

**BOOKS IN TEACHING SCIENCE IN A KINDERGARTEN CLASSROOM:
A STUDY OF ONE TEACHER**

by

SECK CHER TAN

B.Sc. (Hons), National University of Singapore, Singapore, 1983

Diploma in Education, National Institute of Education, Singapore, 1984

**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS**

in

THE FACULTY OF GRADUATE STUDIES

Department of Curriculum Studies

We accept this thesis as conforming to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

October, 1995

© Seck Cher Tan, 1995

In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the head of my department or by his or her representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Department of Curriculum Studies

The University of British Columbia
Vancouver, Canada

Date 3 November 1995

ABSTRACT

This study investigated one teacher's use of children's literature and trade books in teaching science in her Kindergarten classroom during one school year. The study was guided by two questions: 'How does a teacher make use of books in her Kindergarten science programme?' and 'Why does she use books in the way(s) she does?'

A qualitative case study research methodology was employed in this investigation. The collected data consisted of field notes written from observations of the classroom activities and transcribed from in-depth interviews with the teacher. Related documents such as samples of one child's class work, parent newsletters written by the teacher and weekly newsletters from the Kindergarten were also collected.

The teacher used books to teach both science content and process skills directly and indirectly. Books were used to teach science content directly by introducing science concepts, giving information and teaching vocabulary; and indirectly by assisting visualisation and providing simulation ideas. Books were also used to teach science process skills directly by guiding children's observation and self exploration; and indirectly by engaging children in scientific behaviours and providing opportunities for engaging children in scientific discourse.

This teacher had two underlying beliefs which supported her use of books in the classroom. One, a personal conviction that books supported science learning. Two, a practical intention of attracting children to explore a given activity.

TABLE OF CONTENTS

ABSTRACT.....	ii
TABLE OF CONTENTS.....	iii
LIST OF TABLES.....	v
ACKNOWLEDGEMENTS.....	vi
PROLOGUE.....	1
CHAPTER ONE.....	2
BACKGROUND	
1.1 RESEARCH FOCUS.....	4
1.1.1 Research Questions.....	4
1.2 SIGNIFICANCE OF THE STUDY.....	4
1.3 LITERATURE REVIEW.....	6
1.3.1 Early Childhood Science Education.....	6
1.3.2 The Role of Books in Early Childhood Science Education....	10
1.4 DESIGN AND METHOD OF ANALYSIS.....	14
1.4.1 Rationale for Qualitative Case Study Research.....	14
1.4.2 The Research Site and Participant of the Study.....	16
1.4.3 Data Collection.....	17
1.4.3.1 Observations.....	19
1.4.3.2 Interviews.....	20
1.4.3.3 Documents.....	23
1.4.4 Managing and Recording Data.....	23
1.4.5 Data Analysis.....	23
1.4.6 Criteria of Soundness.....	27
1.4.6.1 Credibility.....	27
1.4.6.2 Transferability.....	30
1.4.6.3 Dependability and Confirmability.....	30
1.5 PRESENTATION OF DATA.....	31

CHAPTER TWO.....	32
THE CLASSROOM	
CHAPTER THREE.....	40
THE TEACHER	
CHAPTER FOUR.....	49
THE CIRCLE	
CHAPTER FIVE.....	66
THE CENTRES	
CHAPTER SIX.....	75
EPILOGUE	
6.1 DISCUSSION.....	76
6.1.1 Research Question 1.....	78
6.1.1.1 Books used to teach science directly.....	78
6.1.1.2 Books used to teach science indirectly.....	81
6.1.2 Research Question 2.....	86
6.2 RECOMMENDATIONS FOR FURTHER RESEARCH	87
REFERENCES.....	88
APPENDIX A - Interview 1.....	93
APPENDIX B - Interview 2.....	112
APPENDIX C - Interview 3.....	134
APPENDIX D - Samples of observation field notes.....	157
APPENDIX E - Excerpts of newsletters.....	174

LIST OF TABLES

Table 1. Book use for direct/indirect teaching of science.....26

Table 2. Book use for direct and indirect teaching of science content.....84

Table 3. Book use for direct and indirect teaching of science processes.....85

ACKNOWLEDGEMENTS

I am grateful to my thesis committee members, Drs. Robert Carlisle, Ann Anderson and Karen Meyer, for their insightful comments, constructive criticisms and support of the narrative mode of documentation used in this thesis. I thank Ms Megan Farrow (assumed name) for her co-operation, friendship and for allowing me to tell her story.

To my husband, Tuck Wah, thank you for your support, encouragement, and firmness in not letting me give up on this last stage of the Master's Programme. Wen E, you inspired the initial idea for this thesis. Thank you for your nightly prayers and acceptance of the times when Mummy had to write instead of being with you. Ming E, you were my alarm clock waking me up to work in the wee hours of the morning. Thank you for the enlivening distraction you provided. To my family, this thesis is dedicated to you.

To God Be The Glory.

Prologue

This study is presented in a format different from the conventional thesis. *Chapter One* consists of the introduction to the study, research focus and the two research questions to be answered, and the significance of the study. It also includes a review of selected literature to situate the study and a description of the design and methods used to collect, classify and analyse the data. Issues of validity and reliability of the study are also addressed in this chapter.

The story of how one Kindergarten teacher uses children's books, both trade and fiction, to teach science is presented in Chapters Two to Five. *Chapter Two* describes the context of the study and *Chapter Three* focusses on the participant of the study. *Chapters Four and Five* present how books are used to teach science. Finally, a discussion of the research findings, conclusions and recommendations for further study are presented in *Chapter Six*.

CHAPTER 1

Background

It was a wet winter morning. In the car, looking out of the frost covered window, Wen E sat waiting while I scraped the frost off the windows. The quick haphazard scrapping had left a crooked, zig-zag pattern on her side of the window. She looked at it and laughed, "Mummy, there are stalactites and stalagmites on my window." I laughed with her but in my mind, I wondered how she had made the association. We had never seen stalactites and stalagmites before. Her acquaintance with these 'icicles' had been through our reading Joanna Cole's The Magic School bus Inside the Earth.

As a mother of a five-year-old who enjoys books immensely, I have the opportunity to read a wide range of books to her. The appeal books and stories has for her, and other children I know, has been astounding. Often a cloud of attentive quiet descends on a roomful of children when a book is read. Egan (1986) points out three reasons for the appeal of stories. First, inherent in stories is a rhythm of expectation and satisfaction that draws children and holds their attention. Second, embedded in a story or embodied by the story are conflicts between binary opposites, like good and bad, courage and cowardice, or fear and security, which children can identify with. Finally, stories appeal because they engage the affective responses of children.

At the same time, when one peruses any selection of children's books, one is impressed with the amount of science content that is present between their covers. Animals imbued with life and feeling, capable of speech and movement are frequently used as the main characters in stories. Children learn and pick up the distinctive, identifiable features of each animal long before they see the animal in real life, and can immediately recognise them on seeing them for the first time.

Woven into the storylines are common scientific facts: day and night, seasonal changes, sun and moon, light and shadow, space, prehistoric animals, birds, sea creatures, insects, metamorphoses of caterpillars to butterflies, animal habitats and plant growth. Often the explicit theme of the story is the sharing of a 'correct' social attitude or some aspect of human relations or just entertainment, all of which is non-science. However, in the course of depicting the animal character or describing the context of the story, there is the potential for some scientific content being conveyed to the reader.

Today, there is a growing selection of children's informational books or science trade books available. Children's trade books are often a child's first introduction to science (Barlow, 1991). Further, the books are generally of a high quality, written by professional authors or scientists who take serious responsibility for producing interesting reading based on accurate information about subjects attractive to children. Illustrations which are often striking, vary from drawings to photographs to computer formulated images (Barlow, 1991). The potential of these books in sharing information about our world promises to be immense. Yet how are these books being used in a kindergarten classroom to teach science?

The current study seeks to show how and why a teacher uses children's literature and trade books in the teaching of early childhood science. Daisey (1994) on the use of trade books in the classroom writes, "Their use promotes constructivist-based instruction, vicarious experiences of the science and mathematics process, positive attitudes toward science and mathematics, and higher levels of literacy" (p. 170). Thus, as stories in books are read and pictures shown, associations are made between the described situations and phenomena to

the children's own experiences and encounters with the physical and natural world. Furthermore, apart from what the pictures and story in the book portray of nature or a physical phenomenon to the child is the human element of the teacher. What can a teacher do with a book in a Kindergarten classroom other than reading it to the children during story time? This thesis documents how one teacher uses books in her class to teach science.

1.1

Research Focus

The focus of this study was an investigation of one teacher's use of children's literature and trade books in teaching science in her Kindergarten classroom during one school year.

1.1.1

Research questions

Based on the research focus, the following two research questions are addressed:

- How does one teacher make use of books in her Kindergarten science programme?
- Why does she use books in the way(s) she does?

1.2

Significance of the Study

It is generally recognised that human relations, geography, morality and other aspects of life are embedded in stories, but mathematics (and science) has sometimes been regarded as outside the realm of story: they are purely intellectual abstract disciplines (Griffiths & Clyne, 1991; brackets added). Likewise, classroom science and mathematics are often presented and taught as inhuman structures of knowledge, almost taking pride in their logical and inhuman precision and lacking any affective meaning (Egan, 1986). Yet paradoxically, one

of the goals of pedagogy is to draw the content of the lesson into the life-world of the student. To accomplish this, a human context with which the student can relate and identify must be provided, and more crucially so when the students are young children (Donaldson, 1978).

This study is important because in the area of science education, while the potential of children's literature as a teaching tool is recognised (Coville, 1992; Pond & Hoch, 1992; Nordstrom, 1992), no actual empirical research has been conducted to show the use of literature to teach science in the classroom. This study will describe and document in a narrative style how one teacher uses books in her class to teach science content and process skills. In so doing, it shows how science may be effectively communicated in a classroom curriculum for Kindergarten children.

Further, prior to the study, I believed that the reading of relevant storybooks as an introduction to a science lesson or to highlight some science concept could provide a context or a background to the child's learning of science. Books could serve to prepare the child's mind, provide a framework, a point of reference, a vocabulary for the hands-on activities that were part and parcel of a science lesson. However my experience was limited to one-to-one encounters between myself and my child. This study is therefore significant in showing how books in teaching science are used in a classroom situation when the teacher/student ratio is expanded to one-to-twenty; and how the learning of science can be supported and mediated through a shared reading of children's literature.

In the light of the present movement to integrate science instruction with

other curricular areas (Nordstrom, 1992) and with the emphasis on a “whole language” approach to instruction (Goodman, 1986) this study is also significant in providing an in-depth picture of how the reading of stories and trade books for information, insights, ideas and entertainment can simultaneously assist science learning and encourage the children’s emergent literacy and writing skills.

1.3

Literature Review

The literature review is divided into two sub-sections. The first will review literature on early childhood science education. The second reviews literature on the role of books in the science curriculum.

1.3.1 Early childhood science education

In a study by Iatridis (1981), the findings suggest that the time to begin science studies is in the preschool. In her study, a year-long science curriculum which embraced four broad topics- water; environmental terraria and small animals; magnets, batteries, and bulbs; and gadgetry including simple machines; was designed by the author for a class of 19 four to five year olds in a nursery-kindergarten class. A comparable class in the same school served as a control group where apart from the standard equipment of blocks, art and music supplies, dress-up corner and water play, no science-based materials were provided. At the end of the year it was found that while mastery behaviours had increased in both groups, the experimental group enjoyed one significant advantage. Children exposed to the science based curriculum showed an increase in their self-directed discovery (active, child-initiated exploration rather than an aimless handling of materials) and verbalised curiosity more often than the control children did.

The North American science curriculum for preschoolers has been influenced by the work of Jean Piaget (Chittenden, 1970; Elkind, 1972; Howe & Johnson, 1975; Smith, 1981; Nordstrom, 1992). According to Piaget, the pre-operational child is perception bound. She is able to deal best with the here and now. She easily centres all of her attention on one prominent dimension or attribute of an object or event and is unable to make mental reversals. She is egocentric, frequently seeing only what she chooses to see and is unable to understand an alternate perspective. She is able to focus only on the beginning or the end state of a transformation, and not on the transformation itself. Children at this stage have not yet developed the ability to think logically or abstractly; reasoning is unsystematic and does not lead to the generalisation or formation of logical concepts.

However, although young children might be limited conceptually, there are no limits to their curiosity, imagination, zest for learning and interest in many things around them (Smith, 1982). Similarly, although they are unable to think logically at this stage, they are nonetheless still exploring, manipulating, questioning, contrasting, labelling and forming mental images. The learning of science thus begins with their personal experience of their world, and not someone else's interpretation. Science for young children is finding out about the world in which they live, and they are best served by a science that helps them better understand their immediate surroundings (Smith, 1982; Rutherford, 1986). Consequently, science instruction for young children lies not on instruction in the facts or the 'products' of the scientists, but rather on the processes of science or the 'activities' of the scientist (Neuman, 1972). It is these process activities that form realistic and appropriate goals for young children and they lay the foundation for the development of children's ability to think logically.

Further, Piaget's research on children's conceptions of the world has shown that there is confusion in the minds of younger children about what it means to be alive. In the early years they believe that things which move are alive, while things that do not move are regarded as inanimate objects. Piaget also identified three basic characteristics that dominate the child's explanation of causality. The first characteristic is that children's ideas of natural phenomena are animistic; that is they attribute the kinds of feelings and wishes which they themselves have to the inanimate objects of their daily lives. The second is termed artificialism which describes the belief that everything has been built by man or by a divine being who fabricates things in human fashion. Lastly, children may also explain causality in terms of magic in situations in which cause and effect are not connected but where the child believes through her participation she is able to modify reality (Piaget, 1929/1979).

With this understanding of preschoolers it is clear that the goal of an early childhood science education is to provide a child-centred and activity oriented programme which gives children a varied environment to explore first-hand, at their own pace and according to their individual cognitive abilities. The presence of plants and animals in the classroom provide opportunities for children to develop an understanding of what it means to be alive; to form the concept of identity- the knowledge that organisms grow and change but remain the same. In addition to experiences with plants, animals and the world outside the classroom, preschool children need to participate in activities that are basically open-ended, freewheeling and based on the manipulation of a variety of materials in a variety of ways. In 'sciencing', a term coined by Neuman (1972), children become exposed to a variety of activities in which they are allowed to make their own observations,

draw their own inferences, sort objects into classification schemes of their own choosing and share findings that they feel are important. This same tenet is held by Elkind (1972). The most important skill to be developed in young children as they experience reality is observation which encompasses a total involvement of all the senses, and classification. Lastly, children must be encouraged to think about what they are doing and seeing, to ask questions and share experiences, and to talk to each other about what they are doing and seeing.

