study found that reflection is critical to ongoing learning and the development of deeper level cognitive processing, more by omission than by explicit demonstration. Students’ capacities for reflection did develop over the duration of the study and it is clear that this was an effect of the micro environment. At the end of the study it was

clear that students' reflections on learning had more depth and they knew more about information gathering and presenting processes (5.4.5; 3, 5c, 6a, 6b, 7). They had acquired considerably more of the "metalanguage" of hypertext than anticipated when called upon to define terms (5.4.5; 5b).

There were some instances of reflection observed in the final phase of the study, compared to no instances in the initial observations. At the end of the study, interview results indicated that students would be receptive to discussions which centred reflection round the use of terminology of hypertext as a means of describing, analysing and evaluating experience (5.4.5, 5c), indicating that their reflective capacities had grown.

Discussion of the above six components has shown that, in this study, classroom organisations and learning patterns definitely influenced students' acquisition of information literacy generally and with respect to hypertext in particular. In all the component areas described and discussed above positive changes in learning patterns were evident and these can be directly related back to the establishment of the socially-interactive, reflective hypertext-enhanced learning environment in the second and third phases of the study.

6.3 How students' perceptions of learning and information literacy affect cooperative interactions with hypertext

Research question 2 : What perceptions of learning and information literacy do students have and what bearing might these perceptions have on their work with hypertext?

Information from the first phase of the research provided several general indicators of students' perceptions of learning and information literacy (5.2.2). The final interview showed some changes in these perceptions and suggested that students' experiences with hypertext had enhanced their perceptions of information literacy and learning.

Initial perceptions :

Students appeared to understand that learning with others could be helpful (5.2.2; 3a and 3c) but articulated little insight into the ways that speaking, listening reading, writing, viewing and presenting (language modes) helped them to learn or how language helped them to learn with others (5.2.2; 4a, 4b, 4c, 4d). Most students were unsure of what “thinking skills” were (5.2.2; 5a and 5b), and had no specific approach to problem solving in their learning (5.2.2; 7). No students had heard of the term “hypertext” although just under half of those interviewed had used hypertext in some form such as internet (5.2.2; 8b).

Students indicated little understanding about the metalevel of learning; for example when asked how reading and writing helped them to learn, over half of the students responded “because it teaches me big/new words” or “because it teaches me spelling” (5.2.2; 4c and 4d). This surface level thinking was reflected in the dearth of “wondering”-type statements observed throughout the study : often real opportunities for real inquiry would occur and students were unaware of these because they were so keen to “get it done”.

There was a generally “closed” attitude which equated learning with getting a task done, getting approval (or “good marks”) for it, and emphasis on surface features such as presentation and “getting it right” and this was evident throughout the initial interview.

Students were not aware of stages in the research process, and their responses indicated concepts of information literacy that emphasised a “good” product and “meeting standards” (5.2.2; 6a and 6b).

The effects of these perceptions on the students’ work with hypertext were that they often demonstrated rigid attitudes about product-focused expectations of learning, and approaches to accessing and processing text that were based on their experiences of linear models of text. Further, they were often hampered by lack of experience in using language to discuss text and text meanings (for example 5.2.4, T and D).

Throughout the second and third phases of the study, the modelling and explicit use of text features and functions of hypertext was the focus. Because students were immersed and engaged in the learning environment they began to acquire some understanding of this text type through experiences and discussion. Some students began to use specific terminology to communicate about hypertexts and all students began to internalise

concepts of hypertext through ideas of form, function and use. These specific experiences appeared to add substance to students' general perceptions about information literacy learning, and to reflect more fully on this as evidenced by the final interviews (5.4.5).

Later perceptions :

Because the learning experiences set up by the researcher deliberately followed an information-processing model (Gawith, 1987), and focused on explicit discussion of features of hypertext in order to access and present information, learning arrangements and activities challenged students' shared thinking and problem-solving.

One effect of this challenge was that there were some evident shifts in perceptions of information literacy learning when students were interviewed at the end of the study. Effects of shifts in perception were evident in students' responses to questions about hypertext : they were able to comment confidently on the benefits of hypertext for their information literacy work in terms of functions and use of text features, and some students made distinctions between features of hypertext and linear text (5.4.5; 5c). All students interviewed were able to comment on some of the characteristics and some of the functions of hypertext (5.4.5; 5a) and were able to name and describe some of the terminology of hypertext (5.4.5; 5b).

Students' responses to questions about working together were fuller and they articulated some clear strategies for working together successfully (5.4.5; 2a, 2b, and 2c). Students named some cognitive actions when questioned about "thinking skills" and were generally more definite in their responses (5.4.5; 6a). They also responded more fully to questioning about information literacy (5.4.5; 3) and referred to many issues and stages of the research process. They were also aware that there were many aspects to cooperative problem-solving that assisted learning (5.4.5; 4b).

The study found that students' perceptions of learning and information literacy definitely changed over the period of the study, and students' work with hypertext had a carryover effect on perceptions about learning in general.

It can be concluded that the evidence of the study supports the idea that students need to

- be able to use text as tools for deep learning (Leu, 1996)

- be able to use the specialised terminology of hypertexts to communicate effectively about the text type, in order to access, process and present,
- be able to “stand above” the text in order to be able to manipulate its structural features (Tunmer et al., 1988).

6.4 Key features of access to hypertext

Research question 3 : What are key features of literate activity where hypertext is a learning context?

Because hypertext is an entirely new text type (2.6.5) the purpose of identifying literate activity is an important one for future teaching practice : teachers need to know about structural and language features of text types and genre in order to provide appropriate literacy acquisition experiences for students. Three main areas were monitored closely. These areas were : accessing hypertext to search for information, processing hypertext, and constructing hypertext.

6.4.1 : Accessing hypertext

The study found that students need clear strategies for accessing hypertext and that these strategies should be informed by consistent reflection on hypertextual structures.

Initial experiences of students accessing hypertext through CD-ROM encyclopedias indicated that they had no consistent strategies for operating on text of this type and that they were unused to taking risks and problem-solving to devise access strategies (5.2.4). It was evident that many students approached the text with the assumption that hypertext was structured like linear text and they approached their search in a literal manner, for example treating the index file as the only source of information.

The development of hypertextual strategies in the second phase of the study resulted in a marked reduction of time and increase in facility in locating articles, so that students spent most time focusing on the information of particular articles (5.3). Key literate activity centred around having a clear purpose for their general search, and knowing what to do and where to go for most effective access. This was established through semantic

mapping of the topic and recording clear questions for investigation, and the search plan helped students by bringing together the search questions and the search tools, allowing students to check possibilities and record a plan for reference.

Most students did not really move much beyond these activities during the study but some began to become aware of other aspects such as the need for alternative strategies if searches were unsuccessful. Some also began to realise that hyperlinks had a particular function and strategic use in information searches (5.4.1, RP and MK; NB and NH.).

The scope of the study did not allow for deliberate introduction of strategies and reflection beyond the initial search strategies, and the researcher had to work from her assessment of where students were at in their development, but it was clear that this would be a critical step towards deeper learning.

It would have been beyond this initial searching stage that deeper-level learning about the nature of the general text structure of the encyclopedias could have taken place. For example, understandings such as the need to think expansively throughout the search because of the referential nature of the text, and the semantic confusions that can arise because of the structure of the text, could have been explicitly explored and discussed.

6.4.2 : Processing hypertext

The study found that focused reciprocal processes assist students to process hypertext more effectively, provided that there is a sound base of competence in processing oral written and visual text.

Initial observations indicated that students had few strategies for processing hypertext effectively (5.2.4). Again many students approached the task from a linear perspective. They tended to look at visual information first, but only in a superficial manner, without making connections to their search, another indication of a print-based “mindset”. They also tended to browse the print and copy out text word for word in chunks.

The second phase of the study implemented a reciprocal strategy for systematic close “reading” of hypertext (5.3.1b). This strategy expected discussion of visual and aural information, skimming, scanning and discussion of print, and verbal summaries of information before recording in note form. The strategy also encouraged the exploration

of relevant hyperlinks within the text, and the use of a retrieval chart incorporated in the search plan sheet.

Literate activity was enhanced through the use of this strategy which gave systematic support to searching for information within articles. Students' activity was more purposeful and usually more fruitful with this support, therefore there was more ease and speed in the location of specific information. Most importantly, some students' dialogue began to focus more on meaning than action (5.4.1, MM and M/AG; 5.4.2, MM and H) which meant that patterns of shared cognition to construct deeper meaning were developing.

Issues arose from this reciprocal process which was helpful but not particularly sufficient.

The first issue was that effective separate strategies for decoding oral, written and visual texts underpinned the reciprocal strategy - the strategy really only gave a superficial structure for assuring that the different sources of information were covered.

The students in the study were not experienced in this area and needed more explicit and ongoing experience in "reading" texts in each mode. Opportunities for teacher scaffolding of language processing were apparent and critical to students' real comprehension of texts (for example 5.4.2, MM and H where the "dense" text needed collaborative "translation"). The importance of basic ability to decode and get meaning from texts in all three language modes was very obviously critical to literate activity with hypertext.

A second issue was the difficulty associated with drawing together information from diverse sources to create a coherent collaborative interpretation.

This was one of the keys to effective use of hypertext. As well as actually locating relevant information, students needed to be able to recompose information in their own words, to learn to negotiate language to express their joint interpretation as exactly as possible. The retrieval chart gave a visual organisation for assembling a joint interpretation but the students needed more - practice and strategies for constructing meanings. So, ability to initiate meanings, question, clarify and elaborate were all critical to this processing. The reciprocal strategy trialled didn't really help students to process text at a deep level in the time given but certainly equipped them with the beginnings of strategic ways of working on hypertext.

6.4.3 : Constructing hypertext

The study found that some general principles of text construction applied to literate activity with hypertext and that more research is needed to develop a sound basis for teaching practice in this area. The findings also show that hypertext authoring was an essential element in developing students' understanding of the structural features of hypertext, through the direct and experiential nature of the authoring process (Mason, 1996) and the notion of student "ownership" (Graves, 1983).

Expressive and receptive language processes such as "reading" and constructing hypertext are reciprocal. It was hoped that this principle would be borne out in the construction of hypertexts in the study, however it was more implicit than explicit in the dialogues and actions of students. Important literate behaviours for students constructing hypertext involved two areas.

The first area related to understanding of text type. How is our whole text structured? How can it be linked across stacks so that discrete conceptual elements can be developed? How can we connect these separate parts of the whole to replicate and practise schematic "chunking".

It was important that students got a visual sense for overall hypertext structures at the onset of presenting one of these texts jointly. Students were quick to grasp some of the important construction features of hypertext when they planned their whole text together with the researcher. This was done with cards representing the hypercard stacks, and string to represent the relationships between the basic structure so that students had a visual representation of the overall basic structure. The students who later made hyperlinks on this plan were able to justify their links conceptually thereby indicating understanding of the function of the links (5.4.3).

Although the study was not able to complete this area in depth, interview responses - (5.4.3) such as "when we did the bees we had stacks instead of pages and they all went behind each other on the plan but when we joined them up we could jump over some of them and on the computer too" - indicated an increasing understanding of the nature of hypertext structure. This student was also making links over to the already-authored hypertexts that she had used because she went on to say "On the encyclopedia we could

find “related articles” quickly, also the hotlinks”, indicating that she was comparing text features.

The second area of literate activity with hypertext related to single card construction. How can we plan our card to represent information as clearly as possible, using sound, print, and visual information? As we author the card what changes may be needed? What bearing does the information on our card have to other cards? Is it in the best place in the stack?

Students became increasingly confident with the authoring tools needed to make each card so that they began to evaluate and adjust planned text as they went, focusing more on conveying meaning through the impact and relationship of verbal and visual features than on the mechanics of construction. Students needed to be able to plan components of each card with regard to its part in the whole text, and needed to use the construction tools quickly, evaluating and editing as they went especially in terms of spatial relationships.

The students in the study needed more time to practice and reflect upon the structural features of their presentations (and the researcher wished that there had been more time for this), but it was evident that most students had acquired some basic ideas and knowledge about the features and functions of hypertext (5.4.3, 5a, 5b, 5c.). They were also beginning to use terminology in order to communicate about activity with hypertext. Had more time been available it would have been useful to deliberately compare linear text with hypertext in discussion.

To conclude, the key features of literate activity with hypertext discussed above would provide a starting point for teachers and for further investigation into this topic.

6.5 Strategies for scaffolding when hypertext is a medium for learning

Research question 4 : What interactive teaching strategies are effective for successful scaffolding of learning experiences when students are using hypertext?

The study found that the following six strategies were effective in supporting students' learning.

6.5.1 Strategy one : a sound organisation for ensuring a range of student "expertise"

This aspect is discussed in 6.2.1. It could be added here that, as in the study, organising for "training" experts could be systematically integrated into classroom information literacy programmes in the form of contextualised "mini lessons" over a period of time. There could be ongoing assessment of the increase of text awareness, so that appropriate higher order operations could be developed as learning goals. It would also be important to observe and experiment with the challenges of group numbers working effectively : as noted (5.4.2; L, MK and T), there appeared to be significant differences in dynamics in the one group of three that was observed. This strategy is an important foundation to successful experience with hypertext.

6.5.2 Strategy two : teacher modelling of text access and construction

The researcher, acting as a participant observer, used interactive modelling strategies to make text features of hypertext explicit (5.3.1a, 5.3.1b, and 5.3.1c). These strategies were important in helping students access, process and present hypertext, and introduced them to explicit terminology and functions of hypertext. Observations indicated that students had grasped enough essential experience from the modelling of this type of text to achieve some successful learning (5.4.1 and 5.4.2). However there was little opportunity to model some of the cognitive processes that could have further intensified learning. Students would have benefitted greatly from planned modelling strategies that questioned text and text structure in depth, and just plain "wondered" with curiosity : these strategies would have helped counter students' perceptions of learning as "doing" a topic, and opened up the creative, exploratory, motivational areas of learning which are a feature of teacher-independent learners (De Corte, 1990; Daiute and Morse, 1994).

6.5.3 Strategy three : teacher acting as cognitive coach

The researcher, as a participant observer, intervened to support students as necessary (Table 5.2; 5.4.4). The interactive language used by the researcher acted as a model of strategic work on text that arose out of the learning experiences. These interventions were of particular benefit to students because they took them well into their individual proximal zone of learning (for example, 5.4.2; MM and H), and directly supported their understandings about processing hypertext. This strategy is a very necessary element of successful scaffolding of hypertextual experience (De Corte, 1990; Mercer, 1993).

6.5.4 Strategy four : active development of interactive cognitive processes

Students developed in this area in relation to accessing, processing and presenting hypertext and many episodes of shared cognition were observed. However this was an area that could have been further deepened by the more effective use of the language of making and negotiating meaning : many students used simple intuition in negotiating meaning but there was no evidence that students “knew about” how to use the different oral language functions to systematically construct meaning. There was little questioning of each others’ talk or of the texts, and little conscious ability to summarise, clarify, describe or explain in order to construct joint meanings (see also 6.2.5).. As stated repeatedly throughout the study, the importance of this strategy to the development the “intellectual collective” of the learning community is critical (Ryba, Selby and Kruger, 1999)

6.5.5 Strategy five : deliberate establishment of simple reflective frameworks

Reflection was deliberately built into the episodes in a very simple manner by the question “what did you learn?” because the students were unused to reflecting. Few responses went beyond surface thinking (5.2.5; The nature of learning). There was evidence that students did reflect as they worked (for example 5.4.2; L MK and T) but this was rarely articulated. This area should have been developed in a more systematic manner by the researcher but the time needed to facilitate deeper level reflection was beyond the scope of the study. The interview responses (5.4.5) suggested that students were able to reflect on their experiences with a greater degree of insight than in the initial

interview and it was clear to the researcher that deeper reflection would have been an ultimate vehicle for internalising understandings about hypertext. A series of model questions for developing this type of reflection would be a useful extension to this study.

6.5.6 Strategy six : use of retrieval and planning frames

This strategy was very successful in the study. Students were able to record findings and planning in a guided manner which reminded them of the components of their tasks and provided visual and cognitive props for later reference (4.5; 7, 8, 9, 10). These frames also provided representations of overall text structures, visual information organisers, and assessment evidence. This type of support is essential for effective literacy acquisition (Morris, 1986; Labbo, 1996) and this strategy is considered essential for successful scaffolding of students' learning with hypertext.

6.6 : Conclusion

This chapter has presented an interpretation of the findings of the study with respect to the separate questions that underpinned the research activity. It was deemed important to deal with each question separately to present findings specific to each question however it is important to reiterate the integrated nature of the findings.

The integral relationship between the research questions was borne out during the study by the emergence of several themes that enabled the researcher to summarise findings at the end of each section of the research and there is a certain amount of overlap throughout the sections of this chapter.

These findings are important in developing understandings of the way in which these new interactive hypertexts act as "bridges" to literacy (Daiute and Morse, 1994), through their unique possibilities to facilitate students' active meaning-making of symbols and print.

Using the analysis in this chapter as baseline information, a response to the main objective of the research will be summarised in the next chapter in order to conclude the study.

Chapter Seven : Conclusion

Researcher : What do you think now about hypertext helping you to find and present information?