In spite of the emphasis on the importance of, and the awareness of the type of programme suitable for an early childhood science education, research conducted on the teaching of science in elementary classrooms have revealed some startling conclusions (Stake & Easley, 1978; Schoeneberger & Russell, 1986). Schoeneberger & Russell (1986) reported that

Although science is prescribed within the official curricula, it is not being taught regularly or effectively in many classrooms. Time for teaching science is always scarce, and this leads teachers to 'integrate' science with other subjects, to teach it infrequently or to ignore it altogether...Teachers who avoid teaching science or who teach science halfheartedly do so for a variety of reasons. Many feel uncomfortable dealing with anything scientific because they have inadequate backgrounds; some rationalise the teaching of science by 'integrating' it with other subjects. (pp. 536, 537)

In summary, research has shown the importance of introducing science at the preschool level and the need to provide hands-on concrete experiences in science for children to enhance their understanding and familiarity with the world they live in. However, little is actually being done in the classroom.

1.3.2 The role of books in early childhood science education

According to Piaget, the pre-operational child's capacity to think and reason is limited by extreme dependence on experience. Piaget also observed that the thought of the pre-operational child is much closer to overt action than is that of older children and adults. Therefore, it is experiences rather than experiments that should form the core of preschool and kindergarten science. However, what seems to be missing in the emphasis on an experiential, hands-on approach to science is the omission of the context within which these science activities are introduced. Children should be encouraged to observe carefully, note similarities and differences, make and test predictions, ask questions, interact with one another and with the teacher, to think and talk about what they are doing and seeing. At the same time, there should also be an immediate relevance of these activities to their daily lives as they satisfy their curiosity about their world and lay the foundation for relating meaningfully to later instruction.

Donaldson (1978) argues that when Piagetian problems make "human sense" they are clear to young children. Children are actually less egocentric than thought by Piaget, especially if the task put to them lies in the context of familiar patterns of events or intentions. As long as their thinking is sustained by this kind of human sense, children can frequently reason well, understand, relate and identify with a described situation. However, once we move beyond the bounds of human sense there is a dramatic difference. Thinking, which moves beyond common known experiences so that it no longer operates within the supportive framework of meaningful events, becomes disembedded and unfamiliar to children. Hence, in the teaching of science to young children, while it is important to provide activities which involve all the senses of the child and a variety of manipulatives, there is also the need to embed the activities within a supportive scaffolding of

familiar events and intentions with which they can relate and identify. It is in this latter function that books, particularly children's literature with their intrinsic story line, warmed by characters capable of life and emotion, can play an integral role in early childhood science instruction. This same observation is reached by Butzow and Butzow (1989).

(Children) are not able to abstract information and ideas or use formal logic to understand scientific concepts...Therefore we need to teach in terms of children's existing knowledge and abilities, not only to foster their conceptual understanding, but to provide them with security in the immediate human environment. (p. 5, brackets added)

Hence, children would find it easier to follow ideas that are part of a plot and concepts which are from a story about characters and places than to comprehend facts as part of a textbook (Martin & Brouwer, 1991). The captivating story line, the vivid illustrations and bright colours make children's literature both appealing and fascinating for young children, with the result that their interest is sustained and the story structure helps them to comprehend and draw relationships (Butzow and Butzow, 1989). Thus, an early childhood science curriculum should be one that combines hands-on explorations with vicarious experiences in books (Smardo, 1982).

The use of children's literature has been primarily studied in the area of language arts. The research has shown that shared reading of children's literature between parent and child, prior to formal schooling, appears to play a central role in the child's early literacy development (Sulzby & Teale, 1991). More recently, the use of children's literature to enhance mathematics learning has been researched (Ohanian, 1989; Welchman-Tischler, 1992; Gailey, 1993; Kliman, 1993). As Griffith and Clyne (1991) indicate, "Mathematics as an integral part of human experience is also an integral part of story. Building on the mathematics

which is implicit or explicit in a book... can assist children in developing concepts, solving problems and making connections" (p. 10). There is currently no empirical research on the use of children's literature in teaching science in the elementary classroom. Nonetheless, as an extrapolation to Griffith & Clyne's comment, it can be argued that science is also an integral part of human experience and an integral part of story. Thus likewise, building upon the science highlighted or alluded to in children's literature can assist children in developing science concepts.

Indeed, much has been reported on the feasibility and sensibility of integrating science and literature in the elementary classroom (Dole & Johnson, 1981; Smardo, 1982; Saul, 1986; Butzow & Butzow, 1989; Rubino, 1991). As Smardo affirms, "while children's literature about science should not become a substitute for direct science experiences, storybooks and activities can be effectively blended in an early childhood science programme" (p. 268). Among the reasons cited for this integration are that literature: provides a story line which children can follow (Butzow & Butzow, 1989); brings science into the personal world of children (Martin & Brouwer, 1991); humanises science (Egan, 1986); helps to clarify science concepts (Smardo, 1982); relates the science concepts covered in class to the students' everyday lives (Dole & Johnson, 1981); motivates children in science by generating interest and involvement (Guerra & Payne, 1981); and has the evocative power to connect the interior world of the child with the natural world (Nordstrom, 1992)

The use of science trade books in the classroom has also met with much support (Simon, 1982; Janke & Norton, 1983; Daisey, 1994). When well chosen and intelligently used these books can assist in giving children knowledge about the world; help them experience the excitement of discovery; arouse their interest

and stimulate them to explore on their own; stretch their minds and enlarge their vocabularies; and stimulate their imaginations (Janke & Norton, 1983). Barlow (1991) claims trade books are often a child's first introduction to science. Further, science trade books bring what is outside the realm of children's sensory experience within their understanding, such as dinosaurs and space (Saul, 1986), and offer an opportunity to transform a child's interest in a subject to knowledge about it (Nordstrom, 1992). Simon (1982) advocates the use of trade books because they provide for varying levels of reading ability among students and can provide a child with different points of view and in-depth information. The substance and quality of these books generate enthusiasm and foster growth.

Short & Armstrong (1993) in implementing an inquiry approach to students' learning of science sought to explore the range of functions literature could play in the students' inquiry process. Their study showed that the students' interactions with literature supported their inquiry process by "creating interest in a particular topic, encouraging broad explorations of content, making connections to life experiences, finding focussed questions to research, searching for facts and ideas related to inquiry questions, engaging in in-depth discussions, introducing new perspectives and connections, and sharing ideas with others" (p. 197).

Finally, although many elementary school teachers are uncomfortable dealing with anything scientific, literature on the other hand is often a major strength and interest with them. They feel comfortable dealing with children's books and are used to reading them to groups. As Corinne Wester in her preface to *Stepping into Science* (1992), a publication by the Abbotsford and Mission Primary Teachers' Association, wrote, "Excuses, excuses, excuses! I must have a dozen of them for avoiding science...In reality I teach what I enjoy most, and like

many primary teachers, I enjoy literature. That enjoyment of literature traditionally has led teachers and their students into exciting paths of learning language and the Fine Arts. But...literature can also lead us into exciting paths of discovery about science" (p. 7).

In summary, the use of children's literature and trade books in the elementary science curriculum provides a way in which science can be effectively communicated to young children, while at the same time embedding the scientific concepts taught within a context with which they can identify. The storyline and characters can provide the element of "human sense" with which children can relate to, emotionally respond to and hence realise the relevance of the hands-on activities planned by the teacher.

1.4

Design and Method of Analysis

This section provides the rationale behind the research design, the methods employed in data collection and analysis, and discusses the validity and reliability of the study. Only a brief description of the research site and the participant in the study is given here as a more detailed picture of both will be presented in the following chapters.

1.4.1 Rationale for qualitative case study research

The purpose of this study was to document how and why one Kindergarten teacher made use of both fiction and trade books in her classroom to mediate science learning and support the hands-on science encounters she provided for the children. Underlying the study is the assumption that what the teacher does in class makes sense to her and that her beliefs and actions, and that the meanings attached to them can be uncovered. This study thus sought to delve in-depth into

the beliefs and perspectives of the teacher as she introduced science at the preschool level, and dealt with the form and shape of her science programme as well as the role children's books play in that programme. It also sought to understand the source of these beliefs and perspectives, whether they stemmed from theoretical assumptions, pedagogical experience or both; and observed how the teacher acted on these beliefs to implement them in her pedagogy and instruction. In addition, this study documents in a narrative style how the students' interactions with books, through the guidance of the teacher, have supported their experiences and learning of science in the classroom.

A case study research strategy was used for this investigation. A case study is defined by Yin (1981a, 1981b) cited in Yin (1989) as ".....an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (p. 23).

The investigation took place in a natural setting of a kindergarten classroom with the observer in an adjoining observation booth which has a speaker built in to allow her to see and hear the discussions between teacher and students. Hence the inquiry occurred within a "real-life context" where the boundaries between the phenomenon and context were not clearly distinguished. The multiple sources of evidence used were: field notes obtained from observations of how books were used in the classroom by the teacher reading the book, and when books were placed at the various activity centres; interviews with the teacher; samples of one child's class work; parent newsletters written by the teacher; and informal personal conversations with the teacher.

1.4.2 The research site and the participant of the study

The site chosen for the study was the Kindergarten class at the Mackay Early Childhood Centre, at a local University. The participant of the study was Ms Megan Farrows who taught a Preschool and a Kindergarten class at the Centre. The choice of the research site was guided by the four considerations suggested by Marshall & Rossman (1989).

The ideal site is where (1) entry is possible; (2) there is a high probability that a rich mix of many of the processes, people, programmes, interactions, and/or structures that may be a part of the research question will be present; (3) the researcher can devise an appropriate role to maintain continuity of presence for as long as necessary; and (4) data quality and credibility of the study are reasonably assured by avoiding poor sampling decisions. (p. 54)

The Mackay Early Childhood Centre was established at the University as an inter-disciplinary centre for the study of child development and early childhood education. As a research facility of the Faculty of Education it is often used as a research site for graduate students and faculty. Hence, both the Director and Ms Farrows were open and comfortable with the concept of researching her use of books to teach science. This ensured accessibility and ease of entry. The specific research focus of the study meant that I had to look for a teacher who had a science programme for her class and at the same time was using books extensively as a vehicle in teaching science. Ms Farrows has a reputation among her colleagues for teaching science in her classroom. Also, in her classroom books were not merely located at the reading corner shelves but were opened to appropriate pages at the many different activity centres. She frequently referred to them in her discussions of science-related events or live creatures with the children. The phenomenon observed was not artificially set up to provide the data for this thesis. It was a real and existing situation with the rich mix of people, programmes and interactions that were a part of the research question.

Observations of the classroom activity were made from an adjoining observation booth which allowed me to maintain my role as a researcher without being seen by the participants or intervening in their interactions and disturbing the integrity of the natural setting. Preliminary observations of the site and the participant ensured their suitability for capturing credible and valuable data.

1.4.3 Data Collection

The major sources of data for this study were collected from observations of the classroom and in-depth interviews with Ms Farrows. Samples of one child's classroom work, parent newsletters from Ms Farrows and from the Centre, and informal conversations with Ms Farrows constituted other sources of data. Data from observations were collected over two time periods, the first over a period of eight weeks in the Spring of 1994, and the second for six weeks in the Spring of 1995. Altogether twenty three observations were made. Three interviews with Ms Farrows were conducted in the Summer of 1995, after the 1994/5 school year had ended.

Although data were collected in two batches with a time span of one year in between, contact with Ms Farrows was maintained over the entire period from September, 1994 to June, 1995. When I was first introduced to Ms Farrows our relationship was that between a researcher and a participant. Over the course of the school year 1994/5 the relationship expanded to include that of parent and teacher as Ms Farrows was my daughter's kindergarten teacher. As a consequence of this, when I was on maternity leave from September, 1994 to March, 1995 and was unable to maintain observations in the observation booth over the time period, I was nevertheless in and out of the classroom daily. I was able to follow the changing themes that transpired over the entire school year, see

the changes that occurred in the classroom exhibits and displays, closely examine the activities laid out for the children at each centre and have conversations with Ms Farrows concerning the current theme or the goals she had for some activities. As a result of being in the classroom I was privy to the rich interactions between Ms Farrows and the children. As a parent I played down my role as a researcher when I was with Ms Farrows in the classroom. But her view of me was that of researcher and parent. This was seen in her occasional comment of "That should be in line with your research" when she shared her ideas with me. I do not see a conflict of roles as a researcher and a parent. Marshall & Rossman (1989) advocates that in the conduct of qualitative research "some sort of participation usually becomes necessary as the researcher helps out with small chores (or large ones), wants to learn more about a particular activity..." (pp. 79-80), and that such informal interaction is usually highly informative. The purpose of this study was to understand Ms Farrows' role as a Kindergarten teacher who taught science as a regular part of her curriculum and who used books as a vehicle to accomplish her goals. In my position as parent I saw a fuller picture of Ms Farrows' role as a teacher interacting not only with the children in class but with other parents both inside and outside her classroom.

Furthermore, the research design was strengthened by a longitudinal component with observations of Ms Farrows using books to teach science to two different cohorts of children, one in the 1993/4 school year and the other in the 1994/5 school year. This ensured that the phenomena observed were not accidental or artificial, but indicated a deliberate and consistent approach to her science teaching in the classroom.

1.4.3.1 Observations

The observation activities employed in this study were used to answer the “How?” aspect of the focus question. The primary aim was to observe how Ms Farrows made use of books in the classroom, the discussions she had with the children as she read the books to them, the links she made between the story and the planned activities, and the references she made to the story. Observations of the Kindergarten classroom activities were made twice weekly, usually on Monday and Wednesday afternoons. This frequency of observations was chosen because the children followed a slightly different routine on Tuesdays and Thursdays which either took them out of the classroom, or when they concentrated on a ‘*Structures*’ theme with building and construction toys. Each observation was for an average of two hours since the last hour was spent on the children’s journal entry, snack and outdoor play.

The observations also included those made in the classroom prior to the start of the class where I recorded the types and titles of the books resting on book-stands at the activity centres and to take note of the content in the opened book. When the class was in session, I observed the:

- ways Ms Farrows used the chosen books during Circle to teach science;
- discussions she engaged the children in;
- follow-up activities she had planned for the children;
- ways in which the books, placed at the different centres, were used by the children.

On-site field notes of the above were recorded together with any questions I had as I observed the classroom activities, particularly pertaining to the selection of the books, what Ms Farrows intentions were for the children and what she

hoped to achieve with books opened to specific pages at the activity centres.

Another source of data which was available to me as a researcher were the "headnotes" (Ottenberg, 1990, p. 144) made through my daily interaction with Ms Farrows, the children and the classroom resources. These headnotes are "the notes in my mind, the memories of my field research" (Ottenberg, 1990, p. 144) and further described by Marshall (1970, p. 167) as "the remembrances of, and reflections upon...the encounters, the evaluations and the episodes that are chiselled in memory". Jackson (1990) reflecting on the shifting, ambiguous status of field notes among anthropologists wrote, "At times they (field notes) are seen as 'data' - a record - and at times they are seen as 'me'." (pp. 21-22; brackets added). There is a strong interdependence of written field notes and memory. As Sanjek (1990) maintained, "Field notes are meant to be read by the ethnographer and to produce meaning through interaction with the ethnographer's headnotes" (p. 92). However Jackson (1990) reports that one interviewee sees herself as a field note. "Are memories field notes? I use them that way, even though they aren't the same kind of evidence...I had memories but no notes. I had to say, 'Well, I saw that happen.' I am a field note (p. 21)." Similarly, as a parent who daily entered the research site when I brought my daughter to school, situations were seen and conversations were heard for which there were no written field notes, but nonetheless these headnotes contributed to the depth of my observations.

1.4.3.2 Interviews

The purpose of the interviews in this study was to answer the "Why?" aspect of the focus question, by having Ms Farrows reflect on her own perspectives of science instruction and her use of books in her teaching. In addition, the interviews also facilitated an in-depth dialogue from which I could

understand and capture fully her intentions, objectives, beliefs and an attempt to trace the source of these beliefs and goals. Over the year, as a result of the increased contact, a growing comfort level between us helped enrich the interviews.

The interviews were guided by interview schedules which identified the areas to be explored and which were given to Ms Farrow at least three days prior to the interview. This was necessary since the intention behind the interviews was to uncover her perspectives with respect to her use of books, her beliefs and actions, and the meanings attached to them. The interviews conducted were open-ended, informal and were allowed to flow more like a conversation as she shared her perspectives and 'told her story'. There were three in-depth interview sessions with Ms Farrow. The average time for each interview was one and a quarter hours. The interviews were held in a classroom at the Mackay Early Childhood Centre. All the interviews were audio taped.

The areas that were explored at each interview, other than the first, were built from the themes that emerged from the previous interview. Thus, after the first interview, the entire dialogue was transcribed and analysed to identify areas which required further expansion or explanation. The questions in the next interview schedule were formulated from the identified issues the participant had raised which I wanted to explore further. For example, in the first interview Ms Farrow mentioned how books facilitated the teaching of various process skills. Making reference to her statement, questions which probed a deeper understanding of what she meant were formulated and written in the schedule as shown:

p. 12 (You mentioned that) '...some books foster categorisation, sorting, patterning...'

How do you make use of books to foster these skills? Can you share some examples with me? (brackets added)

The transcript of each interview and the interview schedule were given to Ms Farrows prior to the next meeting. The intent behind the sharing of the transcript was for Ms Farrows' confirmation and as a stimulus for recall of new details into the events mentioned in the previous interview.

The first interview was held towards the end of the school year in June 1995. This was a preliminary interview which covered many broad areas, Ms Farrows' educational and professional background, her goals and objectives for the children, her perspectives of science and science instruction, and the reasons for the widespread use of books in her classroom. Based on her responses in the first interview, the second interview was conducted to understand the evolution of those perspectives concerning her emphasis on science and belief in the use of books. The strategy of stimulated recall was also used with the bringing in of some books she had used in the classroom during the school year to assist her recall of how she had made use of those books and the children's responses to them. The second and third interviews were held in July, 1995. In the third and last interview, the focus was on her classroom encounters in her use of books and the children's responses to the books used. In this interview Ms Farrows brought along examples of some books she had used in the classroom and shared how these books were used in teaching various concepts and skills.

The work involved interview, transcription, and identification of areas for further exploration. This facilitated an in-depth dialogue which enabled me to capture more fully her intentions, objectives and beliefs in focussing on science in the classroom and her use of books to support and mediate the teaching and

learning of science.

1.4.3.3 Documents

Supplemental documents constituted another source of data collected. Lincoln & Guba (1985) maintain such documents are “singularly useful sources of information” because they represent a “stable source of information, both in the sense that they may accurately reflect situations that occurred some time in the past and that they can be analysed and reanalysed without undergoing changes in the interim”. Documents are also “a rich source of information, contextually relevant and grounded in the contexts they represent” (pp. 276 - 277). The documents in this study include samples of one child’s classroom work, such as worksheets, mini-booklets, and drawings. Also collected were newsletters which Ms Farrow wrote each term to inform parents of the classroom activities, the themes engaged in, and the events and field trips planned for the term; as well as the weekly Mackay Early Childhood Centre newsletters (Appendix E). All these documents were important in triangulation, particularly for the purpose of attesting to the classroom activities, themes and events over the school year 1994/5.

1.4.4 Managing and Recording Data

Observation field notes were written immediately after each observation from the scratch notes. Included in the field notes were observer comments and questions. The audio-taped interviews were transcribed immediately after the interviews in order to prepare for the next interview.

1.4.5 Data Analysis

Data analysis is the process of bringing order, structure and meaning to the

mass of collected data. This procedure involves organising the data, generating categories from the data and developing themes as relationships between categories become apparent (Marshall & Rossman, 1989).

The reviewed literature give reasons for the use of books in teaching science and evidence for the use of books in supporting students' inquiry process in science learning. I could not find any research on how teachers used books in their science teaching. Thus I entered my study without any established framework to guide action. However, initial classroom observations revealed some immediate and clear ways in which the teacher used books in the class. An early entry in my journal on 28 March, 1994 states, brackets added:

With three observations made,...let me try to analyse how she (the teacher) uses books:

- the book is used primarily for the illustrations in it. Take the case when she was talking to the children about owls. Short of taking the children to some place with owls in free flight and in hunt of prey, the next best alternative appears to be drawing upon the illustrations in books to show how the owl stretches out its wings to act as a brake to slow itself down and swoop its prey. The book (*Owl Lake*) by *Tejima* had few words and a simple story but the strength of the book laid in the wood-cut print illustrations which Megan used effectively to talk about the habits, the flying patterns of owls.
- books are used to guide the children's exploration on their own. The books *Snails* and *Dandelions* at the Science table acted as guides for children looking at snails in the absence of the teacher...Later on when the class had salamander eggs in the tank, a book on pond life, opened to show the life cycle of frogs was placed by the tank.
- the book is used to make a visual impression. For example, on the Art table was *Eric Carle's The Very Hungry Caterpillar* opened to show a brilliantly coloured illustration of the butterfly. The craft was to make butterflies with drops of food colouring on absorbent kitchen paper.

These three ways by which books were used to teach science became the

initial tentative categories in answer to my research question, 'How are books used to teach science?' As observations continued, the field notes were read and reviewed to create new categories of book use in this classroom. Altogether eleven provisional categories were identified . Two new categories were later added upon analysis of the interview transcripts.

The field notes were colour coded to represent each of the identified provisional categories. On a master chart, data coded with the same colour were collated under the provisional categories. Each piece of data was referenced by the date the observation was made to ensure quick access into the field notes. The categories were reviewed for overlap and examined for possible relationships among categories. Finally, eight distinct descriptive categories of how Ms Farrows used books to teach science in her Kindergarten classroom remained.

Upon further analysis, the eight categories of book use fell under two sections, teaching science directly and indirectly. Books were used to teach science directly when scientific concepts and information were presented in the text and the illustrations. Books were used to teach science indirectly when they played a supportive role to the teacher in effecting science learning. Books were also used to teach both science content and process skills. Science content was the knowledge the children acquired about their physical world, and science processes were the skills and attitudes which reflected the research methods of the scientific community. A 2 x 2 table was constructed to represent the use of books to directly and indirectly teach both science content and processes (Table 1).

	TEACH SCIENCE DIRECTLY	TEACH SCIENCE INDIRECTLY
CONTENT	<ul style="list-style-type: none"> • INTRODUCING SCIENCE CONCEPTS • GIVING INFORMATION • TEACHING VOCABULARY 	<ul style="list-style-type: none"> • ASSISTING VISUALISATION • PROVIDING IDEAS FOR SIMULATION
PROCESS SKILLS	<ul style="list-style-type: none"> • GUIDING OBSERVATION & SELF-EXPLORATION 	<ul style="list-style-type: none"> • ENGAGING THE CHILD IN SCIENTIFIC BEHAVIOURS • PROVIDING OPPORTUNITIES FOR ENGAGING IN SCIENTIFIC DISCOURSE

Table 1: Book use for direct/indirect teaching of science

1.4.6 Criteria of Soundness

In any research work there is a need to establish the "truth value" (p. 290) of the study, its applicability, its consistency and its neutrality (Lincoln & Guba, 1985). In quantitative research the soundness of the research is addressed by looking at the internal and external validity, the reliability and the objectivity of the study. However, for qualitative research Lincoln and Guba (1985) propose four alternative constructs which they claim more accurately reflect the qualitative paradigm. These are "credibility" for internal validity, "transferability" for external validity or generalizability, "dependability" for reliability and "confirmability" for objectivity (p. 300).

1.4.6.1 Credibility

According to Lincoln & Guba (1985) to demonstrate the "truth value" or credibility of the study, the researcher must show that she has represented the multiple constructions of the participant/s in the study adequately. In other words, the reconstructions that have been arrived at via the inquiry "are credible to the constructors of the original multiple realities" (p. 296). In my study, by engaging in the activities of "prolonged engagement", "persistent observation" and "triangulation", as recommended by Lincoln & Guba (1985), the inquiry was carried out in a manner which enhanced the credibility of the findings. Furthermore, through "member checking" the findings and interpretations were demonstrated to be credible to and approved by the participant being studied.

Prolonged engagement is the investment of time to understand the phenomenon with reference to the context in which it is embedded, to recognise "distortions which might creep into the data", and to provide the investigator with

an opportunity to build trust (Lincoln and Guba, 1985, p. 302-303). My dual role as a parent and a researcher provided a daily and year-long access to the classroom and teacher. The observations of the teacher were not confined to the fourteen weeks of formal observations made from the observation booth but came from my vantage point within the classroom throughout the school year. This prolonged interaction helped me collect credible and pertinent data. At the same time, the daily contact was instrumental in the development of trust and rapport with the teacher.

The technique of *persistent observation* adds the dimension of salience to the observation activity. Persistent observation involves the identification of the characteristics and elements in the situation that are most relevant to the issue pursued and then to focus on them in detail. While “prolonged engagement provides scope to the study, persistent observation provides depth” (Lincoln & Guba, 1985, p. 304). Over the course of the data collection, persistent observation was accomplished through my daily interaction with the data and continuous engagement in identifying tentative categories of book use to teach science. These identified categories were then explored in detail at subsequent observations and interviews.

Triangulation is the act of bringing more than one source of data to bear on a single point, and can be used to corroborate, elaborate or illuminate the research in question (Marshall & Rossman, 1989). According to Lincoln & Guba (1985), “the concept of triangulation by different methods can imply different data collection modes (interview, questionnaire, observation, testing)” (p. 306). Thus, any finding or conclusion from the study is more convincing and accurate because multiple sources of evidence essentially provide multiple measures of the same

phenomenon. Further, Goetz & Lecompte (1984) recommended triangulation to assist in correcting any bias that may occur when the researcher is the only observer of the phenomenon being investigated. In this study, data were collected from my observations, interviews with the teacher, and documents which included parent newsletters the teacher wrote, newsletters from the Centre, and samples of one child's work. The observer comments and queries, which were made in my observation field notes, were raised in the interviews and during casual meetings with the teacher. Insights into her reasoning behind her purposive actions observed in the way books were used in the classroom were also sought. The documents collected served to corroborate the accuracy of the observation findings.

“The *member check* , whereby data, analytic categories, interpretations and conclusions are tested with members of those stake holding groups from whom the data were originally collected, is the most crucial technique for establishing credibility” (Lincoln & Guba, 1985, p. 314). This activity was particularly important to this study since the aim was to represent the teacher's perspective in her use of books in teaching science in the Kindergarten classroom. Member checks were conducted over the course of the data collection through the informal conversations and the sharing of each interview transcript with the teacher. Furthermore, since the information shared in each interview provided the issues and themes for the next and subsequent interviews, sections of the previous interview was recounted or “played back” to the teacher to stimulate recall and to facilitate further inquiry. In addition to this, the final draft of this thesis was given to the teacher for her verification to ensure an adequate representation of her ‘reality’ and was accepted without changes.

1.4.6.2 Transferability

According to Lincoln & Guba (1985), it is “the naturalist’s task to provide the data base that makes transferability judgments possible on the part of potential appliers” (p. 316). Thus, the burden of demonstrating the applicability of one set of findings to another context rests more with the investigator who would make that transfer than with the original investigator (Marshall & Rossman, 1989). This study therefore reports the phenomenon of a teacher who uses books in a variety of ways to teach science to Kindergarten children over a school year within the context of the classroom at the Mackay Early Childhood Centre. However, to provide a framework which is useful to readers interested in seeking applications of the findings to other contexts and circumstances, details of the research site, the participant and the methods used for the study have been included.

1.4.6.3 Dependability and Confirmability

The qualitative researcher purposefully concentrates on recording the complexity of situational contexts and interrelations as they occur. Marshall & Rossman (1989) emphasised that “...qualitative researchers can respond to the traditional social science concern for replicability by taking the following steps. First, they can assert that qualitative studies by their nature cannot be replicated because the real world changes. Second, by keeping thorough notes and a researcher’s diary that records each design decision and the rationale behind it, researchers allow others to inspect their procedures, protocols and decisions. Finally, by keeping all collected data in a well-organised retrievable form, researchers can make them available easily if the findings are challenged or if another researcher wants to reanalyse the data” (p. 148). For this purpose a reflective journal was maintained where information about self and methods,

particularly the methodological decisions and the rationale behind them, were recorded.

1.5

Presentation of Data

This study sought to understand Ms Megan Farrow's use of books to teach science in a Kindergarten class. Qualitative case study methods were used. In this study the use of books is presented within the context of the classroom and the rich interaction between the teacher, the students and the classroom activities. To 'bring' the reader into the context of the study, the classroom, the teacher and the research findings are presented as a narrative text. Carol Witherell & Nel Noddings, in the prologue to the book *Stories Lives Tell* (1991) tell us, "Stories and narrative, whether personal or fictional, provide meaning and belonging in our lives. They attach us to others... by providing a tapestry rich with threads of time, place, character, and even advice on what we might do with our lives. The story fabric offers us images, myths, metaphors that are morally resonant and contribute to our knowing..." (p. 1). Thus by presenting a holistic and lifelike description of the teacher and her use of books to teach science, the reporting builds on the reader's tacit knowledge and gives the reader a measure of vicarious experience of being in the classroom (Lincoln & Guba, 1985).

CHAPTER 2

The Classroom

Light streamed in the huge windows in the wall along one side of the room. The walls are bare except for the row of pictures of the twenty six letters of the alphabet on the wall above the doorway. The building blocks and construction toys are neatly stacked on the shelves. The sand and water tables are empty and covered. The table tops are clean and empty. Along another side of the room the book shelves lining the wall stand vacant. All the costumes, hats, kitchen items, dolls at the Pretend Centre are kept in the cubicles by the wall. The art supplies, stationery, writing materials are untouched, stored on the shelves and in the cupboards. The classroom stands quiet.

Megan walked in. Over the next ten months the room will take on a different tone, transformed from its Summer slumber by nineteen five year olds, fifteen boys and four girls, who will trudge in daily, Mondays to Thursdays from 1 pm to 4 pm. This is Megan's school room. She loves this room with its big windows that look into the play yard outside.¹ This is one of four classrooms in the Mackay Early Childhood Centre.