Marc : Fun, but hard to get the hang of it if you really get stuck. It's a bit useful. Also it was very educating. It's very good if you can teach other people it.

7.1 Introduction

In this chapter, many of the key points raised by the discussion of the four research questions in the previous chapter are synthesised in an attempt to identify implications for teaching and learning. This process also serves to evaluate the effectiveness of this study in meeting the research aim.

Finally, general successes and limitations in meeting the research aim are discussed, some recommendations for research are made, and a final summing up closes this study.

7.2 Meeting the main research aim - implications for teaching and learning

The research aim was : *to identify implications for teaching and learning with hypertext in relation to information literacy acquisition.*

Becoming information literate involves the ongoing acquisition of effective strategies for interacting with a variety of text to select, retrieve, analyse, synthesise, interpret and communicate information (*English in the New Zealand Curriculum*, 1994 : 7). To become “hypertextually” literate implies that students will develop this general strategic efficacy in relation to the specific non-linear linguistic features and demands of hypertext.

This study has contributed to an understanding of the contexts and teaching strategies which are needed to provide conditions that nurture successful information literacy where hypertext is used. Implications for teaching and learning with hypertext are discussed in the following sub-sections.

7.2.1 Implication one : A socially-interactive , reflective learning environment is a critical quality factor in students' learning about hypertext. The study gave evidence that successful work with hypertext must be precluded by the necessity for generally

sound conditions for learning with the establishment of a socially-interactive, reflective learning environment (Leu, 1997).

For teachers it is important to set up and maintain the conditions of this type of environment in a manner that reflects theory and their own thinking (Brown, 1998). For students it is crucial to acquire strong cognitive, metacognitive, and social skills in order to get and convey meaning related to information. Therefore a sound balanced English programme which focuses on essential processes and functions related to oral, written and visual texts is an essential pre- and co-requisite to the development of information literacy where hypertext is used.

The researcher believes, on the basis of these results, that the most potent indicator of any processes in action is the talk of students (Fisher, 1997). The study gives ample evidence that the ability to articulate one's own ideas and questions, and to interact confidently and effectually to negotiate meanings through explaining, describing, disagreeing, speculating, recounting, elaborating and a host of other functions of talk, is critical to quality of learning in a truly socially-interactive learning environment. The ability to stand back both from texts and one's own learning processes and discuss these with reflective insight is also critical to quality of learning. Students need to gain experience and gain skills in being "reflective practitioners" (Ryba, Selby and Kruger, 1999).

This clearly implies the importance of assessment of talk in new ways : ways that examine the nature and frequency of different types of talk and the ways in which that talk assists students to jointly construct meaning. This information can then lead to appropriate focuses for helping students "know about talk" through teachers' modelling, demonstration and deconstructions of types and purposes for talk (Mercer and Fisher, 1997). The analysed transcripts from the study revealed enlightening and substantive evidence of students' needs in these areas. A similar modified assessment procedure could be useful in classrooms. These considerations, based on the findings of the study, will assist teachers to develop students' awareness of and use of a language for thinking that is used regularly for communication within the community of learners.

In hypertext environments the same broad principles above apply, as demonstrated by the strengths and shortcomings highlighted in the study. Specific processes to be developed relate to the nature and form of the text type, and the next section attempts to determine these implications further.

7.2.2 Teachers and students need to make shifts in the way they process text when interacting with hypertext. The study attempted to approach the use of hypertext in a manner that was experimental but based on knowledge of non-linear text structures and a conviction about the importance of strategic approaches to text. The study indicates that these two factors are indeed critical to student learning.

The detail of this implication is, firstly, that teachers approach hypertext use in a manner that reflects the unique and dynamic structural features of this text type. They should accord this text type an equal place in their instructional programmes with the linear text genre which are so comprehensively developed in many New Zealand primary schools. For teachers accustomed to working strategically with students on texts, appropriate strategies will arise very naturally out of the interactions between teacher and students, as this writer found. Again it must be reiterated that the quality of this strategic work, as with linear text, will correlate directly with the quality of understanding the teacher holds about the text type. The following table makes explicit some of the contrasts that the researcher believes could be further developed to inform teaching practice.

Table 7.1 Differences between traditional literacy and dynamic hypertextual literacy

Traditional literacy	Dynamic hypertextual literacy
<ul style="list-style-type: none">• Based on linear text genre, print usually predominates	<ul style="list-style-type: none">• Based on a complexity of oral written and visual texts integrated within a single information node; relationships between content components of hypertexts are immediately accessible through formed linkages
<ul style="list-style-type: none">• Whole text access is organised in a sequenced list-like index-based fashion	<ul style="list-style-type: none">• Whole text access necessitates generation of own “possible index” through search terms and selective navigating of hypertextual links and nodes. The possibility for disorientation is high because of the limitless and dynamic outwards-radiating nature of hypertexts
<ul style="list-style-type: none">• Chunks of text require linear processing and readers must reorder information from a linear accumulation of information to get deep meaning	<ul style="list-style-type: none">• Nodes of information are multi modal and require intensive oral visual and print processing, then synthesis of information to construct an interpretation.
<ul style="list-style-type: none">• Linear texts are static and finite; processing related information must be generated outside the text itself	<ul style="list-style-type: none">• Hypertexts are responsive to readers’ directions and are therefore more prone to access issues.
<ul style="list-style-type: none">• Construction of text usually requires sequenced linear planning structures and confines thinking to linear models of text	<ul style="list-style-type: none">• Construction of hypertext content requires conceptualisation <u>across</u> expansively-structured chunks of text (nodes)
	<ul style="list-style-type: none">• Redefines and transforms what it means to know and to understand

Secondly, some information and strategic cues for work with hypertext should be developed and published as guidelines for teachers to think about and apply in their own practice. Models of language such as questions containing and developing conceptual material about the terminology and conventions of hypertext could be devised to assist teachers with their own thinking : this has been carried out for linear text genre in Ministry of Education publications (*The Learner as a Reader*, 1996; *Exploring Language*, 1996), and there are numerous other books containing content information about the structural properties and language features of linear texts. Such published information could be used as part of the professional development necessary to promote an entirely new and increasingly common globally-available text type.

7.2.3 Implication three : Teachers must have knowledge of structural features of hypertexts used in classroom programmes in order to effectively scaffold student information literacy acquisition. The literature review of this study stressed the importance of awareness about the profound differences between linear and non-linear

texts and the way of thinking each text type requires. The study itself confirmed this by showing that the way in which many students approached the hypertext structures was from their own experience with linear texts, for example many students scrolled down the alphabetical index of the CD-ROM encyclopedia instead of entering a search term. This had the effect of limiting them both from the locating aspect and from the processing aspect (for example 5.2.4, T and D).

When locating “chunks” of information - in this case articles on CDROM - the students were far quicker and far clearer about their intentions when they understood something of the organisation of the whole text, the CDROM encyclopedia, and had carefully planned a search strategy that took into account the structural features and tools of the hypertext. When trying to extract information from a “chunk”, students found it difficult to integrate the multiple sources of information, to synthesise meanings in relation to their questions, even with the trial reciprocal strategy to assist them. So, orientation within the micro environment of the programme was a critical feature in relation to cognitive loading and action.

This clearly implies that students need flexible strategies for navigating hypertext and, to assist them in this, teachers need to analyse the textual demands of their particular non-linear sources of information and devise strategies for their use, including the use of visual plans for access. Just as the “balanced language programme” contains a range of scaffolded approaches, including guided and reciprocal reading, to help students become fluent readers of linear texts, so too should be developed some modifications for helping students become fluent “readers” of hypertext. The processes trialled in this study yielded some interesting information indicating their usefulness, but need more development.

It should also be noted here that the complementary natures of the deconstruction and construction of text were clearly applicable to hypertext use. Students’ spatial and visual awareness, and use and articulation of conventions of hypertext grew markedly as the study progressed (see 5.4.2 MM and H, and L, MK and T for examples of this). So it is important to link these areas, just as they are already linked in linear texts by teachers.

7.2.4 Implication four : Authoring of hypertexts should be promoted in order to provide students with a personalised “bridge” into understanding more complex hypertexts such as Internet. The study powerfully demonstrated the principle of “ownership” in authoring, where students adapted quickly to the new environments and were able to discuss and manipulate many of the structural features of their own hypertexts with very little experience, for example see 5.4.1, KT/W and MR, and also NB and NH..

The implication that this point raises is that hypertext authoring should be an important basis for students developing textual understandings in the security of the construction processes and using content they have generated themselves. This should be an important consideration for long term development of hypertextual thinking in classrooms.

A further aspect of this implication is that students’ metalinguistic abilities would be further enhanced in relation to construction of hypertexts where teachers enable them to reflect fully on a range of processes. This study has indicated some limits in student learning where deliberate reflection has not developed. Reflective activity should include the process itself (how the construction is carried out including making the hyperlinks explicit and justifying them), the product or content (what goes into it, and where, and when, and justifying these decisions), and the use of terminology to convey ideas, actions and meanings. Again teachers need to have knowledge of the specific features of hypertext and their effects, in order to facilitate students’ deeper reflections.

7.2.5 Implication five : Teachers need to design learning opportunities for students to reflect on and use the language of hypertext. The study attempted to give opportunities for students to acquire terminology and conceptual knowledge of hypertext structures and conventions through their own experience and endeavours as well as through instructional scaffolding by more expert others.

It was evident that students did acquire a degree of ability to discuss and use specific structures and conventions of hypertext during the study because the researcher, acting as a participant, was able to model and foster the use of this terminology in both

instructional and intervention situations, and so the students began to use it as part of their language processing of the texts. The students in the study were unused to working in this manner and did not develop thinking in depth in this area, however the writer also questions the developmental readiness of some students of these ages to think in depth about text (5.2.4, ST and MV).

Implications for teaching and learning from this evidence are that the conscious design of learning experiences to include this aspect of text processing is very important for students' ability to think and communicate about hypertext because it gives them a "meta-language" for use when discussing and describing hypertexts, and a linguistic and conceptual schema for applying to analysis and reflection of hypertexts. Again, teachers themselves are most able to facilitate this type of learning experience when they themselves have direct knowledge of hypertext terminology and ability to apply that knowledge in these areas. Explicit teaching of text features and functions in context is essential for students' higher order thinking development and the study indicates that this is an area that needs further monitoring and research.

7.3 Meeting the aim of the research : successes, limitations, and implications for theory and research

As with any project there were high points and low points. Evaluation of these assists the identification of implications for theory and research, some of which have been outlined above. All four subsidiary aims were well achieved to the degrees discussed in Chapter Six, as was the main aim which has been discussed above.

7.3.1 Ecological perspective The research was designed to investigate the potential uses of hypertexts in teaching and learning of information literacy, and sought to develop the inquiry in an authentic classroom situation. This design very aptly captured the ecological nature of the study through its progressive focus on the existing community of learners, then on the creation of "new" conditions for learning based on "master and apprentice" and legitimate peripheral participation concepts, then on the operation of the "new" community and its potential for future learning (Lave and Wenger, 1991). The clarity of

the research design model provided disciplined boundaries to operate within and held the researcher to account in the areas of coherence, flexibility, and current practice.

An ecological theoretical research perspective proved most satisfying in terms of its suitability for use in a New Zealand learner-centred classroom. The researcher recommends this focus on the analysis of socio dialogical processes especially socially shared cognitions as a way of achieving clarity of understanding of phenomena within a complex, multi-faceted and dynamic learning environment.

7.3.2 Data collection The contextualised nature of the research required intensive attention to a multiplicity of detail about the learning environment and a very demanding transcription process for collecting oral language interactions but the end result was a very impressive and satisfying abundance of authentic and immediate evidence to draw on.

The method of collecting interactions for analysis was a particularly interesting and effective one because it clearly orally and visually tracked the actions, the spoken language itself and the relationship between the speakers and their speech. The insights gained from the analysis of social interaction and shared cognition were very clear and substantial.

In addition, being able to combine the evidence from the transcripts of oral language, the interviews, and the observations, in order to “triangulate” evidence was a most fascinating experience, like doing a sophisticated jigsaw puzzle which fitted together so well. The confidence in substance of evidence gained from the “triangulation” process was considerable.

7.3.3 Role of the teacher A main limitation of the study was the actual involvement of the class teacher who became so busy with extra corporate duties such as trainee teachers and the school concert that, although he was interviewed at the end of the study it was deemed appropriate not to press him for more intensive contributions to the evidence (Appendix C, Item 4). He remained interested and fully supportive of the activity

throughout and said that he thought it had been of benefit to the students. He also appeared to enjoy the development of the various learning experiences. His full perspective would have been of use in substantiation of other sources of evidence, especially in the light of the importance of the role of the teacher stressed throughout this study.

On the other hand the researcher, immersed in activity as a participant observer, had many opportunities to further experience mentoring and facilitative teacher roles. These experiences strongly bore out the assertions made by Brown (1998 : 7-9) about the types of teacher knowledge needed, and the “skilled craftsperson” and “creative artist” roles he discusses.

7.3.4 Software decisions Another limitation of this study related to the software used. The researcher thought that the use of the software Kid Pix (TM) for the initial authoring experiences would be a suitable scaffold into the hypertext software Hyperstudio (TM), but in retrospect it would have been better to go straight into using Hyperstudio (TM) because the students would have coped well with the new medium and would have had more opportunities than they did to acquire a working knowledge of hypertext. Further to this the use of only two CDROM encyclopedias could have been extended, because it was significant to note the ease and confidence with which students carried over their newly-acquired expertise in navigation into the second CDROM which was not introduced until the final hypertext project.

7.3.5 Students Working with young students and becoming a part of their classroom community for several weeks was a most fulfilling experience, and the positive relationships which developed with the students was one of the highlights of the undertaking. The interest the students showed in the project, the desire to participate, the fun we had, and the sheer hard work they put into the development of an “intellectual collective” was most gratifying and exciting to the researcher, as was the development in their learning that occurred over the period of the study. The actual records of “live” interactions are included in the appendix to this study as an acknowledgement of the importance of the students’ “voices” : research that involves direct work with young

students must surely be one of the most gripping, precarious and rewarding areas of educational inquiry.

7.3.6 Length of the study This study could perhaps have been longer than it was although it is debatable how much more evidence would have been needed in any area to come to stronger conclusions in the particular setting. In the researcher's opinion the most fruitful scenario for this kind of study would be an action research setting where the optimal conditions for learning (in particular the reflective processes and awareness of the information handling processes) were already established, and the teacher would also be the researcher and fully able to make decisions about the whole learning environment.

7.3.6 Reflections During the course of the writing of the study, the researcher read an account of an ethnographic study that involved students working in digital environments both as a focus of their inquiry and as the means of recording and processing and creating the research study. As a result of this process a kind of blending of the two seemed to take place, creating a literally vibrating, moving, new perspective on research : the ethnography became alive and dynamic through the interactions of the researcher, participants, and information and communication technologies (Goldman-Segal, 1998). Such an undertaking here in New Zealand seems a possible, and very convincing, way of entering into research such as the present study. The researcher has a small regret that she was not able to employ similar ways of managing this study but realises the time was not right in this case.

The study has never pretended to produce a set of uniform expectations about information literacy and hypertext simply because the setting was (and any such setting always would be) a unique set of circumstances. However it is hoped that the example of this case, this set of circumstances, and the general recommendations for practice that have arisen, may help others with their quest for optimal conditions for teaching and learning.

7.4 Recommendations for best practice and research

The findings of the study inform the following recommendations for teaching practice and for research : this study attempted a global perspective on a huge area, and many sub-areas of the study are worthy of their own development by researchers.

- Teachers should establish general and hypertextual information literacy learning environments that are strongly socially interactive (with a focus on developing oral language for thinking), reflective, and that also allow opportunities for teacher scaffolded instruction.
- Teachers should build a firm base of expertise in different areas of hypertext use and application in order to increase and enrich the intellectual potential of their class, then combine and mix expertise so that shared ability to process the complexities of hypertext is maximised.
- Teachers should acquire knowledge of terminology, linguistic and structural features of hypertext, and experience in accessing and authoring hypertext, in order to develop their own “language for thinking” about hypertext, and so that they can appropriately guide students’ ongoing acquisition of dynamic hypertextual literacy.
- Teachers should capitalise on the immediacy and clarity for students, of their own hypertextual authoring processes in order to make conceptual links into more complex hypertexts such as the Internet.
- All Ministry of Education initiatives related to literacy should recognise hypertext equally with traditional texts – it is the text of the future and it is here now.

7.5 Final comments

It would be easy to end this study on a note of doubt because it is patently clear that issues abound within this chosen topic.

- “Schools Left Far Behind” cries the Herald editorial of August 8, 1998, in relation to a just-published report about information problem solving in four schools, and there are a host of similar headlines.
- (New Zealand) students at both year four and eight had “less success when task components required some ingenuity, flexibility or persistence to find appropriate search keywords or search routes... performed distinctly less well when asked to

interpret or summarise information...had difficulty identifying and setting aside relevant information and ... difficulty developing categories which fitted the information well" (Ministry

- of Education, 1998 : 4 and 5)
- The recently published Report of the Literacy Taskforce contains no mention of literacies beyond a traditional view that nine year old students must be able to "read and write for success" (1999 : 3).