The Mackay Early Childhood Centre is an early childhood/child development research facility of the Faculty of Education at a University. It is used as a research site by the graduate students and faculty and also functions as a demonstration laboratory where students and staff can observe and study young children, curriculum innovation and teaching strategies. The Centre is located on the periphery of the University campus. While it is within the campus, it is away

¹ Appendix A, p. 94, 63 - 65

from the main bustle and activity of campus life.

Across the street are the woods with many trails which form part of a large provincial park in the city. Megan likes teaching at the Centre because of the wonderful resources all around.² The nearby woods means she could take children out for walks along the trails, listen to the birds singing, collect berries and look for frogs' eggs in the Spring, observe bugs underneath logs, bring in 'specimens' of plant and animal life for study under magnifying glasses and then return them to their natural haunts. Additionally, affiliation with the University means having the University resources, access to the books in the library, audio-visual materials³, quail eggs and incubators from one of the University departments, field trips to the University Botanical Gardens and Dairy farm. Everything she needed for her Kindergarten programme she felt was at hand. The room in its setting within the University was like a little laboratory⁴ for her and the children.

Megan knew what she wanted to do with the room. Together with her assistant teacher Marcia they would put up various posters on the walls. Kindergarten at Mackay was going to be a new experience for many of the children, and she wanted the pictures and posters to communicate to the children that this was a safe and fun place to be, a caring place.⁵ At the same time, it was a place for learning and especially a place where they could take risks with their emergent reading and writing and developing friendships.⁶ Later on as the children embarked on their craft activities and as she invited suggestions for themes of

² Appendix A, p. 94, 64

³ Appendix B, p. 128, 561 - 563

⁴ Appendix A, p. 95, 67 - 68

⁵ Appendix B, p. 126, 519

⁶ Appendix A, p. 96, 106 - 110

study,⁷ these walls would be filled with displays of the children's work and posters relating to the theme of study. Megan had made these posters from pictures cut out from various magazines and over the years had accumulated posters on a wide range of topics.

To begin, the pictures she placed up on the walls were of children in relationship with each other or in relationship with other people like their parents and grandparents. For that first week, Megan knew that foremost on the children's minds were questions like, "Who are all these other children?", "Am I going to be liked?" Her task was to foster a community spirit, a class spirit with the children, and build a sense of belonging and relationship.⁸

Megan had visited the children in their homes or school visits were arranged in the last few weeks before school would commence.⁹ The children had met her. Some were excited about school, others a little apprehensive. The first week at school was an Orientation week where only half the class came in on one day and the other group met her the next day. That way the children could accommodate slowly to her and Marcia and to the classroom. At the same time they could be introduced gradually to the daily schedule of sitting around in a Circle for a time of singing, shared reading from a book Megan selected and discussion, and then break off to the different Centres set up around the room to work on an activity which appealed to them. There was a time for clearing up, when the children helped in cleaning the craft table, put away the puzzles, toys and games they had played with, cleared up the Pretend Centre, and replaced the books on the shelf. Second Circle followed with another book read or a time for Show and Tell, and snack

⁷ Appendix B, p. 126, 500

⁸ Appendix B, p. 126, 486 - 491

⁹ Appendix C, p. 136, 77 - 80

time. The day ended with outdoor play in the yard.

Marcia Appleton, the assistant teacher walked in. Marcia was new to the Centre having co-taught with Megan for only six months. She was vibrant, keen, enthusiastic, warm and caring with the children.

“What would be a good beginning theme for the children?” Marcia asked and sat down with Megan at one of the low tables made for preschoolers.

“I was thinking of *Berries*. Many of them have been berry picking with their families and its a social experience, picking berries. We could read *Blueberries for Sal* because its a story about fear and separation as well as a story about berries,” said Megan. “And that could be followed with some social activities of baking and even berry picking together in the woods.”¹⁰

“Ya and there’s a very nice book *Jamberry*¹¹ with a nice beat to the rhyme and it introduces them to the different berries - blueberries, strawberries, blackberries, raspberries . We could get the children to brainstorm ‘What can we make with berries?’.”

Together they planned for the first week of the school term before they rummaged through the files¹² stuffed with posters and charts for pictures of berries and of children in play or doing social activities with other adults to put up on the walls.¹³

Megan took a step back to survey the room. It still looked a little bare. But she knew from years past that the pictures in the room would gradually add up as

¹⁰ Appendix B, p. 126, 510 - 515

¹¹ Appendix C, p. 139, 175

¹² Appendix B, p. 128, 561

¹³ Appendix B, p. 125, 483 - 485

the children's art and representations of the various themes discussed were displayed over the room. With each new theme of study some pictures on the previous theme were replaced with appropriate posters related to the new theme. Megan wanted the classroom to be one where the children could feed their curiosity and learn from as they looked about the room.¹⁴ At the same time there would always be some pictures of the previous themes remaining on the walls. Once, a student teacher at Mackay, upon visiting the classroom, had asked, "You're on to *Fish*, why are some *Space* 'things' still up?" "She had the idea that with each new theme they were to gut the place of the previous theme and swamp it with the next." Megan felt it important to have remnants of the previous theme because there were always connections the children could make between the present theme and those they explored previously. Besides, the children liked having the familiar around even though they were moving on and discovering new ideas. She wanted the children to feel the room was their room as much as it was hers. Experience had taught her that by leaving the children's work on the walls, gradually they would ask to take their drawings home and the more recent art work could then be displayed. She thought this communicated to the children that they too had ownership of the room.¹⁵

The classroom space was cleverly utilised. With seven low tables placed spaciouly along two sides of the room and strategically placed shelves for the construction toys and wooden blocks, a demarcated open area for Circle, another area for the Pretend Centre, and a smaller space where the children could play with the construction toys were created. Altogether fourteen activity centres were laid out for the children to involve themselves and learn through the manipulation of the materials, interact with other children, teachers or books. Every square

¹⁴ Appendix B, p. 127, 521 - 522

¹⁵ Appendix B, p. 128, 565 - 577

centimetre of the room was occupied. Every metre of wall was covered by cupboards, tables, or shelves.

There was the Reading Corner, the Pretend Centre, Sand and Water tables, the Computer Centre, Building Centre, the Writing Centre with its adjoining shelf of writing materials, the Painting easel and the Craft table. Over the years Mackay had accumulated a wide range of games, toys and manipulatives for the children to explore, such as jigsaw puzzles, coloured pattern blocks, coloured cubes, magnetic letters, coloured Cuisinaire rods for exploring lengths, weighing balances for the children to explore weights and the concept of equality. Other activities included sorting seeds or buttons into self-selected categories, laying train tracks followed by dramatic play with train locomotives, and building with the variety of construction toys available on the shelves. One of the tables sometimes served as a Listening Centre where the children could listen to a story from the headphones provided while following along with the accompanying book. Some days they would do baking. The ingredients for a sponge cake or a simple recipe would be laid out for the children to add in their right proportions, breaking eggs and stirring the batter. Shaping clay and play dough were popular with the children too. The Sand and Water Tables when covered, served as an extra centre where often Megan would place items like sea-shells, flowers, bird-wings, rocks, magnets with a wide variety of materials to explore. Whenever possible there would be live creatures in tanks or containers, with accompanying magnifying glasses, for the children to touch and to learn to handle these live specimens carefully.¹⁶ Depending on the theme, new and varied activities were planned and laid out for the children.

¹⁶ Appendix A, p. 107, 503 -505

What was different in this classroom and commented on by many parents was the obvious presence of books in the classroom. Books were not found only on the shelves at the Reading Corner but were also found opened, resting on book-stands at the many centres in the room. Today the teachers busied themselves preparing the walls and activity centres for the first day of school. They searched for appropriate posters and relevant books for the Reading Corner and other centres. For the theme *Berries*, for the Writing Centre, Marcia had made small booklets in the shape of a strawberry. These mini-booklets provided incentive for some children to practise their print, others enjoyed drawing in them. On the table with plastic letters was the word B-E-R-R-Y and resting on a book-holder was *Lois Ehler's* book, *Eating the Alphabet* opened to the page 'B Blueberries'. On the top of the shelf with the construction toys were books titled *The Diggers* and *Truck* opened and similarly placed on book-stands. Over at the Art Table were paints, brushes, rollers, glue, coloured paper for drawing a collage which the children could work on cooperatively and to collectively make a picture of a berry patch. Pinned to the shelves beside the table were posters of the different berries and *Bruce Degen's* *Jamberry* rested on a book stand at one end of the table.¹⁷

This year, another surprise awaited the children. A parent of two former students wanted to give their two yellow canaries, Badger and Jessica, away and asked if the teachers would like them for the Centre for the children to observe. Megan had agreed and decided on having the birds in her classroom initially before putting them in the atrium outside the classroom for the other children at Mackay to enjoy. By the cage was a pictorial book *Canary* with information on caring for canaries which Megan had finally found at a pet store after much effort. She had bemoaned the lack of stories on canaries as she scoured libraries for a book which

¹⁷ Appendix C, pp. 138 - 139, 163 - 185

she could read to the children.¹⁸ The birds hopped about daintily, perched on the rods in the cage or pecked at the grains. Megan whistled at them to encourage them to sing but aside from a little twitter, they stayed quiet.

The classroom was ready to receive her next cohort of five year olds. Over the next ten months, the walls would be transformed with the changing displays. The activities at the tables would change daily to match the interests of this incoming cohort of children. But with each change would be the growing sense of belonging as the room would become their room.

¹⁸ Appendix C, p. 137, 102 - 118
& p. 138, 140 - 144

CHAPTER 3

The Teacher

“Megan, look what we’ve got!”

The two children, Matthew and Lilly ran into the classroom, each holding a Lucerne yogurt cup in their hands, smiling excitedly.

“Tadpoles.”

“Did you find them in the culvert we went to yesterday, by West 70th?”

The children nodded. “Matthew’s mum brought us,” added Lilly.

“I’ve got two tadpoles. I traded one with Matthew. Can I put some tap water in, Megan?”

“That’s not a good idea, Lilly. Tap water has chemicals in it. The tadpoles will die. You’ll have to get pond water.”

Megan Farrow was the teacher of the only kindergarten class that school year. This was her seventh year at the Mackay Early Childhood Centre, having first begun as a Teaching Assistant when she was working on her Master’s degree in Early Childhood Education. She worked with Abby Sinclair then but when Abby went on maternity leave she had been asked to take over as Head Teacher of the preschool class, and for the last three years the kindergarten class as well.¹⁹

The children were familiar with Megan’s interest in animals and nature. Many of their Circle discussions had focussed on animal and plant life. Almost every Thursday afternoon Megan brought them on a walk in the woods. Together they explored the trails and collected bits of bark, leaves, mosses, pine cones, twigs, and berries. She pointed out the birds singing and once, they stood quietly to watch a bird building its nest.²⁰ Another time they found some unmistakable fluff from a cottontail rabbit²¹ and collected frog’s eggs for their tank in class (*at the*

¹⁹ Appendix A, p. 94, 37 - 40

²⁰ Appendix D, p. 166

²¹ Appendix A, p. 109, 581 - 583

same culvert Megan had told Matthew's Mum). The visitors Megan brought to their classroom over the school year included Badger and Jessica, two yellow canaries who made their home in a cage in the corner of the classroom for a school term, a tank of frog and salamander tadpoles, a vivarium of worms and snails. Towards the end of the school year their last live-in visitors were six caterpillars which the children saw turn into pupae. These were carefully placed in a butterfly hatch case and the children were exhilarated to see the butterfly fluttering in the case one afternoon when they came to school.

Megan's interest in science did not stem from a science background in school. She recalled her high school years where she had struggled with Chemistry and Physics. As soon as she could she had 'dropped' these subjects like hot potatoes and pursued English and the Arts-type studies, subjects she excelled in. As an undergraduate she majored in English Literature and completed a minor in Psychology for her Bachelor of Arts degree. Following that, she completed a one year Education degree.²² However, the focus on the Arts in University could not erase the free existence she had cultivated in her childhood years. Her parents had given her and her siblings a free rein to romp about the woods, exploring, observing and loving nature. She remembered being out into the woods, tapping the maple trees to collect the sap and then going home to boil it up, looking for frogs and spawn, making forts out of trees and branches.²³ When she majored in Literature at University she enjoyed literature that involved description and scenery.²⁴ In hindsight she realised that perhaps she did not possess the organised temperament to be a good scientist in terms of what is required in high school

²² Appendix A, p. 94, 42 - 48

²³ Appendix A, p. 93, 3 - 7 &
Appendix B, p. 112, 8 - 19

²⁴ Appendix A, p. 93, 7 - 9

science.²⁵ But science in terms of observing, exploring, talking about and finding out continued as a strong interest through the years.²⁶

It was this background that had firmed her resolve to foster an interest in mathematics and science in young children, particularly females. It was easy for children to take the same path she had and just 'drop' the science subjects in high school. If she could nurture, through her teaching and example, childhood spontaneity and curiosity and foster an excitement when the children were young. Then perhaps if they did not eventually fit into the structured pattern of high school science, they would still possess this life-long love for nature.²⁷

Her love for nature explained her disposition towards biological science themes in the classroom. She "enjoyed"²⁸ Physics as a student but as a teacher she felt less confident and was uncomfortable with physical science topics. One year a child had voiced interest in learning about '*Electricity*'. Apart from providing batteries, wires and light bulbs, she felt inadequate in developing the idea and had let it fall through.²⁹ With nature and animals on the other hand she could easily exude high enthusiasm and a sense of wonder.³⁰ Also, she found nature themes to be very "hands-on" for the children. It was not something she had to present as facts from a book or a filmstrip. Spiders, birds, bugs, butterflies, rocks, dandelions, snails, seeds, these were real and immediate to the children, which they could

²⁵ Appendix A, p. 94, 43 - 45

²⁶ Appendix A, p. 93, 11 - 13 &
p. 94, 55 - 56

²⁷ Appendix A, p. 94, 48 - 58

²⁸ Appendix B, p. 113, 48

²⁹ Appendix B, p. 113, 47 - 49 &
p. 115, 130 - 135

³⁰ Appendix B, p. 113, 49 - 50

explore further on their own or with their friends or parents.³¹ She tried however, to balance the emphasis on biological themes with activities on mixing coloured solutions, miscible and immiscible liquids, provided magnets with a tray of magnetic and non-magnetic items for the children to categorise, and studied change with the children in terms of the effect of heat from the palm of the hand on an ice cube, a chocolate chip, or the effect of various mild chemicals like vinegar on rocks.³²

Her teaching career had started with teaching Grade 5. She was told in her Practica in her first Education degree that she would work well with young children. But at 22 she had wanted to get right to the “*core curriculum*” rather than work with *little kids!* Ten years and three children later she changed her mind and decided that teaching early childhood was “okay” and that she would probably do a “good job”.³³ When Grant, her husband, came to University to continue with his education she enrolled in a Diploma in Early Childhood Education programme. Later she decided to switch to a Master’s programme in Early Childhood.³⁴

Megan liked it here at Mackay. Apart from its location with the woods nearby and its affiliation to the university, she enjoyed the flexibility and freedom it offered her in realising her ideals of a child-centred and emergent curriculum³⁵ for the children. She was able to follow her intuition of what children wanted to learn about their world³⁶ and carry out her ideas to encourage literacy,

³¹ Appendix A, p. 97, 159 - 162

³² Appendix A, p. 98, 175 - 180

³³ Appendix A, pp. 93 - 94, 28 - 35

³⁴ Appendix B, p. 114, 69 - 71

³⁵ Appendix B, p. 123, 391 - 394

³⁶ Appendix B, p. 120, 296

computational and writing skills.³⁷ She liked the excitement she felt in working with the slightly older kindergartners (as compared to the younger preschool children). They loved to articulate their thoughts and were beginning to think about their audience as they spoke, discuss a point somebody else had made and argue points of view. She was able to “go in a little deeper” and to stretch their thinking.³⁸

There were sixteen to twenty children in each class but she had an assistant teacher to share the work of planning and searching resources for each theme. Together they tried new ideas and spent time with individual children. The prescribed curricula at the Kindergarten level were given as broad objectives and guidelines in the six developmental areas of the aesthetic and artistic, emotional, social, intellectual, physical and social responsibility in the British Columbia Primary Programme Foundation Document (1990). Together the teachers had to create a curriculum which would foster growth in those developmental areas. This was the exciting part of her job, creating the curriculum for the children.³⁹ It was not a static curriculum which they could repeat and reuse in its entirety each school year. It was dynamic in that it was necessary to customise the curriculum to suit the different interests and personality of each group of children that came through.⁴⁰ She could see distinct differences between the present group of children and the group that had come before. This present group was very competitive, concerned with whether what they had done was the highest, the broadest or had they done it the fastest, rather than focussing on what they could get out of the

³⁷ Appendix B, pp. 119 - 120, 272 - 285

³⁸ Appendix B, p. 119, 250 - 265

³⁹ Appendix B, p. 118, 228

⁴⁰ Appendix A, p. 98, 180 - 184
& pp. 103 - 104, 380 - 382

given task.⁴¹ The previous group were more conscientious and were able to pursue the various jobs in a more systematic manner. For example, they worked carefully with the balance and balance weights comparing the weights of the different nuts, seeds or toy animals provided. With each group the teachers have to programme different tasks which the children would enjoy, and derive some understanding and experience as they handle the manipulative tools and live specimens provided. In her curriculum planning, attention was given to those children who were at Mackay for preschool and were now in her kindergarten class. She had to be cognizant of what had been covered by the other teachers⁴² so as to judge and decide which themes were worth repeating or to explore new themes in order for the programme to challenge and appeal.

However, formal curriculum aside, Megan wanted to create a class environment where the children could feel good about themselves, especially in these early years. She believed that if the children did not have a high self-esteem, their focus was going to be on themselves instead of the learning in school.⁴³ She wanted to create a climate where the children could feel confident and secure in taking risks with their own attempts at reading, writing and developing friendships.⁴⁴ Above all she wanted to foster a sense of wonderment in the children, both of how wonderful things around them were and how they too were a part of that wonder. Just the other afternoon, the children had entered the classroom and were greeted with the news that one of the tadpoles had metamorphosised into a little frog. "It's like a miracle!" was Robbie's spontaneous response on seeing the frog. "Yes, these changes were powerful images in fostering

⁴¹ Appendix A, p. 103, 375 - 377

⁴² Appendix B, p. 118, 215 - 216 & 219 - 222

⁴³ Appendix A, p. 95, 94 - 98

⁴⁴ Appendix A, p. 96, 106 - 110

that sense of wonderment.”⁴⁵ This was one theme she knew was worth repeating year after year even if the children had seen it before.⁴⁶ Each year the metamorphosis of the tadpoles to frogs had elicited that same incredulous wonder in the children. She never grew tired of watching their excitement and amazement.

Megan’s high enthusiasm for nature and all the “little things” and the children’s natural curiosity about their world was the common ground she had with the children.⁴⁷ Reading and mathematics were given a heavy emphasis in class, but science was the vehicle she used to encourage the children’s emerging literacy and teach number computation. She felt that if she could “hook” kids into coming to school and enjoy watching tadpoles grow she could then “hook” them into reading books about them, draw their observations and record their data in their journals.⁴⁸

Unknown to her earlier, she had built a reputation among her colleagues and parents as a teacher who emphasised science and mathematics in her class.⁴⁹ Megan recalled her first attempt to collect frog’s eggs, or what she thought were frog’s eggs. They ended up being salamander eggs! So when these creatures hatched out they had these external gills and did not look like what she always knew tadpoles should look like. She had to resort to books to find out what was going on. The next year she learnt that salamanders and tadpoles did not belong together in the same tank because salamanders were carnivorous and it was only when she started losing tadpoles that she realised what was happening. She learnt that teaching science in the classroom meant doing it and learning from

⁴⁵ Appendix A, pp. 108 -109, 555 - 564

⁴⁶ Appendix B, p. 118, 216 - 218

⁴⁷ Appendix A, p. 93, 13 - 15

⁴⁸ Appendix A, p. 96, 129 - 132

⁴⁹ Appendix A, p. 96, 114 -116

each experience.⁵⁰ It was these very experiences, making decisions and reexamining them, making predictions and hypotheses, and turning to books for explanations, which she wanted to transmit to the children.

Another aspect which Megan liked about Mackay was the emphasis placed on books at the Centre.⁵¹ She liked books and reading but it was when she read picture books to her own young children, even before she had an academic background in Early Childhood Education, that she realised the pictures motivated children to learn more about the subject read. However it was through working with Nellie Summers, a former colleague, and watching her use books at the many activity centres that possibilities of using books, other than just sitting a child on her lap and talking with the pictures, “jelled”. She realised that the books could be the teacher in many instances and help children make associations without her having to say anything.⁵² Later on, she had worked with Dr Adele Kiley on an action-based research project on art and she too believed in the use of books and pictures to provide children with a model to work from as well as to learn. The use of books was something Megan believed in and which was reinforced by the people she had worked.⁵³ As she began to accumulate books on a variety of subjects and topics, she realised how she could use books for everything she taught in the classroom, for mathematics, counting, letters, vocabulary, art, science.⁵⁴

Megan liked the idea of the embeddedness of subject matter the stories in

⁵⁰ Appendix A, p. 94, 60 &
Appendix B, p. 115, 106 - 124

⁵¹ Appendix A, p. 106, 463 - 464

⁵² Appendix C, p. 140, 209 - 218

⁵³ Appendix A, p. 99, 224 - 225

⁵⁴ Appendix A, p. 99, 225 - 226

books provided. Last Wednesday when they were studying *Whales* she had read them *Humphrey the Lost Whale* which was based on a true story but had some fictional parts in it. It was a story the children enjoyed and they were captivated by the story element. Their interest was aroused and their curiosity piqued. They were an attentive audience ready and willing to learn more about whales and eager for the follow-up activities she had planned for them.⁵⁵

In preparing the Art Table this morning as a follow-up to the book *Bringing the Rain to Kapiti Plain*, she had planned for the children to draw and paint something about the wildlife in Africa. She wanted them to try a technique using bold lines and then washing the background with water colours. Two books were set up at the table, opened to a page showing photographs of cheetahs running. The books were there to give the children some ideas of animals that might live in the habitat on the plains of Africa. But she knew she had deliberately chosen the cheetah because the children were drawn to the power and swiftness portrayed by cheetahs. She lamented that teachers were now competing with impressive television and entertainment outside the classroom. They had to work hard to excite and lure the children into exploring the topics of study.⁵⁶ And books helped.....

⁵⁵ Appendix B, pp. 116 - 117, 162 - 171

⁵⁶ Appendix A, p. 108, 527 - 541

CHAPTER 4

The Circle

'Flick!' went the light switch.

"You have five more minutes to Circle," said Megan to the class, before flicking the light switch back on again.

The children came round to the space by the corner in front of the reading shelves and sat next to each other in a circle. Children's voices crying, "Sit next to me, Heather!", "I want to sit here!", "Over here, Stephen!" could be heard as the children scrambled to sit next to their pals at Circle.

Megan went to the front, sat in the circle with the children and in her singing voice went, "The more we get together, together, together. The more we get together, the happier we'll be. There's Robbie and Lilly, and Matthew, and Heather and Stephen..."

Behind them at the tables, half completed art pieces were left at the Art Table or the easel; castles, Lego space mobiles, train tracks at different stages of construction remained on the floor in the Building Block area; misshapen clay creations sat on the tables awaiting completion; still to be finished jigsaw puzzles with the loose pieces scattered laid on the table....everything the children had started earlier was put on hold till after Circle.

30 March Wednesday

Megan spent last Friday at the library browsing through books which she could use in class. This was a two hour job. With six years experience under her wing, she could now take a book from the shelf, open it and judge immediately from the type of pictures, the size of print and amount of text if the book was going to 'work' with the children. She read through only those books she thought were interesting, before deciding if she could use them.⁵⁷ Then there were the old, tried and true books which she knew the children would enjoy⁵⁸ and these were frequently used as and when it suited the theme. Megan's preparation for Circle involved reading the book ahead of time⁵⁹ to explore the concepts which could be

⁵⁷ Appendix B, p. 121, 333 - 344

⁵⁸ Appendix B, p. 117, 193 - 195

⁵⁹ Appendix A, p. 102, 326

brought out and discussed during Circle. She read the book keeping the children in mind, trying to predict the kind of comments they might make and then thinking through how she was going to handle their reactions and channel their thoughts toward her intended goals.⁶⁰

Today, Megan read a book by *Ruth Heller, Chickens Aren't The Only Ones*.⁶¹ The pictures were colourful and the print was big. In particular, she liked the categorisation in the text of the different animals into egg layers and live breeders. The book also featured the duck-billed platypus and the spiny ant eater as the only egg laying mammals. She led the children in some opening songs as they waited for everyone to move into the Circle. She had deliberately chosen to sing "*She sailed away on a lovely summer's day on the back of a crocodile...*" as their last song and on that note she continued with, "How do crocodiles have their young? How are they born?" she asked.

"They hatch out of eggs," came a reply.

"Do you know any other animals that hatch out of eggs?" Hands raised as the children waited impatiently to voice their answers. Megan wrote each suggestion on the board placed in front of the children.

"Lizards."

"Chickens."

"Dinosaurs..." came the answers in quick succession.

"We have two things in this room that hatch out of eggs," she prompted.

Immediately came the response, "Tadpoles...frogs."

"Newts."

"Snails."

"Slugs." The children made the association, if snails then slugs too!

⁶⁰ Appendix A, p. 102, 321 - 323

⁶¹ Appendix D, pp. 166 - 169

When there was a short pause, Megan gave a hint by pointing to a picture of a spider. "Spiders," a child shouted out.

"Fish," said another. She wrote **F i s h** on the board but added **(s o m e)** next to it, cautioning that some fish were live breeders.

"Deer," came another suggestion.

"Deers are mammals and they have live births," she told the children.

With a substantial list of egg laying animals now on the board, Megan showed the children the egg she had brought. "Can you tell me something about eggs before I break it?" she asked.

"Comes from a chicken."

"It's yellow inside," came two responses.

"Do you know what the yellow part is called?" she added.

"Yolk," came the reply.

Phoebe added, "There are different kinds of eggs. There is brown and white."

"Yes, we see them in the store. What about the texture of the egg?" holding the egg up for the children to see.

"It's hard," chorused the children.

"Are they all hard?" Megan asked. "Remember the frog's eggs in the tank? The eggs were a soft jelly mass; and turtle eggs have a soft shell," she reminded them.

Megan cracked the egg. "It's like when a window breaks or when the earth breaks when it gets too dry."

"Is there a chicken inside?" Robbie asked.

"No. The egg has to be fertilised first, before it can hatch into a little chick," she replied.

“Ya, the egg has to be kept warm,” Matthew joined in.

“You are right, Matthew. The fertilised eggs have to be incubated before they will hatch into little chicks.”

With the egg broken into the bowl, the children all moved closer and peered in. Megan pointed to the membrane lining the shell and pulled it out for the children to touch and feel. “The outside shell is like a skeleton, “ she told them, “it prevents the egg from being bumped; and the membrane keeps the egg from drying out.”

“Like your skin?” asked Erik.

“Yes, the membrane is like your skin.” Then pointing to the yellow yolk, she confirmed, “This is the yolk. Outside is the albumin, the clear part. That’s the part that becomes white when cooked. There is another part. Do you see it?” passing the bowl around the circle.

“The white part?” asked Kenny.

“That’s the part that attaches the yolk to the chick if it is fertilised, just like the umbilical cord, the life line between the baby and the mother. The yolk provides food for the young chick as it is developing. As the chick gets bigger, the yolk gets smaller, and a little yolk sac is left over.”

The book covered the different classes of animals that were egg layers - fish, birds, reptiles and amphibians. The illustrations showed the eggs of different animals, a comparison between hummingbird and ostrich eggs, and ways eggs were protected from predators. Megan checked off the list of egg laying animals brain stormed earlier as each of the animals mentioned was highlighted in the book. Most of the animals featured were raised in their earlier brainstorming. The book ended off with a new word introduced to the children, “Everyone that lays an egg is OVIPAROUS”.

As a follow up to the discussion together, Megan had prepared several two paged egg-shaped mini books for the Writing centre entitled 'Out of an egg hatch a ...' for the children to fill. With the book *Chickens Aren't The Only Ones* opened before them, the children assigned to the Writing centre for the afternoon wrote the names of egg laying animals they had discussed with the book as a guide for ideas and spelling. The book is non-fiction and though the words are relatively few and simple and the illustrations are colourful, it had been a long session at Circle. Some of the children were restless before they reached the less common and more interesting animals in the later part of the book.⁶²

Science to Megan was not a bag of facts⁶³ to be presented to the children, but at each Circle she hoped to present just enough content to encourage them to ask questions of her, or each other and to use the resources in the classroom to extend their knowledge.⁶⁴

Individually, the book reading, the concrete object of the egg, the follow-up activity and the teacher guided discussion, could each be important in the science teaching. However, when used collectively each augmented the other to help the children build upon their past experiences and make associations with new experiences; and construct their own scientific knowledge through the handling of concrete objects and exposure to new information presented in the books.

⁶² Appendix C, p. 148, 500 - 501

⁶³ Appendix B, p. 123, 410 - 413

⁶⁴ Appendix A, p. 100, 257 - 260

4 April Monday

Megan introduced today's topic of *Owls*⁶⁵ with "We are going to talk about a creature that makes its home in the tree. The tree is home to...." and with that starter she left it open for the children to add their contributions of names of animals which live in a tree while she played the role of recorder, writing the names on the board. By just ten minutes into discussion the children had talked about dormice in tree roots, woodpeckers in holes made in tree trunks, owls in abandoned holes, foxes and bears in their dens in tree roots, and robins in tree branches. Using a poster showing pictures of different types of owls she had cut out from magazines, the children identified the big round eyes and distinguishing horn-like tufts as typical features of owls.