But this researcher prefers a positive view. Although writing this thesis has often felt like being lost in the cyberspace of a living hypertext, with all its "criss-crossing of (educational) landscapes", the clarity of the main findings has simplified the whole undertaking. The main title of this study - "*New Bridges to New Literacies*" - is symbolic of the radical and dynamic ways in which new interactive, non-linear texts are transforming views of learning and teaching. Throughout this thesis the researcher has tried to be true to her belief that informed teachers' practical everyday approaches ("bridges") to information literacy acquisition in their classroom will become transformed in order to "bridge" students' active engagement with these new texts.

The spread of ideas may seem slow beside the pace of technological change, but it will happen, and keep happening. The bridge metaphor can be extended further because it symbolises many things.

It symbolises the capacity of strong New Zealand teachers to generate innovative approaches to literacy learning using new interactive hypertexts. In one sense these teachers are the "bridge" and their adaptive practice and networking is critical to future teaching and learning in New Zealand.

In another sense the interactive hypertexts are the bridge because of their dynamic, responsive and mediating powers which are so conducive to supporting and motivating socially constructed literacy learning.

And in another sense our students are the bridge because they provide the life of learning and they show us the straight way across the water of doubt through their faces and voices and actions.

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Appendix A

- Item 1 Informed consent form
- Item 2 Information sheet for participants and substitute consent givers
- Item 3 Workplan for implementation of research activity
- Item 4 Interview questionnaire (students)
- Item 5 Interview questionnaire (teacher)
- Item 6 Observation format (whole class)
- Item 7 Tracking sheet – hypertext observations
- Item 8 Retrieval chart 1 (used with hypertext activity in phase one)
- Item 9 Transcripts (hypertext observations in phase one)

Consent Form

This consent form will be kept in a secure location at the Auckland College of Education for a period of 3 years.

Title of Project : *New Bridges to New Literacies*

Reasearcher : Jackie Mason

I have read an explanation of the research project and have been invited to hear an explanation and to ask questions of the researcher.

I give permission for (child's name) to participate in the project and understand that he/she may withdraw from the project at any time.

Signature :

Relationship to the participant :.....
(e.g. father, caregiver etc.)

Date :

Consent Form

This consent form will be kept in a secure location at the Auckland College of Education for a period of 3 years.

Title of Project : *New Bridges to New Literacies*

Researcher : Jackie Mason

I have read an explanation of the research project and have been invited to hear an explanation and ask questions of the researcher.

I understand the purposes of the research and give permission for observations of my participation to be recorded. I understand that I can withdraw from the research project at any stage.

I agree to take part in this research.

Signed :

Name :

Date :

Appendix A, Item 2

Information Sheet

Dear Parents and Caregivers of children in _____ class,
My name is Jackie Mason and I am a student at Massey University. I am doing some research for my M.Ed. degree and will be working in _____ class for the next 9 weeks to get information for my study. I also work at the Auckland College of Education as a Senior Lecturer in the Centre for Language and Languages. Before that I was a primary school teacher for 17 years. I live in Beachhaven.
My study is about children's learning and how text on computers influences this. I have described it below. I will also meet with anyone who wants to know more about the study at a time advised by Mr. _____
I need your permission to observe and work with the children. Please will you return the attached consent form to school as soon as possible.
Many thanks, Jackie Mason.

Title of Study : *New Bridges to New Literacies*

The study will look at how the use of hypertext (such as CDRom encyclopedias) on computers contributes to literacy development and how teachers can help children to use hypertext more effectively when viewing and presenting information.

The day-to-day programme will be the setting for the research. I will observe the classroom patterns for about 2 weeks then I will work directly with children using some strategies I have designed for working with hypertext. I will observe and work with the children sometimes using videotape to record information. The research will be aligned to the class programme and the timetable so that children's learning is uninterrupted.

All information will be treated in complete confidence and no reader of any report or publication will be able to identify any participant.

A summary of the overall findings will be made available on completion of the study.
If you have any questions please don't hesitate to contact me at the Auckland College of Education, ph. 6238899, ext. 8446.

Jackie Mason
12 October, 1998.

Approved by the Auckland College of Education Research Ethics Committee, October, 1998, for a period of 3 months. If you have any concerns about the ethics of the study please ring Dr. Patricia O'Brien, Chair of the Research Ethics Committee of the Auckland College of Education, ph. 6238899.

Appendix A, Item 3

Workplan : Fieldwork for thesis (draft)

J. Mason 10/98

(5 - 9 Oct. : gather resources and plan unit components)

12-16 Oct.	yes	no	pm	pm	yes	Observe consent forms and info forms obs total program;
19-23 Oct.	yes	no	pm	pm	yes	pre- interview; metacog; samples; obs prob. solving.
26-30 Oct.	Labour Day	pm	pm	from 11.00 am	yes	Intervene CDs to gather, interpret, analyse info.;
2-6 Nov.	yes	pm	pm	from 11.00am	yes	recip strat peer resp. strategy;
9-13 Nov.	yes	pm	pm	from 11.00am	yes	Using m.media (H/studio)
16-20 Nov	yes	pm	pm	from 11.00am	yes	coop. constr. of m.media;
23-27 Nov	yes	yes	yes	yes	yes	planning strats. for m.media constr.
30-3 Dec.	yes	yes	yes	yes	yes	T.conf. - strat.qus.i PostIntv observe metacog.
6-10 Dec	yes	yes	yes	yes	yes	interviews samples

Appendix A, Item 5

Interview/teacher : before intervention

JM thesis 10/98

Purposes : to gain information about

-learning approaches used

-approaches to using text

How do you organise for chn to learn through talk?	
How do you organise for children to learn through co-operative activity?	
How do you organise for problem-solving approaches to learning?	

How do you organise for independent learning within the class structure?	
What approaches do you use when chn are doing research? How do you organise for this?	
What approach do you take to working on text? oral(speaking) oral(listening) written(writing) written(reading) visual(viewing) visual(presenting)	

Appendix A, Item 4

Interview/students : before intervention

J.M, thesis 9/98

Purposes : to gain information about

- attitudes to learning
- perceptions of metacognitive patterns
- perceptions of learning approaches
- perceptions of social-dialogical patterns
- perceptions of the role of language in learning
- perceptions of the role of the computer
- perceptions of hypertext

Name/code :	
Tell me what you enjoy about schoolwork.	
Tell me why you enjoy it.	
(attitude/motivation)	
How successful at learning are you?	
What helps you to learn?	
(attitude/motivation/cognition/metacognition)	
How do other people in the room help you to learn?	
When do you work in groups and why?	
What is helpful about group work?	
(socio-dialogical patterns)	
How does talking help you to learn?	
How does listening help you to learn?	

How does writing help you to learn?	
How does reading help you to learn?	
How does using the computer help you to learn?	
(role of language and computer in learning)	
When you do a research project what are some of the things that are important to help you get it done?	
What sort of stages might you go through?	
(inquiry approach)	
If you have to solve a problem as part of your work how do you go about it....when you're working by yourself and when you're working with others?	
(problem-solving approach)	
What are thinking skills?	
How do you use them?	
(cognitive/metacognitive)	
Have you used hypertext on the computer? (CDRom, Internet or Hyperstudio)	
What did you notice about the difference in using this from using books?	

3. Observation Format 1

Appendix A, Item 6

A Observation Format

Date:

Session process	Learning arrangements	Approaches	Content and Resources	Strategic Knowledge demonstrated	Teacher talk and intervention	Significant dialogue

4. Observation Format 2

Search strategies and screen-reading strategies – observation

Date:

(not when searching or screen viewing)

[illegible]

7. Retrieval Chart 1

We need to look for

We found

Appendix A, Item 9 5.2.4 Hypertext paired activity 5.2.4 Pair A : JSK and JV

Search strategies and screen-reading strategies – observation

Name: J/S/K	Name J/V (mouse)	Action	JM
	OK, we've got to look for – what is it? – air balloons...airships		
air balloons	Air balloons...I'll type it in...		
air balloons	Air b...OK...here we go "air compressor" – "air conditioning"	Reads Pinpointer index	
air balloons – there...	Air pump Air polutions oh		
	my God just look, we've got a lot though...air compressor...air conditioning		
	not air balloons... air pollution... air transport....	Opens air transport	
no...			
can look at air transport now...			
airship...	yeah, we need to find um,...		
	I wrote... We should find it..	opens air ship	
No it's...	No, that's another there Oh here it is...		
	It might be because	Scroll down article	
	"they cope with air conditioning....	Reads aloud	
			Is that what you're looking for?
	The materials they use...		- for a hot air balloon – is this where we might
			Find it – maybe we need to look for a hot air
		Scrolls down article, finds balloon hotlink and clicks	balloon? Oh that was quick...
	OK either hot air or gas...		Might you look at the picture too?
	There's a caption on the picture....	Reads caption	
	Hand on, these hot air balloons go at....would that be any help for where		
	most are? That's cool....	Scrolls back up	
Because....			Why might they mostly go in Summer?

The weather, there's no wind.	I know, but...		
	Well, hail isn't good for the balloons	Points to article, picture and caption	Have a look up here now and
	We can answer one already		see if you can answer some of your questions?
It's not in the captions	We can find some more – that's not in the captions		
Colour, bag, silk, rubber	Here's that, silk, rubber materials used		Non-porous means
Silk is very good.			it doesn't soak up water
Go down	Oh, go down. I saw something back there...	Scrolls down Reads.....records	
Yes			Do you agree?
		Reads questions	Go down your questions again – materials
	Yes		have you got that?
Where most are	Helium		What was that? OK
What did I do?	No, no, you leave that alone!	Scross down, loses picture, gets different picture	Where they are – you said they mostly fly in Summer. What do they look like?
			You went down here J/S and the picture
			changed, because you came, but when you go back
		J/S scrolls up	you'll get the other picture
	What's the other picture there's an axe there, you just click on notes I did before		
	Yeah		But you've gone to another file now So go up, hold
	What shape is it? Oh!	refers to questions	it down – now your question What do they
Is it put all the air?			look like? Do you know how
		J/S clicks on	to make that big? Click on the
	You can do "expand" though		magnifying glass.
			Now the picture
			is big and you can look at it carefully
	What shape is it? It's not really a cone shape, it's more round	Looking at picture	
it's like a round			it's like a sphere, it says "colourful globes"
I know, I know	like a circle with an extension piece on it		
like a upside down bottle – the basket's			
the top – like a upside down bottle			"they are
	and we've got to find...		globes" very good

like a bottle			What else could you say – not just globes
	It looks more like a perfume bottle then!		
They're like...			What about colours?
Big	Huge	Viewing picture	Do you think they're big or Little? How do you know?
	You can see the basket		
There has to be about 3 or 2 people in there			
It's always going when you go and look	You could tell it blows up because it's like an ordinary balloon – you could		
	blow it up and the air goes inside it – see – because it's not tight...		
			I think you've got enough now.
		Scroll down	If you close this one, if you scroll down
		article to next picture	further you will get to the next picture
			make it into a big picture
			J/S – see the magnifying glass – click – that's pretending you're inside a balloon

5.2.4 Pair B : M and N

Search strategies and screen-reading strategies – observation

Name: M	Name N	Action	JM
So, go to Find and push...		(M with questions) (N with mouse) Goes to index, points to "media"	
No...but that doesn't	Why not that one, it's got "other media" and all that		
Say anything about what bites do	Oh yeah, the article		
	Or topic...	(Background article is on Montgolfier Bros)	
Oh, Montgolfier, he's one of the...that person that...		↓	
		Scrolls down article	Do you know what you're doing
	No....		N?
			What are you going to do now, do you
			think, to find the information about kites?
Go on the...	No... Category...	Selects category	
Performing arts?			
No.	Sports and hobbies.	Selects	
	Yes.		Could be under there, good. Could be
	Recreation – kite flying – could be...	Scrolls down alphabetical list of articles	here too. Try them both.
So you're going to go on to 'K'...			Try it.
	Kite.		
History of kites	Describing...		What is this about
.....	Like what kites there		It says what it is too...
"Kite is a flying device consisting of a wooden or similar frame covered in paper, cloth	are and all that...	Reads article aloud	
or syn-thetic material."			Synthetic means
That tells you what	You can get the		it's man-made.
you need for it – it consists of a <u>wooden</u>	picture of the kite		
framework, with paper cloth or synthetic material			Maybe you
wait! Go back to		N scrolls down article	could number the answers...
the start...			
So you need would...	paper...		
"similar"....	covered with paper...	M records from screen	
"framework"...and	or cloth...		
	...synthetic... ... <u>synthetic</u> ... material	N reads screen aloud to	

Nnn...oo anything else?		assist M recording	
Kite is... it needs to be...		Scrolls further	
	"Kites are of Asian origin...and were	N reads article aloud	
Shape, the shape	flown by various Asian people and the Asians...		
that's just history about it...			
string...	Yeah, you need string... flying device....		
	They're all of those kinds of shapes, there,...like,		So, you said "shape"
	cone-shaped.		
			Yeah, you might
			look at the picture in a minute. Do you know
Expand.		Selects "expand"	how to have a good look at it?
	You can get onto it... "A kite festival..."	Reading picture text	
Click on the picture...		Silently	
	"A kite festival in Long	N Reading text aloud	
That's just telling where the picture is and what happened.....	Island Washington displays several colourful designs..."		
	that one up		
	to there, there... there's some from Canada....	Viewing picture	So what can
No those are just plugs What about colour?			you say about shapes?
Did I write colour down?	Yeah, colourful		
	They're all colourful...	Reads down question	
		list...	You're a good old note taker
			aren't you, have you written down
			about colourful?
Oh, um, the tails,	Pipe sort of things	Viewing picture	You can see in the picture too, to balance them up...
	They look like sort of pipe sort of things, all wrapped around...		
Yeah this thing here.....			
No, not that...	It sort of looks like a pipe...	Viewing picture	
It's like – um -	Yeah, it kinda looks like a pipe		
plastic, the stuff that we used to make			
Those kites...	Polyester....		

	Plastic stuff		
Polyurethane			OK go back to the text now and have
			another look and see if you can find any
Keep on going up!	That's good	Closes screen Scrolls article	other answers.
No!	No! Do that text and outline... Aaah!	Goes to Views Clicks on text only	
			I see something about shapes here – look..
Shape....fish	Dragons...forms of birds...designed and decorated in the	Reading article	
Birds...birds...fish	forms of birds	Thinking aloud	
Also I've seen octopus ones where you've got the round thing	...birds, fish or dragons...	writing notes	
and then you've got the tail hanging over there...			
so, diamonds and octopuses	Benjamin Franklin...	Clicks on hotlink "Benjamin Franklin"	
			I wonder why that's related to
	Benjamin Franklin...		Kites....
			look it said "experimented with kites to investigate electricity"
		Clicks on "back"	Go back now. If you go down further it tells
	Box kites	Scrolls down article Finds Box Kite section	you about another type of kite...
	They're like shapes of boxes.		
But they're like the cubes. I've seen those but they've got, the tail			
	Two or more tails.		
is on the outsides, 4 outsides and one middle.	Instruments & stuff like that.	N is reading article silently	What are they used for N?
	"..open-ended boxes are used for sending mete..."	Reads aloud from article	Yeah...
			"Meteorological" that means to do with the weather. You know the
	"instruments to measure..."		weather readings on TV. That means speed.
	"velocity?....."		
	No.		Is there any more on that screen?
			Let's leave it for the moment and have a look at what you've
Just number 2 and number 1.		M. Reads notes aloud.	found.....
			So there were some things you couldn't

Yeah, but we didn't look them up.			find?
Yes if we could go back to the start....from "Go back"....	Go back there....	Selects "back"	Is there anywhere else you want to look?
Right back...	Like that	Selects "back"	
No then back again Back again		Selects "back"	
		JM points to "home"	Go here and you'll go right back to
Now click on... Just go...I know		Selects "home"	the beginning.
what we're going to do, and then you go on "kite device"			
Right	We've just been there	Selects "find"	
I know but – put on something else that made it go on that thing		M Points to "Category"	So you
			think you want to look in another
Yes,			category?
			Go to here and I'll tell you what to do.
		Selects 'category'.	Now this is what you're talking about....
Category	We're in that		Category
Then go to Physical Science and technology, go and see what's in there.		Reading options	You can choose from Physical Science...
	Maths, Science		
	Mathematics.		
Click on that then, now see.	Chemistry?	Reading options Silently	There's nothing else.
Yes.	No.		Thanks we'll stop now.

5.2.4 Pair C : T and D

Search strategies and screen-reading strategies – observation

Name: T	Name D	Action	JM
First we'll got that um	Any pictures?	D. with questions T. with mouse	
	What shall we go to first? To?		
Um, maybe to the um Timeline eh.		Both looking at choices menu.	
	Yeah, that's it I'm not quite sure, back in the future anyway.		
Yeah.....um	OK	Selects timeline	
	Man and woman?	Looking at choices	
What do we do now? Do we just choose one?			This is only if you're looking for a date or a time of
			an event or something. That might not be
	Not really.		what you're looking for. Does it say you have to find the time of anything?
Close the time		(JM) shows "close" Closes	So you could close it.... here
	Find		What's this?
Hot air balloon		Types	So you can type in what you're looking for?
I don't think this could go there....		Reading index of articles	Try just "balloon"
Yes!		Types "balloons"	
Do we have to read it all?			
	It says something over here....	Reading screen	
	That's one of our questions, it's a		
	"big bag containing hot air or gas".		
	What else? Shape?		
It's like a light bulb.	It is like a light bulb except they tip it upside down.		
	...and I think it shows over here how	Both read screen 10-15 seconds	
	much it weighs or how much it takes up something		
			Was that one of the things you need to
	No		find out?
How to make it...			What else do you need?

			It hasn't really got anything
		Checking questions	about how to make it... What makes it move..
No	Lighter....		did you write that down?
		Reads screen	"The gas that's lighter than air fills up the bag..."
	And it's got a hole in the top of it too.....		
			Sometimes you can have a hole to let some of the air out. Is that so
	Mmmm		It will go down or....?
	I'm not sure. I think it's meant to travel.....		
		Check question	
		T with questions D with mouse	Did you find
No	No		out from the screen how it moves?
	Time it was made	Reads question	You might like to look up
			The timeline for the Montgolfiers.
		Goes to picture. Magnifies picture	Click on the magnifying glass
	I think it was 1903 I'm not sure...	↓	You're good!
Wow – can they get closer?	I've seen them...	View picture	
On TV	Only on TV		OK close it
			there and see if you can find Montgolfier
			on the timeline. Remember what we said before....
		Selects timeline	
		Goes to file	You can type in Montgolifer. Can you
Yes M-o-n-g-o-r-f- i-e	I think so Montgolfier	Types	spell Montgolfier?
			It's a 't' after the 'n' that's why it's not coming up.
		File comes up.	Right on!

5.2.4 Pair D:ST and MV

Search strategies and screen-reading strategies – observation

Name: S/T	Name M/V (mouse)	Action	JM
	Maybe we can go on those...		
This one...		Goes to 'Find'/Pinpointer Types in "helicopter"	
	We're looking for engine	Goes to picture file	Is that about the engine? It's telling you
			about the rotors, dot the engine – do you
			think you might have to go back to the other part?
	Yeah....	Closes picture Goes to "view"	Can you close the picture?
There's something more that's better...		↓ Helicopter designs	
They're 3 kinds...	They've got different kind of shape of helicopter		
They're 2 engined...	What engine?		
		goes to print text	JM reads and explains the text and terms eg "hover"
it's like going in air			What do we need to know (refer to list)
	Rotor...	Scrolls up print text	Here/s s/thing about the engine Scroll up a bit
			M. It doesn't say what engine..
			We haven't found engines. What about
What is it? Rotos Engine Yeah in the tail	Rotor Blades Propellor? How about Propeller		parts. What else? Do you know this word? – fuselage? Propellor is in The little rotor.
Fuselage.			The whole body of the helicopter is called the fuselage. It's a funny word. You use it for all airplanes, the fuselage the whole big body of them (pointing) fuselage Anything else – what about the pictures S?
If we click onto that it tells you about the landing gears.		goes to aircraft carrier/heliport	Click on and let's have a look
Yeah It's going down	The helicopter is landing... It's maybe a rescue plane... Yeah...		It's a sea helicopter, it's an aircraft carrier isn't it?
It's a boat			What's that circle for?

It's where it lands It have to know where it goes It's supposed to be a cross in the middle but they put a 2	Yeah...		on the circle?
		(taking back to search list)	OK we know about parts, do we know about different kinds?
No	Close... Yes...	Closes screen	Didn't we see a picture of this? Do you remember which one? Try that one?
No, yes...	It's the other one	Opens helicopter designs	Are they different sorts of helicopters?
That's a 2 engined one it's an army one	That's got one		What about this one How many rotor's has it got?
There's the rescue helicopter these one. It's got another one but at the back.		Point to 3 rd helicopter.	How many rotors has that got? That one's got two rotors too but they go different ways.
		Points to label "fuselage"	See there's that word again – remember what it said
Yeah, fuselage			See it means the body of the helicopter
And there's the fuselage there		Points to other helicopter	Good
		Checking list	Now, did we find out anything about fuel?
No, it takes diesel			Did you know that out of your head – we won't
			Say we found it on the computer! What about a place
			to land? - We found out about one place – didn't we – where?
On the boat – and there's a place... Yeah.... Every single airport	Could be airport...		I'll put that in brackets because we didn't find
			It on the computer. We did find out about landing on the boat.
Yeah/.	Yeah.		Good, you've just about finished.
I'll do...		Goes to "helicopter in the city" picture	?"You <u>have</u> finished! Do you want to
It takes time as well – it lands in the airport, right beside	Yep! Helicopter in the city!		look at some more?
it... See, it lands in the airport	...I think that's not the airport		
Oh, yeah. (realises it's not)	In the street! Landing in the street of the city.		Where's it landing? An ordinary plane

Yes it can – if it's little!			couldn't land in the street could it.
			Very little!

5.2.4 Pair E : M and J

Search strategies and screen-reading strategies – observation

Name: M	Name J (mouse)	Action	JM
Choose those, one of these here...	Yeah	Goes to main menu Scrolls down articles Selects Word Search	
That Type in article over there...	helicopter	Types "helicopter"	
I remember this...	Yeah there it is		
	Helicopter, there we go		
	That's how it folds up	Select "view" Viewing picture	
Yeah	Like a... Got a size and...	Moves pointer to punctuate speech Consults notes	
	There.. OK so now shall we		
Can we go to... Helicopter designs	have a look at...	Selects rotors/lift view	
	helicopter designs that's it... underneath that...		
	good...		
It's coming			Cool, good
Yeah	That's a passenger one.. Goes with passengers	Viewing pictures	on you.
That one (rotors) looks probably a bit higher than that one...			
	touching them...		
That one's shaped so it goes down			
			so they're on different angles.
	Yeah that's just straight down, straight		
Yeah			On your notes did you say "types" maybe you could write these down
		Reading screen text	These are types of design so there's different rotors
	"tandem rotor"	Viewing pictures	CD axial – maybe it means it can
	two rotors?		go either way or there's two no – paired -
Yeah or maybe one goes one way			There's 2 of them look it says paired...
There must be 2 there	Maybe it's like -		
	One's going up and the other's also going down		Stops the

it's in the same place...	Might be going the opposite way		helicopter from crashing...
The top one's going like that and the other one's going in opposite directions		Makes hand movements	
	That top one, single rotor	J checks screen while M writes, pointing to screen	OK have you written that down?
It's just like the normal.	Tandem?	Writing notes (M)	Yeah.
Yeah, we've got it all now.			OK you guys work well together, that's good. What next?
See down the bottom...	Size	Goes to text caption	
	That probably says the size		That says what the design is...
			What have you found so far?
We've just found the types, size.... helicopters?	...yeah the types... Yeah go to helicopters	Closes picture screen	
"It differs from the autogiro – rotating wing aircraft gives it propulsion..."		Reads aloud from article	
I used to have this, like, toy helicopter and you pull it on string and it goes grr....up!	That one looks like it's got 4 blades I had a rescue one	Browsing through pictures	
			Well you've done lots of good things
			Is there anything else to write? What
			Can you say about size just on what you've seen?
Like most of them are small, some of them are quite big	The biggest one's the passenger one	Writes notes	
		Looks at notes	"How they work"...anything about that?
	...the big propeller thing, that back one...		The rotor...
	that makes it smooth	Writes notes	
			makes it stable? Good thanks, can you tick the areas you found information about.

5.2.4 Pair F:L and M

Search strategies and screen-reading strategies – observation

Name: L	Name M	Action	JM
Should we look up...	We could just put...		
	....hot air balloons		
Where's 'b'?		Goes to Pinpointer	
b-a-l-l		types (L) balloon (hot-air balloon is needed)	
We put hot – s balloons			What did
The fact.	She knows a lot.		you get?
	We got Hindenburg	Scrolls up to top	
	Disaster	of article	
			Do you think
			here might be a hot-link in
			here for
	Yeah I saw balloons, keep going up		balloons?
If we go to Find then we might be able to...	It said 'Fire' – something		
		Scrolls articles	
	We're just looking for air on 'a'	Alphabetically	
			Do you know how many articles
	Wow!	T indicates articles number	Are in here? How long will it take to get to 'b' if you do it like that.
Yeah	We could just go <u>back</u> .		
	Go back		
I'm going here			
I'm looking for 'F' – firing a balloon	Fire, disasters?.....	Scrolling articles	
	Push back		
			I'll give you
			a hint – look under balloon and see if
			we can that balloon article
	There's b	Scrolls up and down. Pinpointer	
	b – a l	Article.	
	When's it my turn?		
	3 years!		
	There's ball!		
	Yay "balloon"! I was getting tired!	Finds "balloon"	
Hot air balloon!		Scanning article	What
Yeah, there it is.	How much it weighs....	Gives notes to M.	are you looking for now?

Oh that's how much <u>hydrogen</u> weighs.			
blah blah blah	It's got this 3 there		
Down, down now?	That's just the start		
Can I go down now?	Keep going in articles	Scrolls	
	Just go straight down		
Oh, balloon!		Finds weather	
		Balloon	I think probably you've found
			enough – you're very quick.

5.2.4 Pair G : H and T

Search strategies and screen-reading strategies – observation

Name: H	Name T	Action	JM
	What shall we go to now?	Types in "balloon" If mouse, typing T recording	
The next thing, if you read it you'll find it.	I saw it!		
		(Long pause, text is very difficult, children read silently, separately)	What's this T..? Have you got
	Information...		An answer to any of your questions?
	A bag.		Yes, what do you <u>need</u> ?
Um, silk material.		H. points to screen.	
	Gas.	T. writes.	Good, you've
Basket. Burner.		H. points to screen.	found lots. If you want to look for more, could
	Wouldn't you need some		you scroll down or if you want to look at the picture.
	wire?		I would say so but it doesn't say on there
	Cause there's holes in the basket.		does it.
		Long pause T takes mouse	What else
What they look like.		H. takes recording sheet	do you need?
			You could go back to the
		Scrolls back up.	Picture?
			What did you see T?
	You could just go down and have a look at the picture. I have to		
	Check on weight.	Scrolls down to weather balloon.	
		Scrolls back to picture.	Tell him how
Go into the picture with the arrow.		Arrow changes.	To make the picture big, H.
	Now it's making it	To	Now see it's a magnifying glass.
	big.		
	Colours	H. writes.	
	Big.		
	Got patterns.		Do you remember the shape?
Sphere?			
			Did you find how to make...

	No.		
			Check your questions, I think you've
			got all you can from
Yeah.			this CD.

5.2.4 pair H : RP and CA

Search strategies and screen-reading strategies – observation

Name: R/P (Mouse)	Name C/A	Action	JM
	Go to find, type in on "balloon"	Types & finds screen	
OK we're going down..	What's that?	Scrolls across picture	
Is that the end of it?	There's balloons...		
That's all the stuff that...	Lighter than air....		
Those are the materials...	It's lighter than air	Goes to top, scrolls across	
So we've found out the sort of power			Maybe you could
it's hot air or	helium		go to the next section then...Like making it.
Gas	hot air or gas		What sort of power is it?
"The balloons are filled with.....helium OK, so what holds it	Helium	Reads	
Up is helium and that other word...	Helium or the gas...	Scrolls to "history"	
Oh...(laughs) OK so that's that one		Records on chart	
What particular shape	What's the next one?		
It is.			Are you looking in the print text for that?
Dunno....			Could the picture help? Do you think the print text might help you?
	You should click on the air balloon	Clicks on "expand"	
Mmmmmmm.....	There's 4 balloons I know	Reading silently	Can you tell from the picture, they can tell just as important information as writing
Most balloons are that shape!		Points to picture	
Half circle	Yeah...		It's a bit like a light bulb isn't it....It's actually called a sphere. Have you learnt
		Read silently, the caption	about spheres before? s - p - h - e - r e They've called them globes...
This is a different	Another word could be globes	Looking at picture	
One...	It's bigger though, it's bigger		Do you think that looks like strings or wires, those
	They've actually got wires in there to, like, put them...make the shapes, except	Pointing to parts of picture	Ribs? Mmm

On that part up there	When it goes down the wire doesn't make the shape.		
It showed, it said... oh how do I quit this?		Indicates menu	Go to this part here might tell
Close...		Closes picture enlargement	You how to close it. Good
See....um...		Reading article	Here you are...spherical
	Are these the materials that they use for this?	Points	Yes, here's the materials here
	They got... "silk, rubber, or other"...		"non-porous" – that means
			it doesn't soak water in... Why do you think that
	Just in case it lets out the fire that's heating it up?		might be?
			Yes, but
You'll end up sinking!	You'll drop!		What might happen if it gets wet and it rains and water
	It's heavy...		goes into the material Why?
So shall we write that down?		Writes down	Is it one of your questions?
	Um...yeah!		Can you see anything else now?
"It's flame is commonly created by propane gas".	The balloon is...	Reading screen/article	
....sends powerful jets of gas"	See, look they have	looking at picture of	
	to wear gloves so they don't burn themselves	burner/close up	
Is that kind of like an engine?	Yeah.		
You know that other picture...this bit here...that might be holding		Points to frame	
the ribs bits	It's a bar		Pretend you're
It's to stable that up...	That's the inside of the		looking up...
	Parachute		
So is this the ...um... So this is attached			
to the basket...	Because this is... The parachute's clipped		That's actually the basket – yes
	onto these wire bits, and if it was clipped onto the basket it would break.		That's right.....
			It's got to be far enough away from the burner so
Like helium Helium...	The flame...		it doesn't burn, but the hot air can go in and puff it up

What will happen – you know how that turns off and on, would it be possible if that wouldn't go back on again?			
	We'll die & we'll fall down		What would happen then?
They could always have parachutes in there	Aaah, we're falling we're falling!		
That could be burning!	All the metal can be, like, hot...		It doesn't tell us does it? So, do you find anything out that you want to put down?
			Might there be another article, somewhere completely different?
Oyeah, I know I know I know.....			Try another search and see
How do I – um -	Go to that little box		
I know what's an aerofoil			
Oh you go there...	Oh...	Accidentally shuts down software	2 clicks
I know what.. I'll go back to...	Hurry up		Close it down
Go to airships...			It takes quite a while
	Yes!		
	Like the big burger one		The Lindenberg? (The hamburger!)
Laugh	Laugh		
Ballet dancer...		Software introduction	
			Now what's a word that could help with the burning part
	Yeah, fire		Could you type in fire? Or something like that?
			However, I think you've found heaps...

Appendix B

- Item 1 Retrieval chart 2 (search plan and retrieval chart in phases two and three)
- Item 2 Planning sheet/storyboard (used in phases two and three)
- Item 3 Feedback after authoring, (phase two)

8.Retrieval Chart 2

Search Plan

Key Words/Topics/Questions	Pinpointer
	Word icon
	Category

What we found:

Articles/books/other	Picture	Print	Sound
Hot links Related Articles			
Summary of Information			

10.Planning Sheet/Storyboard 1

Page:		Page:	
Info./notes:	Sound:	Info./notes:	Sound:
Page:		Page:	
Info./notes:	Sound:	Info./notes:	Sound:

Appendix B, Item 3

Feedback, after planning

Screen	Feedback 1	Feedback 2
Title	Needs a few more pictures(L)	What about bigger lettering and something like Ranger Ross saying "Welcome to Shakespeare Park"? (MA)
Cows and bulls	Make horns in the square..maybe you can make it as if they're going on the truck to the meatworks.(L).	You need to put the milking shed in.(MA)
Sheep and lambs	It produces all these things but all it is, is two sheep(L)	He said, "does anyone want a haircut"...(MA)
Pigs	I reckon you should have the pig rolling on his back in the mud.(JB)	You need to point out that that <u>is</u> the hole and continue the fence. About the farmer with the sheep, it needs to look like the way he holds it.(JV)
Dogs	You should put - "Please duck your head". You should put "dogs are used for guard dogs".(JB)	If you're having a dog it could be a Scotch Terrier. You need to have the dog.

Initial experiences which children will then take to further pairings and act as peer tutors

Feedback on screens before putting together the slideshow

Screen	Feedback 1	Feedback 2
Title	A bit dark but nice(MA)	Pretty dark - you could put more on the hair, but good(L)
Cows and bulls	Maybe draw a body for him(MA)	Could click inside things
Sheep and lambs	You spelt his name wrong(MA)	ok(L)
Pigs	There's a little mistake on the face(JB)	Really awesome pig, I like the big ones (JV)
Farmer		What are those?(doors) You could have done some sheep(JV)
Dogs	Too many dogs(JB)	You could put more info.(JV)

Appendix C

- Item 1 Retrieval chart 3 (used in phase three)
- Item 2 Interview questionnaire (students)
- Item 3 Interview questionnaire (teacher)
- Item 4 Table of teacher interview responses
- Item 5 Transcripts of hypertext observation, phase three

9. Retrieval Chart 3

Brainstorm:

Information:

Appendix C, Item 2

Interview/students : post intervention

1. How do you feel about working on the computer to help you to learn about flight and farming?

What did you learn?