Tejima's artwork and detailed illustrations had caught her eye when she first saw his book *Owl Lake*. The story itself was simple and the text appropriate for the children. Father Owl went out in the night to hunt. He heard the swish of fish in the water, swooped down to catch the fish and flew back to the nest to feed the owlets. Next, it was Mother Owl's turn to hunt. Megan chose to read this book because the large illustrations showed the owl in free flight, with outstretched wings and sharp talons reaching out to catch its prey and baby owls in a nest. She could talk with the pictures as she read the story to the children. It was a fictional story but through the text and illustrations information about owls was communicated. The owl's nocturnal predatory habits were highlighted when she read about their hunt for prey "in the evening sun". She engaged the children in a discussion of the prey owls would find in the night. They talked about the owl's keen sight for Father Owl could see the fish under the surface of the water even at twilight. She told them about the special feathers owls had which enabled them to

⁶⁵ Appendix D, pp. 160 - 161

silently swoop down to seize their prey. Pointing to the illustration of the owl reaching for the fish with its talons, Megan compared the owl's outstretched wings and downward pointing feet, to the brakes and wheels of a landing air plane. From the pictures and text she explained to the children that owls laid only one or two eggs, the chicks were called owlets and mother and father owls took turns at hunting and looking after their young.

She used the book to hold the children's attention, utilised the story and illustrations to talk about the features, diet, night hunts, flight of owls and their young. She also used the book to guide their craft activities for the day.⁶⁶ They imitated *Tejima's* wood-cut illustrations by drawing pictures with a pencil pressed deep into Styrofoam trays. Then using rollers, paint was rolled onto the pictures and a piece of paper was pressed over the Styrofoam prototype to make the print. It was a new experience for the children and they were absorbed in creating their art prints from the Styrofoam pictures they had drawn.

Like *Owl Lake*, books read during Circle sometimes provided ideas for craft work and the children enacted the experience described in the story. When Megan read *Little Mouse Makes A Garden*, the children each made a small garden in an aluminium roasting pan with soil, cotton batting and rocks. In it they planted carrot tops and bean sprout seeds. The children added an artistic touch to their individual gardens with colourful pipe cleaners and rock gardens. They felt "very successful"⁶⁷ because their gardens looked like Little Mouse's in the book. The children brought their gardens home with an accompanying instruction sheet on tending the garden and instructions to keep a little journal on the growth of their plants. The children enjoyed working on the project and though the garden got a

⁶⁶ Appendix D, p. 162

⁶⁷ Appendix C, p. 147, 458

little mouldy after a while, the effort the children put into making and tending the garden taught them much about gardening and plant growth.⁶⁸

On another occasion, on the theme of *Spiders*, they read *Eric Carle's The Very Busy Spider*. The illustration on each successive page depicted the incremental stages by which the web was spun. Marcia the assistant teacher had the children stand about the room pretending to be the branches of a tree. Using a ball of wool she followed the sequence shown in the book and brought the ball of wool from one child to another beginning with the initial Y-shape, working on the 'skeleton' and adding the inner strands to build a giant web in the classroom. After Circle, the children pretended to be spiders and worked on building their own webs on a piece of construction paper with string and glue.⁶⁹ Through these activities the children learnt how some spiders built their webs, in a simulated "hands-on" way.

When they studied *Fairy Tales*, one of the stories read was *Jack and the Beanstalk*. After Circle, the children planted scarlet runner bean seeds in small tubs of potting soil. The containers were placed on the window ledge in the classroom to catch the sunshine and were watered daily. The children monitored the growth of the seeds and later the seedlings. Over several weeks they saw leaves appear, scarlet blossoms bloom and bean pods grow.⁷⁰ They counted the number of bean pods on their plant and drew a bar chart of the frequency of plants with the same number of pods.

⁶⁸ Appendix C, pp. 146 - 147, 434 - 454

⁶⁹ Appendix C, p. 147, 461 - 473

⁷⁰ Appendix D, p. 164

12 April Tuesday

The caterpillars which Megan ordered arrived and the children talked about caterpillars and butterflies at Circle. "We've got more creatures we will be observing," she told the children as she held the jar up for all the children to see.

"There are no leaves in the jar? What are the caterpillars going to eat?" Lilly asked.

"Actually the leaves are all munched up at the bottom, like a 'soup'," Megan replied.

Heather's waved her hand frantically in front of Megan, trying to catch her attention. "Yes, Heather?"

"Caterpillars don't eat soup!" Heather giggled.

"Not the kind we eat," Megan explained, "Do you think when you squish the leaves water will come out? So, when the leaves are broken up, it is damp , like a sort of 'soup'. " She told the children caterpillars had glands which secreted an awful tasting, bitter liquid which made birds that caught them release them, hence protecting themselves.

"Skunks have protection too," Erik joined in, "they have a bad smell."

Megan passed the jar of caterpillars round the circle with the reminder not to shake it. The book chosen for today was an old favourite, *Eric Carle's The Very Hungry Caterpillar*. She liked the repeating phrase on each page which went "And he was still hungry". The children quickly caught on and using the illustrations and repeating pattern in the text 'read' the book with her even though many were not able to read the words. The book fostered skills of pattern recognition and prediction making. These were skills which were important for emergent literacy too as the children learnt to read from the context of the pictures and the pattern

in the text.⁷¹

Simultaneously, the illustrations in brilliant colours and the appealing fictional story of the caterpillar eating through apples and oranges, strawberries and plums, chocolate cake and Swiss cheese, portrayed the metamorphic life cycle of the butterfly, from the egg to imago. Through the medium of story, the children learnt the changing phases of the developing butterfly. After the story Megan set them on a task of sequencing correctly the different stages of the butterfly life cycle from a sheet with six jumbled up pictures of the adult butterfly, egg, growing caterpillar, caterpillar preparing for change, pupa and emerging butterfly. The children worked independently on their task without her help. She did, however, try to help the children realise that the life cycle did not have to begin with an egg as was often presented, but could begin with the adult butterfly laying the egg. When Robbie was unsure what came after the caterpillar, the book became the teacher as she referred him to it and that was enough to help him continue his work.

The children were competent in distinguishing fact from fiction.⁷² She recalled what Heather's mother shared as they were talking one day before class. After reading *The Very Hungry Caterpillar* at home, she teased Heather, "Oh, caterpillars eat Swiss cheese and sausages!" Heather replied very indignantly, "No. That's only for fun! Caterpillars don't eat the foods we eat!" But it was still important for the children to see the live caterpillars, the leaves they ate, and observe the changes taking place. Like the metamorphosis of the tadpole, insect metamorphosis was a powerful image and created a sense of wonder in the

⁷¹ Appendix A, pp. 104 - 105, 410 - 416

⁷² Appendix A, p. 105, 439 - 441

children concerning their world.⁷³ The book was important too because the children wanted to know immediately about the changes that were going to happen in the days ahead. To have to wait two weeks to see the entire cycle of change in the butterfly without a book to help them anticipate would have been trying on their patience.⁷⁴

Many books which are written as fictitious stories are based on science concepts. Through the text and illustrations, these science concepts are naturally and subtly communicated, often 'caught' by the children rather than formally 'taught' to them. Another such book read during Circle on another occasion was *Celia Godkin's Wolf Island*.⁷⁵ It is a story of the 'balance of nature' on an island populated by a variety of animals, one of which is a wolf family. When the wolves drifted away from the island on a floating raft an imbalance in the animal populations gradually took place beginning with the deer population.

There were now many deer on the island. They were eating large amounts of grass and leaves. The wolf family had kept the deer population down, because wolves eat deer for food. Without wolves to hunt the deer, there were now too many deer on the island for the amount of food available. (p. 16)

A chain reaction resulted. The rabbits had less to eat because the deer were eating their food. Foxes had less to eat as the rabbit population dropped. Slowly, the animals on the island became hungry because the numbers in the food chains were disrupted. One bad winter many animals died for the lack of food. Balance was finally restored with the return of the wolves to the island when the thick ice spread across the waters linking the mainland to the island. The children enjoyed the story so much that many asked their parents to purchase a personal copy to

⁷³ Appendix A, p. 109, 561 - 564

⁷⁴ Appendix A, p. 106, 475 - 482

⁷⁵ Appendix C, p. 153, 672 - 674

read at home.

On another occasion, Megan attempted to foster the concept of growth and development. Not wanting the children to generalise that everything grows in the same manner, she read the book *Fish Is Fish* by *Leo Lionni*.⁷⁶ The story is of a baby minnow and tadpole that grew up together in a pond. With time they grew and Fish, unable to leave his marine habitat, stayed in the pond while Frog left the pond to explore the world. He returned to describe to his friend the world he had seen. The story told of the parochial view the fish had due to his confinement in his underwater world. Fish tried to imagine what a bird, a cow and a human looked like from the descriptions Frog gave, but all he could visualise was a fish with wings, horns, or clothes. This was the highlight of the book for some of the children. They found the illustrations so funny they guffawed.⁷⁷ The story shows distinctly the different modes of growth in the two creatures, the continuous growth of the fish and the metamorphic change in the tadpole. Another child, Christopher was familiar with the idea of 'metamorphosis' and intending to extend his thinking Marcia asked him, "Do humans undergo metamorphosis too?" His immediate reply was, "No you don't! You get bigger but you don't change like frogs!"⁷⁸

18 May Thursday

Megan was exhilarated. Last week she found this book, *Why Flies Buzz*, an African folk tale retold by *Brenda Parkes*. She thought it was a beautiful story to read to the children and the text had a repetitive pattern, predictability and continued from the fly to a series of animals. When she read it she thought, "What

⁷⁶ Appendix B, p. 130, 643 - 646

⁷⁷ Appendix B, p. 131, 662 - 665

⁷⁸ Appendix B, pp. 131 - 132, 691 - 697

can I do with this book?" The class was working on *Insects* so this book could fit with the theme. However, the book presented flies as a nuisance and she wanted to communicate the idea that everything was on earth for a purpose. She finally thought of a question which she could ask after the book was read to have the children appreciate the concept of flies as useful in the world. Like bait to fish they caught the bait.⁷⁹ She asked, "What do you think flies eat?" with the hope that the children would say garbage or poo, whereupon she could gear the discussion towards scavenger animals which helped to 'clean' the earth. Robbie, intending to be outrageous and trigger a reaction from the other children, shouted out, "Poo!" The children laughed. But she was ready. Immediately, she jumped in and very emphatically said, "You're right!" Robbie's jaw dropped! That was not the reaction he expected! From there she moved the discussion in the direction of health issues and they talked about flies as carriers of germs and diseases.⁸⁰

The author of the book had not meant it to be used for environmental studies.⁸¹ Nevertheless the story helped the children make connections with their past encounters and experiences of seeing flies buzzing around poo and channel the discussion around science themes. Megan wanted associations like these to happen in her conversations with the children. She hoped the stories she read would always connect the children with something in their previous experience, something which they could then articulate and share and explore further as a group.⁸² That afternoon the discussion had branched into talking about scavengers with vultures as an example. One child called out, "Ooh, I know something about vultures. Vultures eat dead things in the desert. I saw it in *The*

⁷⁹ Appendix B, p. 122, 357 - 369

⁸⁰ Appendix A, pp. 101 - 102, 309 - 316

⁸¹ Appendix B, p. 122, 373 - 375

⁸² Appendix B, pp. 122 - 123, 380 - 384

Lion King.⁸³ *Why Flies Buzz* was a folk tale but by capitalising on the comments the children made⁸⁴ the discussion was channelled to science related health issues and scavenger animals. The children learnt from the web of related thoughts and ideas which stemmed from the different contributions the children made.

Over the school year, Megan encouraged the children to bring bugs, nests, tadpoles, snails, etc. to class to examine them under magnifying glasses. They conducted simple experiments, cooked, played “What’s My Rule?” in sorting games. The children also enjoyed guessing games where they could only ask yes/no questions to get clues to narrow their guesses of the identity of the hidden object.⁸⁵ All these activities contributed to the children’s practice of inquiry and the books read supported their inquiry. At the same time books reached children at the emotional level.⁸⁶ Last week they read another African folk tale, *Bringing The Rain To Kapiti Plain*. It was a story of drought on the African plains. Megan realised they could have conducted an experiment with plants to show the effect of drought on them but reading the story, she felt, made it more vivid and graphic.⁸⁷

This is Ki-pat,
 who watched his herd
As he stood on one leg,
 like the big stork bird;
Ki-pat, whose cows
 were so hungry and dry,
They moed for the rain
 to fall from the sky;
To green up the grass,
 all brown and dead,
That needed the rain
 from the cloud overhead - (p. 11)

⁸³ Appendix B, p. 123, 394 - 397

⁸⁴ Appendix A, p. 102, 316 - 318

⁸⁵ Appendix A, p. 103, 361 & 366 - 367

⁸⁶ Appendix A, p. 101, 290 - 293

⁸⁷ Appendix A, p. 101, 292 - 293

In the story a big black cloud covered the dry plains but it was not raining. An eagle flew up and a feather dropped. The boy, Ki-pat, picked the feather, made an arrow and dropped the arrow in the cloud. The cloud burst, bringing rain to the plains. "Scientists are able with chemicals to make the clouds burst and the rains fall," Megan told them, "but that's only if there is a cloud." "What if there were no clouds?" she continued, "how can we bring water to a drought area?"

"We could have a bucket brigade," suggested Phoebe.

"That would take a lot of time and energy!" Erik retorted. Eventually the children talked about irrigation and underground pipes to carry water to the dry areas. Megan was pleased. "They were thinking. And all that from a simple African folk tale!"⁸⁸

29 May Monday

The words "Jump, frog, jump!" chorused in Megan's ears. She read the book of the same title by *Robert Kalan* that afternoon. There were two levels on which she could use the book. One was to introduce the concept of food chains and the other would be to teach patterning and prediction. The story is about a frog and the different predators that comes his way, the fish, snake and turtle. The frog escaped from each predator but the fish is eaten by the snake which is in turn eaten by the turtle. The final predator is a group of children who capture the frog and 'cage' it in an overturned basket. However, one of the children, unable to bear the thought of the frog in captivity, releases it when his friends are not looking. The children enjoyed the book because each time the frog escapes from its predator the reader is given the cue in the sentence, "How did the frog get away?" and on the next page, in bold print, is the refrain, "Jump, frog, jump!"⁸⁹ The children very quickly saw the repeating pattern, recognised the cue and shouted

⁸⁸ Appendix A, p. 101, 295 - 303

⁸⁹ Appendix C, p. 148, 511 - 519

out gleefully the ensuing refrain even before Megan turned the page.