(affect, attitude)

2. How did you feel about working in pairs/3s at the computer?

If you were the teacher how would you get children to help each other at the computer?

How did talking and listening help you at the computer? Sharing jobs?

(socio-dialogical)

3. You've done some little research projects on the computer now. What are some things you learnt about researching, on and off the computer?

(inquiry)

4. You had to problem-solve a lot on and off the computer. Tell me about some of the times.

7. What thinking skills did you use when you did your research and presentation on the computer?

Did you use your thinking skills in a different way to help you with hypertext?

(metacognition)

8. How did the work you did with me help you to learn about learning itself?

(metacognition)

Appendix C, Item 3

Interview/Post intervention : Teacher	
What's your view of the kinds of activities I've been doing with the children in terms of their language learning and development?	
Can you comment on any changes or results you've observed?	
Can you comment on benefits to particular children? Or issues?	
What do you think would be the issues about using hypertext such as CD Rom encyclopaediae and authoring software in your classroom?	

Have you changed in your thinking about computers from your observations of the activities? Can you describe any changes?

Appendix C, Item 4

Results 2 Phase 3, Post programme interview : Class Teacher

Question	Response
What's your view of the kinds of activities we've been doing in terms of the children's language learning and literacy development?	In terms of using the computer I think it's been of best benefit once they've learnt how to use it - when they're confident with computer usage and the language to talk about what's going on at the computer. I think it's really helped them to scan text to find relevant parts, to look in a different index and other skills.
Can you comment on any changes or results you've observed?	They've really developed confidence in using the computer, particularly in going to the encyclopedia. They've learnt a lot of things by watching each other.
Can you comment on benefits or issues in relation to particular children?	I don't feel I was close enough to really comment.
What do you think would be the issues about using hypertext such as CD Rom encyclopaediae and authoring software in your classroom.	Well I think the availability of computers is the first thing. Then there's a need for teacher guidance to get started and to help focus children of the important strategies. Even if you're training them you can get the children to take over.
Have you changed your thinking about computers and learning from your observations?	I can see that if you do put in the time initially you realise what can be done - it's easy to think it's too much trouble.

Appendix C, Item 5 5.4.1 Integrating text strategies

Gathering and presenting information : 5.4.1 Pair A : KT/W and MR

Topic: Shearing

Name: KT/W	Name MR	Action	JM
		Children brainstorm for information. Search, using search plan	
Wool?	You get the dirty	K records	
Wool	bits of...		
- or drag, drags			
d - a - g - s	Yeah, dags d - a - g - s		
Yep	Yeah those clippers, clippers		
-that the man has -	clippers		
	Yeah clippers, just put clippers		
just trying to think....	yeah and um...		
	..the shaving thing...		
Yeah, hair cutters or something - um			
You can't have a form...			
	You have to have one of those slides to put the sheep down -		
	slides....		
Yeah but it might be, like, the one			
in the playground - like they have at	Aah		
school OK.			
You have to have - um -	Just put - slides, and then put - for sheep to go down	↓	
	"slides", and then put in brackets "for sheep to for sheep to go down"		
"for sheep"			
one more - farming?	Races? Race - that they run down to the shearing place....		
	Yeah	↓	
So is it called a race?			
		Children go to the computer to search for information	
		MR has mouse	
	Find...	KT/W has search plan M selects find	
...and push search...			

	Search...		
keep on clicking on search	I am	Scrolls alphabetically	
everythings coming down		down titles	
	I know, I'll go this... Oh you can't....		
Oh that's top, go down			
Oh go here...		K points to word	
Gee....wool sheep Oh you're – delete, go to, that top one, I think...oh yeah	Ohhh	search Has trouble with mouse	
do it there – wool, sheep		K starts to type, then M	
		Types "wool" and "sheep"	
		Sheep article appears M reads and	
	bottom top sheep is	skims article, pointing to screen. K watches	
Yeah	concerned with...blah blah blah	too....reading aloud from time to time	
Oh yeah with the skin...		Scrolls down article	
That's a Merino sheep eh			
Just click on	Yeah I think so ...domestic sheep...		
that, just click on that...(meaning		↓	
hold mouse down to scroll) – enough!			
	...Kay....		
Might have to see something else...			
Oh there's Animal – history -	No -		Try
(Animal husbandry)	What, what do I do? Unrelated articles	↓	Related articles
Oh, there two more...	I don't know where it is		
...fleece like, how many sheep ...sources... ...Keep going down... ...fleece of the sheep... ...are raising... Na	...sources of wool....	↓	
		Come to end of article	OK not much luck – good try
		Children prepare draft screen using information from CD Rom, books, own experiences	
	Put shearing – we're going to put "shearing"	MR drafts demonstrating	
- rainbows -	like <u>that</u> then we're going	visually before drawing ; both	

	to put what – yeah what, when, why, how and	Children demonstrate on empty space	
	which and just going to do them		
and you should like, do a picture, like in that			
rainbow	Could draw a sheep getting shorn		
Yeah shall we do it here?	Yeah...and we could have		
	A pile of – um – sheep stuff there – or		
Blue, yellow, blue...or something...	Have it in colours and have all the – um -		
Yep, yeah	Sheep fur over there or something		
And write... OK	Yeah		
	OK I'll just write it	↓	
' – e – a – r – i – n – g	s-h-e-a-r-i-n-g	M writes title	
Yeah Yeah	Oops...	K & M sketch	
Yeah, like in different colours, like a		Boxes	
Bar graph or something, see what			
One's got the most	Yeah what one's got the most		
Yeah that's it	What one's got the most gets the last colour		
	OK	↓	
Do a picture or something? Over here?	Yeah		
Yeah	A sheep?	K draws	
		Print text is put into boxes (not transcribed) with teacher help. ↓	
		Children go to computer to present information using Kid Pix	
		M has plan K has mouse	
OK?	Cool...	Uses pen tool Draws cloud	
Can they come out of the cloud all round?		Uses straight line to draw "lightning"	
How do I stop?	Yeah		Hold the mouse down then click when the rectangle's the size you want,
Yeah...	Now I can put in the words	Uses rectangle tool to draw "how what" etc boxes. M takes mouse M types information into boxes	like the straight line tool
Next part of transcript, Its feet should be here (laughs)	Drawing animal, was lost	between tapes.	

	Yeah!		It's tapping in time to the music!
			It's just about time to colour.
			M can you go
			around and close up any tiny holes, see
			like that, because when you colour, if there's a hole
			it leaks out...use the pencil, it's easier.
	OK	M repairs breaks	
	Is that it?		Can you see
No...there....			Any K?
Yeah, his neck!	He's drowning!	Continues Repairs	
	Yeah, the lightning		Did you plan your colours?
Yellow..	should be yellow, the cloud is grey	Colours lightning	
It might do the whole thing		line which colours cloud line	See what
	The lightning line is		has happened, why?
	Touching. erase it out and then just erase		What can we do?
	those parts out that...	M indicates screen	
That are attached to it Yep	I'll do that...	M Erases, but in doing so makes breaks in "Who, what" boxes	Good
			Good, but look, now
			while you did that you broke into those squares – I'm just
	OK	J M repairs breaks in boxes	going to repair them quickly to save a bit of time.
	...		Right, can we get going on the colours
		M colours cloud line, with paint can, floods screen	Undo!
Laughs	Laughs		Try it on the
			thick part of the line and you just want to get the tip
		Redoes colour	Of the paint on the part
			you want to colour – that's it, well done.
Are you going to do the cloud blue?	I'm a good boy!		
	No not blue -		
green?	No		
How come you get to do it?	Now yellow – that -		
	that – that – no... now....we're going to make that – grey	Chooses, yellow then grey	
Yeah			
	Cause that's what colour...		

Yep, Yep			
There?		Colours cloud, floods screen	Undo – there must be a hole
	There too...	Repairs breaks	
Yep	OK...go to...		
	they're gone....		
	Better		Yes! What a
	Yes!		stormy day!
		↓	
Green – aw, no, no	Now what colour shall we do that K?	Indicates boxes	It's time K
no	OK Yeah he can choose	And background	did something
I don't know what to do...green	the colours and I'll do the...(joking)	M gives mouse to K	That's generous!
green...	grey...		
	or black...		Try it... If you don't
	OK just go up to that...and just	M talks K through using the paint can	
	the end of the paint...just the end		
Hey!		The colour works, to K's delight	Excellent, do you like it?
OK	Nah, try another colour red, blue?		
purple, that purple!			
	Now you have to go there...	M begins to talk K through changing colours	
Cool	Yeah that's good children	Finishes boxes	Pre-cision! Well done

Gathering and presenting information : 5.4.1 Pair B : NB and NH

Topic: Drenching

Name: NB	Name NH	Action	JM
Cows		Children brainstorm on search plan, key topics for search	
	Yep, medicine...		
	farm medicine....	NB records	
OK			
Umm			Worms? Isn't that what they drench
			them for?
Ah...	They do get worms some of them		So you could look
			worms up -
	The one that starts with p – I keep calling it paracetamol -		What – the drench or the worm?
	The other thing that starts with p		
Oh, pencillin	Yeah something like that -		
			Do they use pencillin in the drench?
	Yeah		Are you sure –
			it's an antibiotic – OK
'Kay, worming..... and		↓	
		Long pause	You've got worms...
			you might find the type
			of worms that live in animals. Also I'm
			wondering if there's a file
			about care of animals – veterinary or something like that....
	Oh I know what that is – isn't that the sorting out the		
Oh yeah that's it	ewes....?		OK that's heaps.
		Children go to computer to search CD for information	
Do we go to find?		NB has mouse	

Pinpoint	Last time I went to find, then pinpoint	Selects find	
	Hey look, wow, straight away		
OK so we'd go to drenching			
D - r - e n what is it?	c - h - i - n - g	NB types	
oh	Enter	NB enters	
Dresden?	word - wrong	Reads on Pinpointer	
	Go to Back Wool		
	Wool production... Wool manufacturing...	Reads existing screen	
No - go to wool	So this is all types of labouring of wool...		
			Look at your search plan - it will help you-
			wool is only a little part of what you want
	Farmer - look up farmers	Re-looks at plan	
farm medicine	- m - e - c - t - m - e dri - c - n - e	NB types	
Medience!	-	neither child watches index	
That's better....enter...	Farmer		
	farmer Medford?	Article on Medford comes up	
	We got down to that...	Scrolls down article	
No way	Go back - um	selects back	
I'm just going to find - it's not			
Going to find what we want	Home then?	Selects home	
Home...	Now do a word		
	Search This...	Selects word search	
OK			Wait, before
			you type how many
			words are you going to type?
Drenching			Try 2 words.....
			If you just do drenching remember it
			will give you everything with drenching
	Drenching and sheep		in, even about rain.....
D - r - e		NB types in wrong place	

I know	Drenching <u>and</u> sheep C – h – i – n – g	NH repeats words for NB, and spells	
	That's only one word		
	You need to delete it and do it there.		
...cows? or sheep?		NB deletes and retypes	
	Cows		
try start over	No articles found!		
Oh –	You just highlight it	NH takes mouse	
Just try N Go back to find N		Selects "find"	
		NB takes mouse	What are you going to do now it hasn't
Medicines and animals?		back	worked?
Worms?		NH types	Could you try worming?
	Animals... Worms and sheep...		
Worms	Up above that one... No we don't want to look up <u>worms</u> .	Scrolls down articles (143)	
You go up again.... Alright		Selects Worms	
	What did you do that for?		
Because...		Article is about city of Worms in Germany Laughter	
It's a city called Worms! Choice !			
What did you do that for?			
	Don't know...		
	Go up to 'S'	NH takes mouse	
	It's not on there it's only got	Scrolls down "143" articles	
	Sh – shrew...see, look up animals.		
	This is quicker. A sheep is an		
	animal an-in-al! (playfully)		
	Animal Kingdom! See if that works...		
Go back to find – push find...	Push word search	Selects word search	
type in.....	What now!	Types sheep (334 articles)	
Sheep	Sheep?	Scrolls down Selects "sheep" Selects picture	
		and caption Selects sounds	

See what happens on caption	Cool!		
Don't do it, I'm reading	Domestic sheep...	Selects caption Scrolls down NB scanning caption	
			Remember you're looking for information about <u>drenching</u>
Go down the page...	Yeah		
	Close.... There's something peculiar....	Closes picture	
Push sheep			You're not having much Luck – have on more try.
Don't go too far			
	That doesn't matter We didn't do anything. We just highlighted it.		
Stop mucking around. Stop/		Scrolls down article NB scanning article	
	Short tailed sheep... fat-tailed sheep...		
Stop! Stop! Keep going...			
Keep going down. Wait, wait, wait...	Various....		
	Look...		
No.			I'm going to tell you where
			to try – go to Animal Husbandry – it's a tricky word that means looking after
			animals
Wait, wait, look, look!	Drafting...	Selects animal husbandry hotlink	
	Branding...	Scrolls down article	Keep going
Don't go so fast Stop – there			
	At last!		
		NB writes notes	
		Children prepare draft screen using	
		information from CD Rom, books, own experiences	
		Children go to computer to present information using Kidpix	
		NB has mouse NH has plan	
OK read them out and I'll do it		They go straight to the print text	
	make – sure – your – lid – is facing down -	NB types using “alphabet” NH dictates plan	
	- and -	NB looks at NH to continue. NB runs hands over	

	- on tight -	whole keyboard, searching for keys	
Grab?	- Grab the animal -	NB types	
Oh I'm thinking of "buy"!	- by -		
	- the neck-		
	- lift up its neck -		
	- Put it down and let it go -	↓	
But! Put! What! Oh that's wrong...		(Plan has But instead of Put) Types small 'p'	
			I'm sorry, I didn't show you how to erase.
	- certain amount - - in a bottle full stop and bracket	NB types	(JM shows eraser and undo tools)
	-		Great, that was quick.
Now we're going to draw a little cloud		NB gives mouse to NH	
	I'm useless	gives mouse back to NB who draws then gives mouse to NH	
		NH types in "cloud" NB reads word by	
Drenching-is-important – don't forget. You need to put		Word	
The arrow here Yes it's like,		Indicates where cursor should go. NH types drenching.	
Drenching – kills – worms – and – disease.		Definition	
That's good, now we have to draw		Screen (Plan taped to side	
the farmer		of computer)	
	I can't...	NB takes mouse,	
It's OK		Draws farmer and sheep quickly	
	I just need to	NH takes mouse	
Yes that's good	do this...	Changes line size	
		And redoes lines NB takes mouse NH takes mouse	
Can I steal that off you for a minute		NB takes mouse	
These can be mountains...			
	Yeah OK	Adds background Mountains (not in plan)	Are you ready to colour now?
Cool		Colours mountains, colour bleeds out	Go to undo now if you don't want that.
Like that. That's better.		NB undoes colour and redoes.	
What colour T shirt?	Pink – no you should	NB colours parts	

Like paint...	do it blue	of clothes	
Cool	Now save it.		Well done.

Gathering and presenting information : 5.4.1 Pair C : MK and RP

Topic: Feeding

Name: MK	Name RP	Action	JM
		Children – brainstorm for search on search plan	
		JM writes topic	Put your topic in the middle – now what do you think?
Farmers, because they			
Do it	OK	RP records	
And may be farming and sheep	and cattle		
Could you have...			What about
	Yes, it could be animals and food		a word search, two words?
Yes, food			
well...no			Anything else?
			If I was thinking like the encyclopaedia
			I'd think of a big word too – can you
			think of one that means animals eating plants?
	I know, herbi -		
Yes herbivores	Herbivores		Yes that's a
			word you've had in your farm work isn't it?
OK I'm going to go 'find'.....		Children go to computer to search for information. MK has mouse selects 'find'	What are you going to do?
and we're going to go "cattle"	Cattle	MK types	
	Find... Cool!...what the!	RP points to screen	
Aah!		Scrolls down article	
What was that? Was it animals?			
	Go back up!		
	Food supply,	RP frequently points	
Where Food supply	Over here	to screen, scans print text	
Shall we look up			
Feeding?	No it's food supply	(Information is	
	But it's about the world...	about world food supply)	
I'll just look up feeding	Umm	MK selects 'find', types.	
Ooops I need the...			