At the Kindergarten level, few children were able to read on their own. Nonetheless, recognising the repetitive pattern in the text all the children were able to predict and shout aloud the refrain each time Megan came to it. This manner of participation encouraged the children in their emergent literacy.⁹⁰ The strategy of looking for patterns upon which predictions were made was useful both in 'learning science' and 'learning to read'⁹¹ and fostering this skill through books supported both. Megan realised that just as she used science as a vehicle through which she could encourage and support the children's early attempts at reading, many authors including Eric Carle,⁹² who used various interesting aspects of science for his stories with animals, particularly insects, as characters. These texts frequently include a recurring phrase which the children can 'read' along. In *The Very Hungry Caterpillar*, it is "And he was still hungry", in *The Very Busy Spider*, "The spider didn't answer. She was very busy spinning her web", in *The Grouchy Ladybug*, it is "Hey you!" "Want to fight?" "Oh, you're not big enough!", in *The Quiet Cricket*, "The little cricket wanted to answer, so he rubbed his wings together. But nothing happened. Not a sound". The children enjoyed these participative refrains. Another story with a repetitive pattern which had the children roaring in laughter was *Sitting on the Farm*. It is also a book about predators and prey.⁹³ As a young girl ate her lunch an animal comes on her knee and bothers her so she telephones a predator of that animal to come but the predator that comes eats more of her lunch instead. Each time there is the refrain, MUNCH! MUNCH! MUNCH! Thus, apart from the patterning inherent in

⁹⁰ Appendix A, p. 100, 269 - 272

⁹¹ Appendix A, p. 104, 410 - 411

⁹² Appendix A, p. 105, 423 - 426

⁹³ Appendix C, p. 149, 526 - 532

the story the predator and prey concept is communicated to the children with the bear eating the dog, the dog eating the cat, the cat eating the rat, the rat biting the snake, the snake eating the frog, and the frog catching the bug.

Megan also believed that learning to categorise could also be fostered through books.⁹⁴ One such story which the children enjoyed because of the suspense it built was *The Camel Who Took a Walk* by Jack Tworokov. The story tells of a tiger waiting at the foot of a tree to pounce on a beautiful camel coming up the road through the forest. Unknown to him, on the tree above him, a monkey is waiting to drop a coconut on his head when he does so. Behind the monkey waits a squirrel to bite his tail when the action starts. Waiting for the squirrel is a bird who is ready to pounce on the squirrel's head with her sharp claws. Just as the camel is about to reach the tree, she suddenly stops, yawns and says, "I think I'll go back", foiling everybody's plan. The children learnt about categorising the animals mentioned in the spellbinding tale into meat eaters and vegetarian animals.⁹⁵ With *Mr Gumpy's Outing*, or *Old MacDonald Had a Farm*, animal stories with a farm setting, these stories were good for teaching categorisation too.⁹⁶ For example, as an extension to learning about animals normally seen in a farmyard in *Mr Gumpy's Outing* Megan prepared several other "scapes", water, trees, in the air, on the ground and a bag of animal cards. She worked with the children to sort the different animals into the "scapes" they spent most of their time.⁹⁷

And so it was with Circle. Stories were read, discussions were constructed, and science was shared.

⁹⁴ Appendix A, p. 104, 395

⁹⁵ Appendix C, pp. 152 - 153, 654 - 669

⁹⁶ Appendix B, p. 133, 740 - 742 &
Appendix C, p. 153, 670 - 671

⁹⁷ Appendix B, p. 133, 742 - 747

CHAPTER 5

The Centres

"We've been doing Frogs for so long. I hope we will do a new theme," lamented Wen E on the way to school.

Once we entered, we saw the room was different. There was a new theme for the week. At one centre were jars of fresh colourful flowers, with sheets of paper and coloured markers available. Christopher was there with his mother drawing the flowers. Erik, Robbie and Lilly were at the Pretend Centre which had been set up as a Garden Shop. There were flower postcards, planting pots, seed packets, Monopoly money and a price list of the items. On the wall was a poster of fruits painted with a bright splash of colours. Standing on the floor was a big book The Carrot Seed. At the Writing centre, the task was to design a seed packet. Lois Ehlert's Planting a Rainbow was opened to the page showing seed packets. At the other centres were a matching flower card game; colourful beads in the shape of flowers to make patterned sequences; jigsaw puzzles; a seed sorting activity with the book Sorting opened to the page 'sorting seeds'. The Sand table was converted to a garden patch with rakes, shovels, rollers which the children used to plough and prepare the sand for planting. On a smaller table was a pot with a dandelion plant and magnifying glasses. By it was the book Dandelions opened to show the dandelion 'clock'. By the Reading centre, was another big book opened to show different stages of growth of a seed to a seedling. On the shelves with the building blocks, more books were placed on book-stands, opened to show pictures of different flowers. At the Craft centre, cut shapes of petals, leaves, stalks ...were laid out for the day's craft, to make a picture of flowers.⁹⁸

The theme-related projects at the activity centres in the classroom involved learning concepts in several different curriculum areas - mathematics, science, literature, social studies, and the arts. For each theme, Megan and Marcia discussed and decided the concepts and ideas to be reinforced and communicated to the children, and the activity centres were prepared accordingly to provide an integrated learning environment. Yet, despite the planning the teachers could not predict how the day would turn out. What the children actually 'learnt' and 'took home' with them could be vastly different from that planned though just as rich. However, it was important to Megan to set up activities at the centres and

⁹⁸ Appendix D, pp. 170 - 171

prepare the room but also be alert to the children's responses⁹⁹ so that she could take advantage of what she regarded as 'accidents in learning'¹⁰⁰ that occurred unexpectedly. She recalled an incident when some children were cleaning out a hamster cage. The children noticed that one side of the cage was really smelly and Lilly asked, "What is that?" Megan replied, "That's where the hamster goes to the bathroom." Looking around Lilly spied a plant in the corner of the room and linking the two discrepant objects asked, "Do plants pee?" Megan adroitly responded with, "Let's see!" and she turned the question into a learning situation. They put the plant in a plastic bag, tied the bag up, and left it for the night.¹⁰¹ She kept that incident in the forefront of her mind as a reminder to be alert to seize opportune situations so children learn 'what the children wanted to know' instead of being restricted by 'what she wanted them to know and learn'.

There was a strong emphasis on books at Mackay Early Childhood Centre. Apart from the widespread use of books in the classroom, each Tuesday the children went to the school library for story time with Dorothy, a graduate student with a strong background in children's literature. Every year Mackay held a Book Fair to introduce parents to the huge selection of books available along a chosen theme.¹⁰² Megan's interaction with her teaching colleagues at Mackay and her involvement in an art project with Dr Adele Kiley¹⁰³ taught her how books could actually be the teacher helping children make associations.¹⁰⁴

⁹⁹ Appendix B, p. 125, 472

¹⁰⁰ Appendix C, p. 154, 699

¹⁰¹ Appendix B, p. 125, 461 - 468

¹⁰² Appendix A, p. 106, 464 - 465

¹⁰³ Appendix A, p. 99, 212 - 218

¹⁰⁴ Appendix C, p. 140, 213 - 218

Three years back, the teachers introduced the book-stands.¹⁰⁵ The books were now opened and placed inclined on book-stands at the centres close to student eye level. The children referred to the books as a resource. One drawback to the use of the book-stands was, as she soon discovered, the children felt inhibited in taking the book off the stand and flipping through the other pages in spite of encouragement to do so.¹⁰⁶ Nonetheless, the book-stands were helpful in displaying the illustrations and information in the book.

At the frog and salamander tank centre

Megan thought of Stephen.¹⁰⁷ The books around the tank showing the life cycle of the frogs was particularly helpful to Stephen. He needed the visual elements to help him anticipate what he knew was going to happen. Each day without fail as he walked into the room his first stop was at the tank. He looked at the eggs or the tadpoles, checked the book and then looked again for any developmental changes in the tadpoles. In fact, he was the first to notice the fully formed little frog. He was so excited because he knew the change was about to occur. He checked the books everyday. He knew what the young new frog was going to look like and he observed closely with the magnifying glasses provided beside the tank. As the tail started to shrink and the tadpole became more frog-like in water, he compared it with the picture in the book and saw that it was not going to be long before the frog 'emerged'. Megan helped him with an idea of the time line, "within approximately two days," she told him. So, he was on a keen look out as the time drew near. It was rewarding for him to find the frog first, even before she or Marcia did. Stephen let out a loud yell to everybody, "The frog! I see

¹⁰⁵ Appendix A, p. 99, 213

¹⁰⁶ Appendix A, p. 99, 227 - 230

¹⁰⁷ Appendix C, p. 141, 245 - 246

the little frog!"¹⁰⁸

The books- *Jelly Babies*, *Life in a Pond*, and *Pond Life*, placed by the tank were instrumental in helping Stephen and the rest of the children anticipate the changes that had occurred over the six weeks of development from the tadpole stage to the frog stage.¹⁰⁹ The children looked at the tank and then peered at the open book by the tank, pointed to the pictures and talked about what they saw. The pictures of the salamander tadpoles with their external feathery gills guided the children to distinguish salamander tadpoles from frog tadpoles. Picture books on pond life provided information on the pond skaters and frog spawn the children collected on their walks in the woods. Megan opened the books at specific pages as a resource for the children to assist them in their observation, identification of the creatures and as preparation for the developmental changes about to happen in the tadpoles.

At the art and craft centre

The children's job at the art table was to draw a picture of an animal focussed on for the week. Nonetheless, Megan always had a book or two opened on the table to show a representation of the animal. She thought this was important because though the animal, say an elephant, was familiar and easily recognised, the children became anxious when they were unable to remember its shape when asked to draw or craft it from clay or play dough. The book in front of them, not only freed the children from having to recall the features from memory but also provided a model. ¹¹⁰

¹⁰⁸ Appendix C, p. 141, 246 - 274

¹⁰⁹ Appendix A, p. 106, 475 - 482

¹¹⁰ Appendix C, pp. 141 -142, 274 - 281

Megan's collaboration with Dr Adele Kiley in her research project on art taught her that children learnt a lot through copying and Megan transferred these ideas to her science teaching.¹¹¹ Whether the children were working on mice or butterflies or caterpillars she always had a book or two opened to illustrations or photographs of the animal for their reference. The details they added to their representations of the creatures drawn or moulded from clay gave evidence to the influence of the books. Phoebe's caterpillar made from small balls of play dough to show the segments bore a resemblance to *Denise Fleming's* illustration of the caterpillar in *In the tall, tall grass* with its red sequins for breathing holes at the side and pipe cleaners for feelers. Given the task of writing a *Mouse* book, each child at the art table used a story or trade book chosen from the stack of books on mice. They flipped the pages, scrutinised the illustrations and decided on the pictures they wanted to copy into their *Mouse* book. With the drawings completed, Marcia helped them with the text. The illustrations provided ideas and models to guide the children's drawings.¹¹² The books engaged the children in a subtle development of their observation skills and their learning of the characteristic features of mice. However, some children felt intimidated by the beautiful illustrations in the books. One child, on one occasion, exclaimed, "I can't draw like that", and walked away. However, with reassurance that the books were there only as a guide and to provide ideas, he began to use the books to assist him in his representations of his understanding of the theme.¹¹³

Often the books lured the children to explore a certain aspect of the theme or motivated them to inquire further.¹¹⁴ Sometimes, when the children completed

¹¹¹ Appendix A, p. 99, 216 - 226

¹¹² Appendix A, p. 99, 220 - 221

¹¹³ Appendix A, pp. 99 -100, 233 - 249

¹¹⁴ Appendix A, p. 108, 537 - 538

one job and were looking around the room for another centre to move to, pictures from the books resting on the book-stands caught their eye.¹¹⁵ They chanced on a picture or illustration which appealed to them, piqued their interest and attracted them to the centre to try the activity there.

At the science centre

Erik brought a snail to class one Monday. He found it when his family was doing some gardening on Sunday. The snail sparked off the theme on *Snails*. Over Circle, the children took the snail out of the container and examined it. They found an empty glass jar and made a habitat for it with rocks, soil and damp leaves. "Why don't we find a few more snails in our gardens and let them mate?" Megan suggested. The children approved the idea enthusiastically. Over the next week one glass jar with one snail increased to two jars with a few snails, to three jars and eventually to a tank with twenty or more snails, as the children brought in snails from their gardens. By the tank Megan placed magnifying glasses and a book, *Snail* by Jens Olesen.¹¹⁶ The series of close-up photographs of snails in the book served to guide the children's exploration of snail body parts, snail movement, the sticky trail secreted and later on, to recognise the transparent-like eggs laid. They learnt from the book it took four weeks for the eggs to hatch, and kept a calendar to mark the passage of weeks till the eggs hatched.

Megan sometimes placed other items at the science centre, including sea-shells, live flowers, the moulted skin of a tarantula, or a container with a dandelion plant complete with roots and leaves, or when they were on the theme of *Birds*, she had a pair of bird wings on the table for the children to examine with magnifying glasses. These items and specimens were always accompanied by a

¹¹⁵ Appendix D, p. 173

¹¹⁶ Appendix D, p. 157

related book opened on a book-stand to serve as a resource or to attract and motivate the children to explore further. Sometimes these books were trade books, for example *Dandelions* by *Barrie Watts*,¹¹⁷ which provided information through detailed photographs on every other page. Other times story books, like *Eric Carle's A House for Hermit Crab*, were used to interest the children to explore the sea-shells placed at the Science Centre. The books were also a wonderful resource for herself.¹¹⁸ When the children approached her with questions she referred to these books to read off relevant sections which answered their queries. However, though many of these books were written for children in general, some of the books were too detailed for the Kindergartners. Nevertheless, Megan believed that the early exposure to real specimens and the 'guide-to-an animal/plant' books made the children more receptive to exploring similar subjects more deeply in the future with parents or friends.¹¹⁹ The placement of live creatures and real specimens at the science centre were also used to teach the children respect for living creatures. If anything were broken or injured through mishandling it provided an opportunity to emphasise care of specimens laid out for manipulation.¹²⁰

At the reading centre

The subject of the books on the racks usually corresponded with the theme studied, and featured a mix of fiction and non-fiction books. Like the posters on the walls of the room, there were some books of previous themes as well for the children to revisit, enjoy and make connections between the present theme and those before. Over the school year the children grew competent in using the classroom as a resource, whether in asking the teachers questions or going to the

¹¹⁷ Appendix D, p. 157

¹¹⁸ Appendix C, pp. 144 - 145, 378 - 381

¹¹⁹ Appendix A, p. 107, 517 - 519

¹²⁰ Appendix A, p. 107, 503 - 505

bookshelves to find a book to 'read' more about their interest areas.¹²¹ One series of books which the children particularly enjoyed was *Survival: Could You Be A Mouse? or A Squirrel? and other animals* which focussed on animal behaviour. As the mouse for example, pursued its daily life, the reader had to make choices that would either insure the mouse's survival or cause its death. The text in the book was conceived as a survival game with points given for the correct choices made. Megan would read the book with one or two children at a time. They discussed the options open to the mouse to choose and came to a consensus of the chosen route. The children requested her to read the book to them so frequently over the school term she soon grew weary of the book.¹²² But the books provided the 'meat' to chew and helped develop the children's 'molars' of reasoning and thinking as they worked out the safest choice for the mouse or the squirrel in their forage for food.¹²³

The children were also fond of riddle books where from the given clues for an animal they had to guess the animal.¹²⁴ Often these were easy but the children loved to be the first to make the deduction and to shout out the answer. However, through these books Megan expanded the children's thinking to realise the existence of multiple answers which were possible from the limited clues given and thus though their answers differed from what was given in the book or each other, their deductions were sound and plausible.