What the!		Pinpointer doesn't show "feeding"	
	No, come down here, click on this...	Points to word icon	
Animals and food?	Yeah, animals and food	MK types	
animals.... now, and food	No no no no you don't have to write "and" – delete that – just, cause theres "animals" there just put, the mouse there...	RP points to screen	
Search	Now, click on search...		
Da da da da....			How many
	There's 526 articles containing the words animals and food		Articles are there?
Mmm	African hunting dogs!	Scrolls down list	If there's 500 of them...
"Animal hasbeenry"...			Animal
			husbandry – that means looking after animals...
	So that...		
No you won't find anything there			
Shall I do farming?	So go back to the words		
Shall I find, shall I look up farming?	So, come back to the word search	MK selects 'word'	Farm and animals, or something?
	Come back up, oh delete		
OK Find all articles...	Find all articles that contain the word... Type in farm animals	RP reads word search box	
Farming?	Feeding		
Feeding		MK types	
This is where we were before – So, feeding articles...	Um		
	Yeah	Scrolls down	
We'll go down – yeah	Just keep on going there's one...	Articles	
So shall we...I'll try and...and we'll animal husbandry... Nothing, nup...			
Nothing to do with it	Go back back to word search – herbivores		

farmer....	Now come back -		
	You do this – and then delete....	Selects word search	
Yeah Yeah	H-e-r-b-i-v-o-r-e-s	MK types	
i-e—s	Then push search,		
	Click on search. There's carnivore, but	Scrolls down articles that's....	
There's cattle, cattle	OK cattle		
OK cattle	So...	Selects 'cattle'	
How many bulls...	Um	Views picture	
Here's a um sound thing	So which one would be brilliant? Hang on, wait		Does it tell you about feeding?
Feeding – “cattle common”...I'll go down looking for...		Both children scan article MK reads aloud MK scrolls down	
			Just a couple more minutes then you
OK			can try the books
“Modern breeds...”	Keep on going down...		
“Dairy cattle...” Feeding -	-Kay-		
“Beef cattle....”	Keep on going		
“Best breeds....”	Aaahh OK		
No it's not going to tell us			
	So we'll go back up, go right	MK scrolls up	
Fine	back up		I've just
			thought of something – what to do
	Grass		cattle eat? and sheep?
			They are herbivores – they only eat grains and
Food just like that.			grasses don't they. So look for articles that have
Grazing			<u>grazing</u> the word <u>grazing</u> , cause that means eating grass doesn't it?
	Yes		
			And “grazing and farms” or something
Grazing and farms	I don't understand	MK types	like that
	What I have to write		You can't
Grazing			write anything yet, so put the articles

	OK		you've looked at so far -
Grazing and?			farms? – don't put animals
			or it'll have all the ones in the world that eat grass -
Farms		MK types	hundreds!
OK we've got 38 articles...		MK scrolls down	Can you
		titles	see anything?
			It's mentioning
			all the countries because each one has
			something about grazing and farming in that country.
Yeah These are just the countries that do it, like,	Sheep, sheep, sheep		
			Nothing else... how annoying
Yeah	Can't we go back up? OK		Doesn't look like anything – we'd better go to the books
		Children prepare draft screen using information	
		Children sit silent for some time	It's just like a map with the shapes on.
			How might you <u>plan</u> to present your information?
You could do a little thing coming out – “I like eating....”	I'll do animals Saying something Speech balloon?	RP sketches	
Yeah	How about “I like eating” and just draw what he eats inside his stomach?		Yeah
Yeah say this is what I eat and do it in his stomach			
Yeah	I'll help you do it		
“fish”	I want to do	M reads from	
“cereal” – I'll do a box of cereal	The fish	information notes	
	Maybe you could	Children share sketching	
	Just draw a bucket...just,		
	Like, a little bit tipped out		
I could do the bucket, spilling out	'Kay so are you...		
Oooh....	'Kay and I'll draw the potatoes...		
	just draw like a milk carton – maybe		that's all looking good

Oh yeah I did that....	What's this?		
		Laughter	You've got 2 noses...!
		Indicates print	Could you make that a
"I like eating...." Yeah that's great		text	title instead of writing it each time?
You could do all the animals and			It would save space...
put them beside it, and a barn		R Labels "farmhouse"	Just put an arrow on this,
	'Kay	Draws arrow to	It's just
	Can I just draw	title area	A plan, a map for a guide
Sheep -	grass inside this?	indicates cattle	
	Do a calf sucking milk		
			I've had an idea, if we put the
			words for the food here, anyone looking
Match, match – draw the food and			could match
the words to match	Yeah in a column. This is going to be hard – it's like a puzzle	Draws list	
		Children go to computer to present	
		information using KidPix. Plan is taped to side of computer	
		RP has mouse	
that's good that's good	I'm going to do the sheep first	draws circle uses circle, then pen, fixes spaces	
Let me do the pig I can do it		MK takes mouse	
	You haven't joined it	draws circle undoes 2 x uses pencil	
I can	up you need to...	RP tries to take mouse MK draws 4 legs	
Here you can do it now		RP takes mouse	
	I need to do all the		
	Tail and things and the body again	draws tail with	
		pen Uses circle to draw head, undoes	
		draws head with pen	
	That's OK now but what about the calf		
Yes, but it's quite	and cow – do you want to do them?		
Hard		MK takes mouse Draws calf Uses undo 2 x	

	that's OK, now do the tail part and it's got to	uses eraser MK draws cow	
	Be little, you've got to do the mother too Now the head ...and the body, and the udder – big! Cool!	with a great deal of concentration	Excellent – you two are great at sharing the mouse
This farmer will be		Starts drawing farmer, realises needs space	
near the house, I really really want to do the barn, can I?	Yes it's your idea	at side, uses eraser then redraws	
I can erase...	too. You need to leave room for the boxes with the food		
Yeah.	names. How are we going to do this?	RP takes mouse	
That hat's....(laughs)	He's funny, (laughs)	draws boxes for types of food, carefully	
	Now I'm drawing for cereal, potatoes, fish,	then the farmer's hat, and erases it	
That's cool	milk, grass, hay, skim milk	Checks boxes with number and type of food	
Can I do the barn now please Pleeease.....	OK	Joins boxes carefully	
This is cool	Now we have to do all	MK takes mouse, draws barn with	
	The words, it's this first	pen RP takes mouse	
	It's too high	Types heading	
	You type some of the things – what kind of letters?	Erases and retypes	
That one	OK	Gives mouse to MK	
		Selects old English	
		Font	
	You did a mistake it's ea not a	MK types in boxes "cereal" Redoes word Gives mouse to RP	
			Think about the size of your letters -
	I think so		will they fit the boxes?
		RP types "potatoes" gives mouse to MK	
		who types "fish meal" they alternate the	
		mouse as they type the other boxes	
Good	Now we need to do the animal sounds	RP with mouse, draws speech balloons	
Shall we do it all four of them?	But I need a different letter....	RP writes "moo" with pen too!	
Just do it			
My turn...		RP does sounds for 2 animals, then MK. 2 animals.	

	Now we're going to draw the food	RP Draws food inside pig	
	How can I do this...	Chooses colour uses paint brush,	
	Oh no it's.... not it's not right.	erases tries again	
Use that one (indicates pen)	that's better	erases uses pen	
	Is this right? Cool!	← colours pig's head using paint can	Yes good, always select your colour
Let me do one now.... I like this colour		Gives mouse to MK who colours sheep	first
best – what do you think?	Mmm OK Look this is cool.... Oh no....	Mouse to RP who colours cow. Experiments with colour – colours whole screen	Remember how to undo that.....
	How will this go... Oh not...	Undoes colour Colours leg forgets to change	
Right, now my turn, this is easy	that's it	colour fixes up leg	
	Ooh, all spots	gives mouse to MK MK colours calf	
		with dots Gives mouse to RP	
Yeah	this is easy	who colours farmer	
This is my best bit, it should	OK	MK has mouse, colours barn brown	
go that colour, oh oh there's holes	No!	floods screen undoes fixes joins	
Good	Yeah	Recolours Mouse to RP	
	This is easy now This bit's wrong	Colours boxes fixes typing error	
	you didn't do it right, I can't	has trouble with type text has to move	
	get it the same, doesn't matter	letters using moving van	You could move with the van
I saw that	Oh no there was a little hole OK it's done.	floods screen, undoes, repairs hole in box recolours	
Cool we're finished	Yeah		You've done a good job!

Gathering and presenting information - 5.4.1 Pair D : M/AG and MM

Topic: docking and drafting

Name: MM	Name M/A/G	Action	JM
Cows		Children brainstorm for search, using search plan	
	Farming, farming first farming	M/A records	
...and sheep What about tails?			
You know docking...	Yes, we should put docking and drafting too and...		
			Do you know
			The word for rounding up – mustering?
			That might help.
OK			
		Children go to computer to search for information	
		M has mouse M/A has search plan	
We'll go to sheep		Selects 'find'	
	farming first, farming		
Oh, no, sheep		M Types sheep	
	What's – caption?	M scrolls down article	
		(Has some problems with mouse not working properly) not transcribed	
		M scrolls down	Hey I can see a view "short tailed sheep"
			I wonder if that would have any information about docking?
Oh yeah		(mouse continues to cause problems – replacement mouse pad is found)	
Good I got it!	Nothing about docking though	Selects "short-tail sheep" view	
			No luck...so, what are
			Some other ideas that you've got?
	What about farming now?	Selects Find	
		Types 'farming'	
		Article on "Farmington" comes up	So what did you get?
			What is Farmington?
	I don't know, we just tried to do "farming"		
OK	Go and put "drafting"		

			Could you use the word tool
Drafting and docking? Oh yeah, yeah		Selects word search	and type in 2 words?
	It's in there		Well try
			drafting first if you know that, perhaps
	Typing...	Types drafting	
Ooh...	It's not the right sort of drafting...		Just scroll
	No, no	M scrolls down	down in case there's something -
	Oh yeah		What about mustering?
			What do they call it in
It's not going to be there...			America? Rounding up?
	Go to find again...		Yes, you
			could try 2 words now
	So docking, ...	M/A takes mouse Selects find	Well think about
		Selects word search	other meanings of docking, like with ships and docks, when you look at the titles
I know, one article includes the plant	No but you're looking at <u>two</u> words		
Yeah I know	Docking <u>and</u>		What's it going to do?
			It's going to pick out all the articles that have got those 2 words in.
OK	Docking and farming	M/A types	
Well there's 14 articles....			
	Not one for us really...	Scrolls down titles	You've had a tough time with that mouse playing up.
No, not.			Let's quit and see what the books say.
		Children prepare draft screen using information	
It doesn't have an eye	Huh!	M draws drenching cycle, first sheep	
	You gotta do the other ear you know -	M/A adjusts drawing	
	-and put the ring so...		
	I'll do the colouring in...	M/A gets felts	
No do the colouring in afterwards.	Yeah, well		
Yeah OK the ring - say just pretend	Yeah OK do...		

Just pretend that the farmer	The farmer...		
Just pretend that	Oh yea rub it out	MA erases	
the tail hasn't come off so they have to cut it			
	No get the farmer Oh no... Yeah, just pretend		
(Laughs)	It hasn't come off. An eye where the nose is for goodness sake!	M draws next part	
	They do it so their bottoms are clean it's disgusting		
There you are he's nice and clean	What are you doing?	M draws docked sheep	
His bum			
	Yeah, and we're finished		
And then and then the fly...no flies!	What's that?	draws Logo	
See I'm going to write "Ewes", "Rams" and "lambs" and I know what we can do...			
	Yeah?		
....is write "Sheep" and then we write um		M indicates flow chart	
"ring on sheep", "if it hasn't come off cut it off"			
and then "hazard free of flies and insects" and all that			
"sheep"		M writes captions	
"putting ring on sheep"...			
	Yeah but you've Got to do something how to um <u>draft</u> , how to draft these things....		
Yeah I know...	you can't just put		
I know I know I know	The ewes there and the ....dadadadada		
Draft will just be "draft"			
And then write sorting-out-sheep-'Kay?	'Kay - go....	M goes back to writing captions	
On sheep...and...cut off...chop off...murder his tail!...	Yup Chop off is more....		
and then "hazard-free"			
	I'll do the ewes	M/A sketches drafting section	
I'll just write...and you can do the lambs as well		M writes captions	
		Children go to computer to present information using Kid Pix	
Right now what shall we draw first?		M has mouse	
We gotta do	The sheep		

	Yeah but we've got to do something like how they draft them		
Just like drafting and docking? How do you write...		Begins to handwrite title using pen tool (not on planning sheet)	
Drafting	Stop!		
	Erase it...		Sorry I didn't explain that you can actually type, if you want to type,
Yes type, type...			Sorry, I shouldn't have forgotten that you can actually go to -
		M goes to Goodies	Goodies on the menu bar and hold it down, go to
		selects Type Text	Type Text and it will give you a choice of fonts. Just click on one and you can start typing
	That one	Selects font	
OK			By the way you can't erase here -
That's too high			like back spacing
		Goes to moving van can't move whole letters Erases	Next time
			make sure your cursor, your marker is further down next time
Here?			Yes, that's a better place.
		(M gets a blood nose!)	
Coloured pencil	Oh no you can't	M/A takes mouse tries to move title	You'll probably need to
	Let's leave it		Erase
Great, so what shall we do now? Get the plan, draw a sheep...			Which part were you going to do first?
Um lines, this one			Weren't you going to do the drafting up the top round the other way?
	No it's too big - you've	Verbally negotiate	
	got to fit both those in. We'll do our drafting	Spatial aspects	
	on the top and docking on the bottom.		
Yeah			
	Would we be able to move it?		The sheep?
	Just up a bit	Uses moving van ↓	You might. Where to?
To there. Yep it does.		but title partly disappears.	Try it.

	We'll probably erase some of it.		
No just erase the whole thing			
			It's difficult to move because there's a hole there – can you see?
No just erase it,	Oh yeah I can see it		
Erase it.			
Can we just erase it?	Why? (crossly)		
Erase it cause we've got to do it up higher otherwise it won't be able to fit.		↓	
...otherwise we're only going to have that much space there...			
	Otherwise we just do one page, I mean, otherwise we just do drafting		I think it'll fit, M.
No...		↓	
			Could you type a caption instead of drawing it?
We want to draw		Begins to draw flow diagram	OK you draw!
What's that?			
No, what's that?	It's a <u>sheep</u> (crossly)		
(Laughs) Sorry	The head		
No...I'll show you	I haven't finished yet.	M	
I'll show you what I mean		Indicates plan, takes mouse, starts drawing	
Gap – gap – Now	Oh wait...		
can I just show you something?			
What are you doing?	No I'll just do this.	M/A takes mouse back, draws	
	I'm doing a 2 nd sheep! (impatiently)		
Drafting?	You can't just draft <u>one</u> sheep! Otherwise it's not drafting at all. <u>Drafting!</u> (crossly)	↓	
We're doing docking first	Look that's drafting		
	There... You can put an arrow there (indicates plan)		
	It's too long... It's too long (very cross)	Continues to draw	
Can I please do it?			
It looks like an old grandma...			It looks good
Do docking first...			
Do docking first -	What do you mean	↓	

Do docking first - now do an arrow	docking?		
	But you put an arrow up there cause you said	Verbally negotiate	
	drafting should go first (indicates plan)	Spatial aspects	
Well this is the biggest, this takes the least space (indicates plan)	so you're going to do docking...		
			So then you won't have to worry about the space OK
			What do you think M/A?
No do this one first because it takes up the most room and this one ...doesn't take very much room up	I don't know cause it's...if you do it like in a, like in a big paddock and um...	↓ Both indicate plan	
	Well we'll still have <u>enough</u> room, otherwise we'll just do the ewes		
Do docking first	And the rams and all of that	↓	Right it won't matter – shall we see if there's an arrow on the stamps to save you drawing it?
	There's one	JM takes mouse and selects "Rubber Stamps"	
There's another one	That's a good one	M/A Places arrows	
		On screen	Well I'll close for you to use yourselves
Can I do a picture	P – lease!	M/AG gives mouse to M who draws man's head.	OK.
It's the man who's doing the bad deed!	What's that?		
That's got no legs	(laughs)		
Can I just do something on this			That's working -
Thank you; but... don't, just, just...	mmm		good!
	Wait there, wait there wait there...	M/A takes mouse finishes drawing	
Oohh – (disappointed)			
Now, what's next?	You can do the other one now		Those are very good sheep M/A.
Oh how am I going to do a knife?		M/A gives mouse to M who draws	
	hang on just do the knife	next parts of flow diagram	
	On it, or just do it next to it		

No I'll show you what I'm going to do... tail like this...			
and then... I'll just erase it			
A bit	It looks like it's Cutting it off, eh.		
			Well I wouldn't like to be that sheep
	I would -		
Yeah better than having blowflies			
how can I point the arrow down?		↓	Go to Goodies
			Go to edit stamp, click
		Uses rotate stamp tool	here till you get it like you want
			it,...good
Oh hang on I need the eraser			
Now...	You show the thing's behind	↓	
Very funny	Yeah that's it	Draws last sheep	
(Laughs) Now I've just got			
To do that fly thing...and...		draws "no flies" sign	
Now what am I doing?			
	It's the drafting		Are you going to put in the type text?
Oh yes...		Selects alphabet sounds and gets a surprise	
Oh!	No you got to cancel...		
Oh!	Undo, undo...		
I didn't need to go to undo...			
No that one	That one?	Selects text font	
	It's got to be small		
Aah	It's too big!		
Yes it is		Selects smaller font	
	No, you need something that really stands out		
	it's too small That first one...	Selects first font	
No...	Yes it is...		It doesn't usually type in capitals – have you got caps lock on?

		Turns off caps lock	
Now what's next, "putting ring on sheep"...		Types	
"-ring - on -sheep"	"cut off if hasn't..."	M/A reads text of	
how am I going to		screen plan	
write that?...		MM points to area	
"cut off..."		of screen	
"if doesn't work"	Yeah	Modifies text plan to fit screen space	
	Isn't that supposed to be before the n?	Reference to apostrophe in "doesn't"	No, it's in
	Why?		the right place.
			Think about
			where the letter is left out
			M/A,
			Like which letter is left out,
			it's the 'o' of
"Does not"			not isn't it...
			You put the
			apostrophe where the left
			out
			letter is. Do you get it?
	Yeah, I know.		
	Is "hazard" alright?	Reference to spelling	
	"Hazzard"	in next caption.	
H - a - z - a - r - d			Can you
			spell that?
			Two z's. Alright.
Hazard	.....free of flies.....	...of insects... no of <u>flies</u> cause insects	
...but those worm things	don't go into them only flies do.		
do and maggots do	Yeah, only if you		
	don't drench them "of flies"....		
"of"	because only say	Types	
	insects when you drench them		
Oh yeah, true...."flies"			
Woo-hoo!		Puts exclamation mark at end of caption	
	Another one!	Puts another exclamation mark	
	Come over here; bring it over a bit....		Excellent
....and now we'll go to this one here and write "Docking".			
I mean "Drafting"	We've already done Docking.	Types heading.	
Will I fit in?			
Oh	Yeah..	Erases	
		Retypes	

	Go, M.		
Can we do a line across the page to divide them?	Use "ruler"?		Yes but it won't be straight...
		Draws line across to divide sections	
Kay, now up here back, no	Go here	|	
Oh	One...	↓	
Now	'a' go to 'a'	Goes to "alphabet text"	
Now...help	Go to 'return'	Puts in sub-headings	
Sorry...now...	Press your return		
I'll just do some lines down here			
and we can do the	do the straight		
Oh, yeah	line...	Uses "ruler" to divide 3 sections	
Will it make it?	just up to there...		
Is that straight?			
Now here, eh, because	Yep, yep		
The lamb's not very big	Yeah	Making spatial decisions	
Oh	Don't worry, just go up to the top one		
Sorry...			
			You've gone really quickly – that's great
And it looks neat, eh.			Swap mouse and plan now
		M/A takes mouse	Please
Just draw it, like up to there, (indicates plan)	Good!	Begins to draw lower section.	
I reckon our thing looks cool!		|	
Oh, you're just doing the face? They don't go like that, the horns go like this	Yeah I know	|	
No, I mean, erase it out...	No that's how they do it - they're much curved at the	↓	
No, like, I mean, I'll show you...	front		
You go like this...I'll just leave the head		M takes mouse and draws	
there, you go like that...and like			
That...Like that...	I'll do it much bigger then	M/A takes mouse, draws and	
Do the head a little bit smaller		adjusts	

And try and do it like I did	Smaller...		
It isn't fat like that!	I know that!		
Try and copy off this, copy off that...		Show plan to M/A	
Copy off that!	Yeah I'm trying to do this – I can't look at 2 things at the same time.		
Yeah, and, no, that's the body – make that the body and then the two legs – the four legs – down there – just try and copy my thing. Doesn't have to be...	Do you want it like that?		
Look at my head... and so the shoulders		M talks M/A through the drawing using the plan to	
go up there, yep...that's enough! That's enough! And now the head comes down here,		Illustrate her	
Yep...and then the horns come around like that...		instructions	
Yep...			
	Do we erase this now? it's like a dog....		that was very hard....
(laughs)			Good job M/A you've done
			really well – maybe if you did the sheep's ears under the sticky-out sheep's ears -
	Why?		Sheep have got little ears – you've done the horns but you haven't done any ears – if you did the ears just next to it.
	Aw, look at that eye!		
No, no, here I'll show you,		M tries to grab mouse	
I just want to rub out my eye! Wait, wait!	I want to do the ears first!	M/A holds mouse and keeps working	She's going to do it.
Oh, yep			M/A'll rub it out too. That's better, that's it.
Like that!			
Do the eyes, like a bit bigger			
Now do that one...	Yea...OK		
		M takes the mouse, draws	
I reckon this looks really cool...		next animals (middle and small sheep)	The whole thing's fantastic
We like everything perfect, me and her, eh			
	Well that's how we get better grades...		
	Aw look at that leg! (laughs)		

			You're just about ready to colour now
Look at that head!	That's <u>my</u> masterpiece... Oh no....mine doesn't look that...Make the eyes look...		
Ohhh...look at that..mine's going to look like a little cute lamb	Big legs...	↓	
That looks kind of cute, eh.		(both laugh)	
Colour	She's going to do		What now?
Colour	the ball aren't you		
That looks like a face...			
	Don't do too much... We gotta write 'Rams'		
	'Ewes' and da da da		You might want to colour
	Yeah the background		The background slightly differently
Now GOSH	What do you think the background...	↓	
You can write the ram,	Write down here	Negotiate type text verbally	
Kay, now write it in this, that, line...you can write all of them, I don't want to....	Yeah I'll write all of them		
Try and get it in the middle		↓	
It is time to colour it.	"Rams"...	Types	
			Do you want to talk about it before you do it?
			You need to decide about the actual colours and not argue...! Do you want them all to be the same colour?
	Not necessarily		
No OK. All these grey...		M points to screen.	
	What about the outside – we'll do the outside blue...		
Yeah blue, blue, blue green, green, green and grey, grey, grey	Oh hang on....	M points to screen objects	
...and then here we'll do grey grey grey			
and this bit down there can be pink	I'm doing it in	M/A repairs lines	
What are you doing	case the blue goes down here		
....and that bit over there			You can
		↓	always go to 'undo' – the
OK		Selects colour	funny face – if a colour doesn't work

Is that paint eh?	go to blue, light	Selects paint can	
	blue...		go to undo
no that looks cool....		Selects undo Laugh at "Oh no"	
Oops – undo Oh you egg...(to self)	There's a hole	On "undo" tool"	
There's a hole in my bucket dear Lisa		floods screen	
		Selects wrong colour, paints	
There's a hole in my bucket.... Yeah	Oh it's gone green!	Selects Undo	Change your colour...
		Selects another colour, playing...	
OK	It's red!	paints	
OK		Selects "right" colour	
Oh good		paints	
That's an ugly blue	much better	Negotiate colours	
	we'll do the lighter one		Very nice
	Now we'll do the ground		
Just this...ohhh	No that'll be alright		
	That'll be alright...		
	Like that	↓	
Yup			
	Now do this NO there's a gap	floods screen, selects 'undo', M/A repairs	
I knew as well			Good M/A Yeah
	I'll do this one as well	Selects colour, paints	
Now do that brown...	Wait till it's going on...what about the faces and the...what about the legs?	Negotiate colour	
Awww-undo!	Oh that's alright.		
Now what do we do for their faces?		Negotiate colours	
	I think a much lighter...		
pink!	as I was saying... a lighter grey		
OK does that look great?	Yep!	Selects colour, paints	Yes, sure does. You've
		M/A takes mouse and colours in	been really quick, the quickest pair...
Even though we fussed around...		detail very	You fussed

		Quickly	around but you fussed around quickly!!
	Done!	↓	You really are wonderful.
That looks fantastic	I concentrate...	↓	
It's the best; we had lots of disasters...			All finished...
			and hundreds
			of arguments but you managed to sort them out....

5.4.2 Integrating hypertextual strategies

5.4.2 Pair E : MM and H

Hyperstudio project: gathering information and presenting using hypertext

Name: MM	Name H	Action	JM
		Children gather information for their screens using (1) TVNZ Encyclopaedia and (2) Encarta 96	
		H has mouse M records notes	
	OK let's go to "topics"	H selects "topics" and scrolls down	
'Kay, go down to "Bee"	Or you could just print in "Bee" – "Bees"....		
Push harder	Aaah! (pleased)	Clicks repeatedly "Bees" comes up on index	Different isn't it.
			Before you select, look at the others. Would any be useful?
Beehive might be useful for honey.		("Beehive" is an article on the Parliament building)	Might it be a bee's beehive? Is there another beehive?
	Now we go down....	H opens "Bees" Scrolls down	
Honey is.... Honey...		M reads captions	
	If you read the top one of them... Swap!	Children swap jobs	
OK, honey!	Sorry, just taking notes "Honey" is widely	M has mouse and own notes H has own notes	
"...as a food in NZ"	Valued...as a food in NZ" "...but even outweighing	Both read screen	
"...pollination"	this value is the....Do you know what pollination is?		
Do you? Yeah it's the stuff on the flowers that they suck up	No?		Do you know what pollen is?
			Well, if you think about a bee going from flower to
			Flower and it walks on the flower what do you think goes on its legs?
	The pollen.		And where does it take the pollen?
To the beehive			It does too, but it also takes pollen from flower to flower.
			And that mixing of the pollen helps flowers to grow properly and make seeds.
Should we write all of that?		JM points to screen	See, it's pollination of plants so that means grasses too.

		Closes window	the CDS then you can have a look at Encarta.
		Now using Encarta '96 M has mouse H has notes	What are you going to search for?
OK shall we go to "Find"?	Honey		
	No – "word search" and "we" have tried "Bees" and "Honey"		Good girl
		M types	
	Oooh	Articles are found	
Honey bee, honey bee! Honey!	Honey bee	"Honey bees" is selected	
		JM indicates screen	Remember how you can get back to this
"...the larvae...the nectar of flowers...oh, here...the nectar of flowers is ingested by worker bees and converted to honey in special sacs in their oesophagi.	H laughs	M reads print text	That's just what the book said too isn't it?
			It said it stores it in their stomach. It's a fancy way of saying that
			oesophagus it's part of your stomach, and a bee's too! - the top part.
"It is stored and aged in combs in their hives" it's like those bits in – um		M reads aloud, processing and	
The honey hive – in the bee hives – I've seen that ad. – going already (sings)		selecting	
Yeah the first bit, here "Sweet super saturated			Anything to write down?
The nectar of flowers is ingested by worker bees..."			
Oh what about this? "Bee honey is an important			
constituent of the diet of many animals such as bears and badgers and is put to many uses by humans. Other insects such as the honey ant and various aphids manufacture honey – like substances from flowers			
from the honey dew of plants or from the			
Sweet secre-tions elaborated -----by			
other insects. I think, we should just write			
"Bee honey is an important consity. nt of the diet of many animals such			

Isn't it...I know what it is – but I've forgotten the words			Do you know what clover is?
	It's, it's 4 leafed clover?	(All go outside)	Right we're going for a walk outside to find one.
			....on lots of farms they grow clover for the animals to eat, that's why pollination is so important.
"pollination of pastures"		M takes notes verbatim	
"Honey is widely valued...."		M reads JM reads "translating" the difficult parts of the text	Are you sure you know exactly what those notes mean? If you just wrote "good food" instead of that it still gives the same meaning, Then this part – "even outweighing" means even <u>more</u> . The value is the pollination of pasture plans so pollinating pastures means the plants animals eat, like beef cattle
So I could say "honey is a very important food And also helps um plants by fertilising them?"		M begins to manipulate and transform text text	Well bees help plants -
The best.	While clover is the healthiest honey...		
Royal Jelly!	Let's see if there's any more	Scrolling down article	
It says quite a lot about clover and <u>red</u> clover.	"pollinate lu-cerne and red clover"...[k] Yeah	Scanning and selecting pieces of text, reading some aloud	Lucerne. That's about bumble bees isn't it.
That's all	That's all	Scrolls, comes to end of article	Have a look at the pictures.
Oh – The Queen bee...			Is there anything about honey there?
	I think it just makes the picture bigger.	Opens picture (Sound didn't work)	Try the sound
	What about the....worker bee?		
We should search for another word...		Closes screen	
		Types "honey" – doesn't come up on index	
It's got to go into the 'o'		Clicks to scroll down index.	I suggest you look in the books while I change over

			That's a good point – could you put “light honey” and an equal sign, equals high quality.
	.....and dark colours	H speaks and writes	
	Equals....equals...high quality....and dark colour equals low!		
- a l – ity	“dark colour equals low”	M dictates spelling, watches it.	
No it's honey, not colour!		Writing and picks up on “error”	
			Do you think you've got enough information?
“other high grade honeys are made by bees from orange blossoms, clover and alfalfa” – I heard of that!			
- what about this bit – white honey?			Remember we said in NZ
			white honey is clover honey and this is
M (laughs)			an American encyclopaedia. Perhaps leave it this time for a bigger project. OK, scroll down and see if there's anything else – you've got so much!
Good – “honey has a fuel value of about 3300....		Scrolls down M reads screen	
Is it petrol? (laughs)	(laughs)		Do you know what a fuel value is?
.			Yes it is sort of – petrol for our bodies, that means
Yeah.....it does?	Yeah		It's very good – you know how sugar gives you energy
Does sugar give you energy?	(laughs)		
			Yes it does if you don't eat any sugar or things with
- or juice -			sugar in the fruit yeah – if you
			Don't have it you don't have quite so much energy
Or if you have too much you could get – what do you call it?			
	Diabetes		Diabetes – thing is your body is like a machine that converts
And you gotta have those tablet things – you've gotta have a certain amount of sugar every day.			sugar into energy.
			Yeah

as bears and badgers, and is put to many uses by humans.			
			What would you write down in really simple words?
"Bee honey is a very important food for many animals such as bears, badgers and is put to many uses by humans – "very important food".....		M records	
"diet food for many animals	...diet food, diet food, diet food.		
um, such as bears and badgers".			If you're taking notes you can just write – bear – badger.
OK, Yeah, and then, and then,			You need to understand it when you come back to it. Do you know what a badger is?
It's an animal...."and is	H (laughs)		
put to use by humans"		JM indicates planning already done	Could you put it up here?
.....uses for human			
put to use for humans			
put to uses for humans		M	many uses
many uses for humans		Gives plan to H	
Ummm.....		M	
"Bee honey is composted		Reads aloud	
(composed) of fructose [o]			
(fructose) glucose and water.			
The varying proportions. It also contains			
e-n-z-y-meas (enzymes) and oils. The colour			
and flavour".....oh, here!			
"the colour and flavour depend on the age of			
\the honey and on the source of the nectar"...Write that down.		H starts recording.	So that's the kind of flower they get it from?
No....Yes!			
			How are you going to write that in holes?
'Kay. Um – colour		M reads aloud what H is writing.	
ahhh age of honey			
source of nectar			That's hard language up there. You have to make it into simple language.
"Light coloured honeys are usually of higher quality than dark honeys"		M goes back to print text and reads aloud	

			Well those bits mightn't be <u>very</u> useful
			though you could mention energy.
	Sugar is an energy food?	Records on plan	
"66° Celsius and about 150° .....F			High energy – that's the same as saying fuel
"..to dissolve the crystals it is poured into containers that are then sealed to prevent c y-sta-l-a c. rystalisation.....		Reads screen	
is crystaleese, crystalised, I mean,			
Ferments at 16° Celsius ....fermentation" (laughs)			Is that useful information?
No			
Can we go to honey bees on the other one?			Do you want
Yeah	OK		Another look?
		M closes N carta and loads TVNZ which returns directly to "Bees"	
Hugh – beeswax! Oh no we're not doing that			
	Honey. "Social honey producers are recognised as the most ec-o-nomically val-able insects"	H reads article aloud	
We could write the <u>kinds</u> of bees, cause there's honey bees, bumble...	Honey bees are valuable!		What is that telling you about bees?
		M is drawing pictures	
			Someone else is doing that but you might need to mention it.
...and, and	...so we could write down the <u>kinds</u> of honey bees – there's honey bee there's bumble bee there's queen bee, there's native bee aah...		
bee bee, buzzy bee! honey puffs!	(Laughs)		Yes well! Maybe you could put that the honey bee is the most economically valuable – think about pollinating crops, and grasses
(laughs)	Also bad because they can sting you (laughs)		Only if you annoy them
They're very freaky because if you annoy them -			
Cause once I got a bee on my shoulder and I didn't want to annoy it otherwise it would have stung me.			Right let's do our screen plans

		Children draft → Hyper Card plans	
OK – Write “very useful food”		Children firstly elaborates on and clarify their notes before categorising.	
“very important food”			
OK, so you draw a bear---a red bear			
Now I don't know what a badger looks like			
like a panda?			black and white... ....sort of....
			You could write the word as well
	...bear...bad-ger	Writes H draws birds	What about our native birds too?
...bees store the honey...when they said “store in cells do they mean nectar or honey?”		M begins to draw a flow diagram	
Mmm			Honey
Um...cycle of			You've done that really well – what could you call that whole thing?
Um....”cycle of bees collecting honey”....collecting nectar?			OK
m-m-m.....and as a result – very useful food!			
		JM gives red pen – helping children categorise information	Can you put a circle round that part with red?
		JM gives green pen to M	Now can you circle the animal part on both ones with green
			because that helps you see what the different categories are.
...and then what honey is <u>used</u> for...then we have a bit down here...			
and then...		JM labels some of the categories	So we've got honey as a food for people
		on H's notes.	honey as a food for animals, and then collecting honey.
	This might take the whole thing up (Hypercard)	Discussing spatial features	
			We should have 2 cards (Hypercards)
We could have this or we could have one big one, or this here			
and this down here	I think, this would be a great one	Indicates honey gathering diagram	
Oh yeah, true, cause it has nearly taken up the page			
....light....dark...	....	M copies some of the text from Hs notes onto hers.	

			OK – excellent, wonderful.
		The children draft hypercard plans – one called “Honey Cycle” one called “Uses”	
		Children go to the computer to present information using Hyperstudio	
		H with mouse M with plan	
		Begins “uses of honey” card	
		Types in title in lower case, deletes, caps lock. Uses adjust to size and move title.	
What the...	No...	Starts to type minor captions changes colour accidentally deletes whole card.	
		Redoes title Adjusts print Types subtopics-loses card again	
			Let’s take a breath and try the Honey Cycle Card!
		Goes to Honey Cycle card which JM has prepared.	
			Now I think you’ve been losing your work when you do something
OK			With colour. Let’s be very careful and slow with colour.
	“Collect nectar....”	H types in caption H reads text aloud, draws arrow	
I’ll try this	It looks like a spider!	M takes mouse tries to draw hexagon cell using rectangle tool.	
		Deletes Hand draws a hexagon, erases whole frame	
This is fun		Redraws Adjusts and moves honey cell	
I bet if the boys see this they’ll...		colours cell colours background which leaks	
YES!	That’s good.	paints white redoes types caption;	
	“Pollen <u>on</u> legs” not “ <u>in</u> ”	H watches and proof reads screen while M types	
	“clover...manuka...”	M draws circle, types flower names H dictates.	
What’s next? I need to move it back (Cursor)	“manuka”		

	"flowers"	Rules line accidentally deletes part of caption	
		retypes and adjusts position deletes again, retypes, adjusts draws line again	
		Types last caption H dictates and spells	
	"stores-in-different -e-n-t, different-cells?"		
is it c-e?			
	c-e-l-l-s yes		
Should you move it to there?			
	Yes, type it then I can lasoo it if it doesn't look right		
I reckon it looks all right but it could go there			Make sure – think -
		H takes mouse, lassos and moves text M takes mouse, paints	
		flowers, repairs leaks repaints	You should
If you draw a honey jar you colour it yellow			repair all the holes now
	OK	H takes mouse, repairs gaps	
		Moves colour menu to side of card so she can colour underneath	
Done!		Finishes colouring without incident	
			Yes that's great, what about our other one....
		Begin work on "Uses of honey" screen	
(laughs)		H starts typing card title Adjusts size up and down	
that's funny "for cooking"		M reads captions H types captions	
		H changes colour of screen and changes colour of eraser	
			OK be extra careful now – remember what we talked about
You can do "Hokey Pokey" with the square... H-o-k-e-y P-o-k-e-y		Draws square, types Hokey Pokey caption M spells for H	
	Yeah, now the box...	H begins drawing box	
Do you know how to do that? You get the pencil and make it look 3D			
I'll do it...	OK....	Tries to make box 3D M takes mouse and adjusts box shape	
"Honey puffs".....use that one		M indicates rectangle tool	

wider?		H draws and erases	
return, return	No I can fit it....	Types vertical text "Honey Puffs"	
Do it wider and longer	I have to do it wider and longer	Deletes, begins to redraw box	
Go across... Keep on going, keep on going, keep on going,			
Keep on going – STOP!		Types vertically	
You should draw a line down the middle		Draws dots on box	
Now you're onto "very important"....do a line		H draws straight line	
You need to make it bigger			
	I'm going to lift it	Types, adjusts, moves type to left, draws box	
"Honey-is-very good for bears and badgers-good-"		M dictates	
Do you want to draw a bear and a badger?		H types	
"NZ native birds – like n-a-t-i-v-e, like tuis, love nectar"	Later...		
"birds" – no, you need spacing -			
"n-e-c-t-a-r-"		H fixes typing error by erasing	
Now you gotta draw – just use the circle – it's more quicker			
	OK	H tries circle, erases, draws, erases, uses circle	
		Repairs lines and colours with no problems	

Hyperstudio project: gathering information and presenting using hypertext

Hypercard Topics: Bees – types (general), Queen bee, worker bees

5.4.2 Group F : L, MK, and T (RP)

Name: L	Name: T	Name: M	Action	JM
			Children brainstorm questions about types of bees; queen bee, worker bees	
	What kind of bees	Ummm.	M is scribe for his information sheet "types of bees"	
		How many different bees are there...		
No, no, like how many different <u>jobs</u> , like				
what's the name of all the jobs the bees do?				
	Well first write something about the bees first			
Yeah like all the jobs...	What things they do...			
like undertakers, honey bees.....	What things do they do?			
How many eggs does the Queen Bee lay	How many...			
in..... in one year	Why don't you do that cause you're doing the Queen bee?	200 a day!		
Oh yes...				
Got that	How many types of bees...			
	Yep what are the names	What are the names of them		
I know one...native bees....	...and the other one you were talking about			
	What country	What country		
	No what country has the most bees and then...no what country has bees...			
No what country are the bees native to?				
	Yep (laughs)	How many countries have bees in them		

Probably all			T scribes for her information sheet "Honeybees"	
	Honeybees – how do they get their honey?			
They just fly round – here's a flower – they go fwoosh. They	(laughs)	(laughs)		
Get all the pollen. They take it back				
and then they have it...				
How many				
flowers do they visit in one trip?	Do they get enough pollen?			
How many times do they go out?		How much honey do they get a day?		
Yeah – that's		How much times do they go out a day?		
What I was saying – how many times do they go out in	How many			
one day?	times do they....	How many trips do they do?		
	No - how many			
	Trips do they <u>take</u> in a day?		↓	
Wait I'm still	OK -	What's thjat?	L scribes for her information sheet "Queen Bee"	
doing the heading	How many babies does a Queen Bee have?			
How many eggs	- does the Queen Bee lay – OK			
l-a-	How long does the Queen Bee live?	I've got a good question		
How long....	Um?	Do bees go toilet?		
No....I'm going to put...what does she look like.				
			Children go to the computer to find information, using TVNZ encyclopaedia.	
	It was <u>Types of bees</u> – how many bees are there?		M has mouse L has own information, T has her and Ms sheets.	
Topics, topics		Try "find"	M types in "Bees" under "Topic"	

	Wait I'll just write down these "Queen Bee"	Cool, cool – Bees	M takes mouse and	
		"they're important"..	scrolls across screen. M reads print text aloud as scans	
"to the beehive" so maybe that might have a bit of information.				
	No wait wait Bumble bee			Just take little notes T
Worker bee		Worker bee Let's go close up to the	M goes to close view	Don't write it all down
Go up close Click on beehive first		beehive	of picture	
"the beehive...."		Oh yeah did we do something about where they live? (looks at notes)		
	I think it			
Queen bee first	Was for <u>you</u> (indicates L)		Goes to close view of bee then back to print text	
		Worker bee	then to close view of worker bee	
Worker bee				
What about the drones? I suppose we can look at the drones		..."tend to all the chores" they have they have to do all the work stuff	All read caption aloud to themselves Goes to close view of drone	
"the eggs laid by the Queen are fertilized by the drones..."		"The eggs laid by the queen are fertilised by the drones".....	M & L read together	
		Oh – that's.....		
That's good!				
The drones fertilise...I can write it down				
	Is there a honey bee	No		
Wow Oooh		If you press on this thing you get a great view	Clicks on full screen view of bumble bee	
it's big	Can you, no you can't photocopy...			
		Back back back Do you want to go back to it?	Makes picture smaller	

(Sings) Those bees look like they have their sacs on there....			M. then copies picture onto his information sheet.	They look very difficult don't they
If you go to the native bees they have really big sacs				
furry, furry		They look like crabs legs		(laughs)
"native bees – often seen in the summer and autumn – is - blah blah – blah blah	What's the sac?			
	Yeah			
				Have you found what you need?
"Queen lays 2000 eggs"	2000 eggs...			
		"Bumble bees of first importance...."	Children find information in books, then plan their hypercards	Right let's have a look at the books....
			Children go to computer to present information on Hyperstudio.	
			T's plan is on first card – worker bees and drones. T is absent. R is substituting R has mouse	
What's going to go In here Mrs M?			M holds plan L watches screen R draws circle,	It's just text so
		OK, it is OK.	types, adjust placement of line	far but you could draw too
			L draws 2 nd circle Types heading	
			Changes colour Draws 2 circles for bee	
			erases wing	
				Shall we
			JM saves card and opens "Type of Bees"	leave it for T to colour tomorrow?
OK	Yeah.	My turn.	M takes mouse and begins own hypercard – "type of bees"	
		Now...	M travels round screen with mouse as if orienting himself spatially	

			L holds his plan M moves tool bar to a corner	
		....Like that	M types heading Draws main shape of bee	
		....it's hard to....		M do you know about insects – that they have
		Yeah that's what I'm doing	↓ (indicates)	3 parts to their body?
				Oh yeah wonderful I thought you'd only done 2 - good man.
			↓	But actually technically the legs go on this part – the thorax
	I thought that was the other way round - the little tiny one was the head			He's got artist's
		It is hard to do...		licence – do you know what that is? Should your
				title say types of bee? Because it's about the different types of bee.
		Oh yeah OK	Adjusts type text	
		Can L draw it now?		Well yes but
		'Kay, circle, legs....	L. draws, very slowly and precisely	you give her instructions
				Is that OK M (seeing it's yours!)
Looks better – cause then you'll have to draw the eyes and -	It's not join on	just draw it....		
		should		
	Looks like...	just draw it	↓	Which way's
	This is the head (laughs)	(laughs)		up L? (trying to hurry L)
	3 on each side			Legs? This is speed
Can I draw it?				for you L, this is speed!
	I know exactly what I'm doing!			She's getting really adventurous now R.
That looks like eyes and a hairy nose... You really should			↓	
do it....like this	But I am drawing with the pencil.		R Takes mouse, adjusts legs – gives mouse to L.	

		See – if you draw it could come up like this	M shows plan to L.	
	Goodbye!		Erases.	
Now the wing is going over the legs				See what it looks like with both wings
Can I have a turn		Yeah		on – is that alright M.
	Gone far away over to there			
Can I help her?		That's OK.		She's getting faster...
	Too small		Erases, redraws	
L – that looks like a leg now			L saves, finishes drawing	Can you save now please?
		Thanks		That's very good L.
Can I just say something? Make that like that but	Yup			
make the leg go that way – cause if, if you did this bit				
Smaller then that would be the head				
	The legs are trying to go....			
		'Kay		
		Feelers....cool		
Can I draw something?		OK		
			L. takes plan M takes mouse to put print text on	
		I'm just going to put the lines	Draws lines for diagram labels	
		On	using straight line tool	
		There's 7		
	One for Queenbee...			
		I saw that.		
	And another		M types labels	Good work Mark
	one...."they sting then die"			
	Another one – <u>drone</u> bee			
It's not fitting!	Another short one-native bee			You are fast M.
			Text needs moving across screen	Yeah

	Another one..."bumble bee..." oh OK a long one,		L looks at available Space on card	
Came up...3 zeros	"10,000 different species of bees"		↓ no – no	Looking good! Do you need species spelt out M?
	"species" do		← do I have enough room to get across?	
	You know I'll just check			
	s-p, s-p-e-c-i-e-s now, "of bees"			
	-e-e-e 'Kay – next one			
	"bumble bees make honey"		↓	
	next line.... next line.....		L. watches type text, reminding M of space available – gives warnings,	
				Can you save again please I'm getting nervous about the colour!
	-and I can colour it in!			Remember, change the <u>tool</u> before you change the colour.
		wow	M colours background and floods screen	
		Green bling bling, bling	Undoes, repairs Changes colours	
Save it!		I'll have....	Colours shapes Saves	Just in case
	Looks pretty bad	Should I paint it a different colour?		
Yes	Same as wings?	Can I connect the head?	Recolours	
Save it?	Yes		R saves	Yes please! I'll just show you
			JM helps children to mark cards	how to put a sign on to go to the next card in the stack it's called
			(not transcribed)	add-a-button.....
				Right, who's next?
			M holds T's plan R house mouse They begin T's card	
It's too small			R types headings	
		Do a circle		

R

L

M

I was going to type...	She was to write...			
			M reads out text R types	
"honey bees...." That's all capitals. Is that all capitals?				
I don't get this....		Yeah caps lock No me too		
Shall I write " <u>the</u> mocker bee" or "worker bee"			JM interprets T's plan (not transcribed)	OK M I've changed it now. Whatever makes most sense to you....
		(reads print caption)	M dictates print text R types	
Oh that doesn't	Like this...		L helps to draw and to move box	
Cool!	it can go there		R. plays, moving squares around	
Oh yeah that's right		"ten trips"....		
Ooh....	...and it takes 10 trips a day...	That's what we said...		
		Should we save it?	R enlarges headings, redoes title. M saves	Yes! Please!
That's it! So I'm going to do it.				
Is that finished?	Yeah that part's done		Children laugh	Now we save it!
OK Why don't I drag this over here because			Drags worker bee caption	
it won't fit?	Very intelligent!			
		You have to go back, you have to get that thing up there....		
			Uses square to drag other caption	
It has to go across There! Can I do that bigger?			Clicks outside to fix caption	
		Leave it and do a lasso round it...no...	M talks R through adjusting size of object	
		Start on that part and go...		
(laughs) 'Kay!		now lift it up, yep, yep there n' – how – you have to do a drone now		
		"drone bee"? drone...	R types	
	Go back you've made a spelling error			
-r-o-n-e		'Kay, next....		

R

L

M

Which one am I doing?		That one there	M indicates plan	
	Not just the bees			
		Start here, then it'll fit	R tries to adjust size M talks her through it	You're such a good teacher M
There! Now...		Yep...you have to do it again		
		And that can be a title		Can you save please Rebecca -
Nooo.....		Go to "file" then "save stack"		Can you do it?
		Now!	M dictates caption R draws bees	Well done R.
Oh, stop...		You could do		
		the red bee different like we've done here.	M indicates plan	
Oh		You can do a big one down here if you		
This is making me feel...			Erases letters and drawing	
	You can erase it			
	Why don't you just start again			
				It's OK R you do need to be very patient and
Now I'm going to go...			R redraws and retypes	not worry, that's it! That's the way!
	There's going to be a picture of a bee on each card		R works, tensely	
				Good, hold your hand steady, go slow and steady like the tortoise winning the race
It's very hard to copy...				
		Could be like that...		
		Could be like that...	M indicates plan	
'Kay...	You're going to be colouring		R finishes drawing	
	the bees - and there's a hole -			
	What about legs on the thorax, on			
	the middle part	Legs up here?		'T didn't do it

R	L	M		
head, thorax and –			↓	on her drawing yes, it should be
(Laughs)				-abdomen
Now I have to...		"fertilises the eggs"	M. reads caption R types	
Yeah, it says		"male honey bee"		
male (the plan)			R. drags caption to place it using circle	Wonderful
There!	Drag it to the middle	R drags other caption →		
		We've finished! Why don't you do those 2 parts	M indicates plan	A technical thing?
		You start from up there and then pull it down	M talks R through adjusting	
		Put your pointer there up and	and dragging another piece	
		Across....see! Now pull it down.	of text	
I'm going to delete this – no – colour now				Clued up M!
			R saves card	Save! Now remember the problems with colouring....
I'll fix them first	There's some holes		R repairs line breaks	
			R colours quickly with no problems (not transcribed)	
			JM helps R to put a button on the card (not transcribed)	

R (only 2 children)	L	R stays to help L with her card	
	There's my card!	L has mouse R has plan	
	Kay	JM goes through L's plan with her	Look L has some very strange words
	"a box or else"	to proof/edit, to make it easier	here – "ab-o-x-els" she hasn't put a space – what's
	"arrive"	For R to read L puts in spaces	that word? "arrive"
		R adjusts spellings and words	"The undertaker digs it out – the undertaker bee
			digs it out" – you really wanted to do that one didn't you L?
Bees....is this anything?	Yes "Bees"		After you've done that – save it.
			Ask the author!
	"so"		
"so the undertaker digs it out...."	"digs"		It's the writing
"The queen-is-twice-the-size-		R reads plan to herself	L save the stack now.
		L draws Queen bee's body with pencil tool	
	Just read, read the		
	Writing out later -		
"Know" – it looks like			
an R – is it "know"	Yes		
One third to go!			
Very straight			
You are going to...	How many lines?	L begins to consider	
1, 2, 3....there's one over here....very long -		Spatial elements of screen in relation	
"The Queen bee"		to plan	
Save! Save! Save!		L saves stack	
"The Queen bee"...	I'm very comfortable		Are you comfortable L?
"The Queen bee must arrive in a box..."		L begins to type captions	I believe you!
(Laughs)			
"...arrive in a box"		R dictates	
"or else" – "it" "may be murdered"			
Oh "can" – sorry	it's funny (laughs)		
	No – a joke?	L types "bee" for "be" and laughs	Do you know about punctuation? You use a word, a kind of mistake
			on purpose using maybe a different spelling like you have
	...Like on the Simpsons. Let's beeee friends?		
Whoever reads this	I want to put it in -		Of course!

they go...she can't spell		↓	If they're thinking
Are we supposed to say – e-d, L.		↓	they mightn't! They'll know why -
M-u-r-d-e-r-e-d-	The 'd' disappeared!	L adjusts spelling	
"by the bees"	"by the bees"	↓	
"the bees"		↓	
"so the undertaker bee" "drags it out"		L saves it	Save!
		L colours card without incident	