At the writing centre

The books used at the writing centre were often crucial in helping the

¹²¹ Appendix B, p. 127, 533 - 535

¹²² Appendix A, p. 110, 602 - 615

¹²³ Appendix C, p. 150, 579 - 586

¹²⁴ Appendix C, p. 150, 589 - 590

children with their emergent print and expanding vocabulary. Megan made use of books with names of animals in different habitats, or fruits and vegetables, or flowers etc. *Lois Ehlert's* and *Ruth Heller's* books were especially suitable with their big print and bright colourful pictures. The children could deduce from the illustrations the accompanying word and either copied the letters or used the letter stamps available to print the word out. One activity the children did after reading *The Very Hungry Caterpillar* was to 'write' their own version of the story. Megan prepared a booklet with blanks for the children to fill in foods the caterpillar ate on the different days. Books with 'food' words were provided for the children to refer to and fill in their booklets. Another frequent task at this centre was 'writing' mini booklets. Booklets cut into various shapes, like the shape of a strawberry when they were doing *Berries*, or a barn when the theme was on *Farms* were prepared and the children filled these booklets with their drawings, print or stories. An example was Heather's story in her Butterfly Book. Marcia helped her with the words to the drawings she made on each page,

The mommy butterfly laid the egg on a leaf

The eggs hatched into caterpillars

The caterpillar spun into a cocoon

The cocoon turned into a butterfly

and at the back, Heather pasted in a butterfly which she drew and coloured. There were labelling activities at the writing centre, for example, learning the parts of a tree. The children used the opened book and accompanying worksheets to learn to label the parts of a tree, trunk, branches, leaves, flowers, etc. or the parts of an insect. The books helped introduce the children to new words and labels to hang concepts learnt, supported their attempts at spelling, and provided new information.

CHAPTER 6

Epilogue

"It is Autumn.

A strong wind is blowing. It blows flower seeds high in the air and carries them far across the land. One of the seeds is tiny, smaller than any of the others. Will it be able to keep up with the others?... One of the seeds ...flies too high and the sun's hot rays burn it up. But the tiny seed sails on with the rest... Another seed lands on a tall and icy mountain. The ice never melts, and the seed cannot grow... One seed falls into the water and drowns... One seed drifts down onto a desert. It is hot and dry and the seed cannot grow... The seeds fall gently down on the ground. A bird comes by and eats one seed. The tiny seed is not eaten...

Now it is Winter.... the seeds settle down... A hungry mouse that also lives in the ground eats a seed for his lunch...

Now it is Spring... they are not seeds any more. They are plants. First they send roots down into the earth. Then their little stems and leaves begin to grow up toward the sun and air... There is a big fat weed... it takes all the sunlight and the rain from one of the small new plants. And that little plant dies. The tiny seed hasn't begun to grow yet... But finally it too starts to grow... The warm weather also brings the children out to play... One child doesn't see the plant as he runs along and - Oh! He breaks one! Now it cannot grow any more. The tiny plant that grew from the tiny seed is growing fast, but its neighbour grows even faster.. And look! A bud! And now even a flower! But... a boy has picked the flower to give to a friend. ..

It is Summer... the tiny plant from the tiny seed is all alone. It grows on and on... It is the tallest flower... It is a giant flower.

Now it is Autumn again... The wind blows harder. The flower has lost almost all of its petals... the wind shakes the flower, and this time the flower's seed pod opens. Out come many tiny seeds..." (Carle, 1987) Megan closed the book, The Tiny Seed, which she just read.

Heather raised her hand, waved it to catch Megan's attention. "I have a question!" she blurted, so that she would be the next to be called to share her comment. "Do you think all the new seeds will grow into giant flowers too?"

"I think you're right," Megan said.¹²⁴

6.0

The purpose of this study was to investigate one teacher's use of children's literature and trade books in teaching science to her Kindergarten class over one school year. Underlying this study was my belief that children's books could enhance the learning and teaching of science. This corresponded with Anderson &

¹²⁴ Appendix D, pp. 171 - 172

Anderson's (in press) finding in their study of one child's use and demonstration of her mathematical knowledge while sharing literature with her parents.

Mathematical learning was supported and mediated through the shared reading of children's literature in a parent- child dyad. However, to date, there has been no similar study in the realm of science learning, either in a home or a classroom situation. This study shows the viability of teaching and learning science through children's literature in a context of one adult and twenty children.

6.1

Discussion

Science for young children is the process of becoming aware of and understanding themselves, other living things, and the environment through the senses and personal exploration (McIntyre, 1984; Rutherford, 1986). This awareness and understanding comes as the children involve themselves in a first-hand exploration of the environment at their own pace and according to their individual cognitive levels (Elkind, 1972; Neuman, 1972; Smith, 1982). Science is both content and process, both a body of knowledge and a method of inquiry. This being so, the goal of science education is to simulate learning of the scientific process skills as well as scientific facts (Munroe, 1993).

In this study of one teacher's use of children's books to teach science in her Kindergarten classroom, the two goals of science education were evident. Literature in the classroom was used as a way to teach science content and processes. Science content was the knowledge acquired, new information, facts and concepts related to ourselves and other living things, our environment and our world learnt. Science processes were the skills and attitudes which reflect the research methods and attitudes of the scientific community. This includes developing attitudes of inquiry, skills of observation and classification and

processes of making mental connections among the myriad of life experiences and making predictions (Elkind, 1972; Neuman, 1972; Munroe, 1993). A wide variety of materials was provided in the classroom and tasks were planned for the children's involvement and investigation. Additionally, these tasks were related and unified under a particular theme of study selected by the teacher and the children. The science content or information communicated through books read were not given as isolated chunks of knowledge bearing little meaning or relevance to the children. Information about animals or observed natural phenomena shared through books provided a greater appreciation and understanding of the theme studied. Facts read supported the children's construction of knowledge stimulated by their manipulating materials and observing living creatures, or in response to questions asked as in the case where a child enquired, "How much blood do we have?". Concepts introduced occurred within a human context to which the children could relate and comprehend. However, at the heart of early childhood science education is the shared belief enunciated by Williams (1975), "The involvement and incorporation of the skills of investigation may be more important to the child than the factual knowledge acquired from investigations; the child's active participation is essential to learning" (p. 34). On the surface books and reading appear to be passive and vicarious, in contrast to direct and multisensory experiences advocated for children's "sciencing" (Neuman, 1972). But on closer scrutiny of the data collected in the study, depending on the teacher's use of the book, books foster children's observation skills and attention to detail, categorisation skills, ability to recognise patterns, make predictions and make associations between ideas and experiences. Books provided opportunities for engaging in scientific discourse as children articulated their thoughts and argued their differing points of view.

It is emphasised that although books feature very significantly in the classroom, they serve to support the children's active engagement in the 'doing' of science and to mediate the children's science learning. The use of books does not take the place of observation and experiment. At the same time, it is also recognised that given the focus of this study, the use of books to teach science has been highlighted in this thesis. The use of books to teach science is not the only role books play within the curriculum devised for the children. Books are also used to teach literacy, address the social and emotional needs of the kindergarten children, build an awareness of different cultures plus a host of other goals specified for Kindergarten in the British Columbia Primary Program Foundation Document (1990).

6.1.1 Research question 1

'How does a teacher make use of books in her Kindergarten science programme?'

In answer to the question, two broad ways of book use were observed in the shared reading with the children in circle time and when the books were opened and displayed at the activity centres in the classroom. Books were observed to be used to teach science directly and indirectly, both in terms of scientific content as well as scientific processes.

6.1.1.1 Books used to teach science directly

Books used to teach science directly relate to how the text and the illustrations serve to impart information or knowledge to the children. In some instances, for example at the activity centres, the bodily presence of the teacher may be not be required as the book acts as resource for the children's queries. However, in many instances with the children's beginning and emerging literacy,

the teacher's presence is still crucial especially in reading the book to the children. Nonetheless, science was taught through the story reading and illustrations in the book without the teacher engaging in detailed explanations.

Four categories involving the use of books to directly teach science were identified in the study: Introducing science concepts, giving information, teaching vocabulary, and guiding observation and self-exploration. The first three categories pertain to scientific content while the last category relate to scientific process skills.

Introducing science concepts

The text and illustrations in the story contextualised a variety of science concepts to the children (Donaldson, 1978; Dole & Johnson, 1981; Butzow & Butzow, 1989). Examples include, the concept of wind as an agent of seed dispersal, the high 'mortality' of seeds in harsh and unsuitable environments, the inherited features of a plant being transmitted via its seeds in *Eric Carle's The Tiny Seed*; the repercussions of a disturbance to the balance of nature on an island when the family of wolves move away in *Celia Godkin's Wolf Island*; the predators of a frog and the concept of food chains in *Robert Kalan's Jump, Frog, Jump!*; and the different modes of growth and development in different animals in *Leo Lionni's Fish Is Fish* and *Eric Carle's The Very Hungry Caterpillar*.

Giving information

The content of the text gave information and ideas (Janke & Norton, 1983; Nordstrom 1992) such as mammals are live-breeders except for the platypus and the ant eater in *Ruth Heller's Chickens Aren't The Only Ones*. In this story too, the scientific classes of fish, birds, reptiles, amphibians and mammals were

introduced. The children were made aware of the variety of egg shapes, colours and textures and ways eggs were protected from predators to ensure their survival. In reading the story *Owl Lake*, the children became exposed to owls, their hunt for prey in the night, their large round eyes and keen eyesight, their wings which when stretched acted like brakes and their nurture of their offspring.

Teaching Vocabulary

New words embedded in meaning-clarifying contexts were introduced through the text (Janke & Norton, 1983). For example, learning the labels to parts of a tree, words like cocoon when learning about the butterfly life cycle in *The Very Hungry Caterpillar*, or drought when reading *Bringing the Rain to Kapiti Plain*. Other words include habitat in *The Magic School bus Hops Home*, metamorphosis in *The Butterfly and the Caterpillar*, amphibians, reptiles, mammals and oviparous in *Chickens Aren't The Only Ones* were added to their science vocabulary.

Guiding Observation and Self-Exploration

The books at the science centre, placed by the specimens and live creatures, aroused the children's interest and stimulated the children to explore on their own (Janke & Norton, 1983). At the salamander tank, the butterfly hatch case and the snail tank, the accompanying books assisted the children in identification of salamander tadpoles from frog tadpoles, preparation of the anticipated developmental changes in the tadpoles and caterpillars, observation of snail body parts, movement, feeding and life cycle. Simple 'guide-to-an-animal/plant' books encouraged the children to make more deliberate, keener inspections of the specimens. Illustrations in books engaged the children in subtle development of observation skills as they noticed morphological details of the

animals studied.

6.1.1.2 Books used to teach science indirectly

The books were used to teach science indirectly when they played a supportive role to the teacher in effecting science learning. The story read may be a fairy tale, folk tale or realistic fiction . However, it was the way the teacher used the book that resulted in science being taught. The teacher was the initiator who decided on how the book was to be used in imparting science content and fostering science process skills. The book was only a means in achieving the teacher's goal.

Four categories involving the use of books to teach science indirectly were identified: Assisting visualisation, providing simulation ideas, engaging the child in scientific behaviours, and providing opportunities for engaging in scientific discourse. The first two categories relate to teaching science content and the last two categories relate to developing science process skills.

Assisting visualisation

Carefully selected picture storybooks were read to the children during circle time. Many of these books contained illustrations and text which complemented each other. The pictures conveyed the mood, matched the setting and invited the children into the text visually, added to the understanding of the plot and theme of the story, all of which were necessary for an audience of young children (Raines & Isbell, 1994). An example is *Tejima's Owl Lake*, a striking woodcut book with textures and contrasts of the outline of the owl set against the sights of the sea at twilight. By pointing to the illustrations, and highlighting significant features of the owl in flight and about to seize its prey, the teacher talked with the pictures and shared additional information about owls as she read the book.

Providing simulation ideas

The children experienced the excitement of discovery when the ideas and plots in the stories were sometimes 'enacted' in "hands-on" activities (Janke & Norton, 1983) as when the children imitated *Tejima's* woodcuts with Styrofoam trays to make prints of their drawings and grew a small garden with carrot tops and bean sprout seeds in an aluminium pan like Little Mouse in *Little Mouse Makes a Garden*. The children grew bean plants after they read about the giant beanstalk in *Jack and the Beanstalk*, and followed the incremental stages illustrated in *The Very Busy Spider* to build a web with string and glue.

Engaging the child in scientific behaviours

The rhyming patterns and repeated phrases made some stories irresistible to young children and at the same time fostered the skill of recognising patterns which allows the young listener to predict what will come next (Raines & Isbell, 1994). Many books were used in this respect, *Jump, Frog, Jump!*, *The Very Hungry Caterpillar*, *Sitting on the Farm*. Categorisation was another process skill indirectly fostered through book reading. Books which featured a series of animals were used and various sorting rules were introduced to guide the children's categorisation of the animals mentioned in the story, for example, classifying animals in *The Camel Who Took a Walk* into animal eaters and vegetarians. Other books introduced the children to less familiar ways animals could be categorised, for example, as egg layers and live breeders in *Chickens Aren't the Only Ones*. Finally, books were set up as a game which required the children to make reasoned choices or careful deductions from the clues given. The *Survival* series of books required the readers to be the animal, to discuss with each other the safest route the animal should take in its forage for food and to weigh the risks involved in the chosen route. Furthermore, the children's deductive skills were

utilised as they deduced the animal from given clues in the book *Guess What?* and realised the possibility of multiple answers to the clues given.

Providing Opportunities for Engaging in Scientific Discourse

The stories connected the children with their past experiences and generated discussion as they articulated their thoughts. Often, the teacher initiated discussions which branched off from the story read. For example, reading *Bringing the Rain to Kapiti Plain* led to a discussion of irrigation and underground pipes. A simple question, "What do you think flies eat?" following the reading of *Why Flies Buzz* helped children make associations with the flies they had seen around poo and channelled the discussion on health issues, flies as carriers of germs and scavenger animals.

In summary, books were used to teach both science content and processes directly and indirectly. Some books could fall into both categories of being used to teach science directly and indirectly. On their own, the text and illustrations contextualised science concepts. However, the book was used by the teacher to indirectly foster science process skills. This teacher was committed to teach science to her Kindergarten class using books to share science concepts, information and vocabulary, to foster observation and classification skills, to teach patterning and prediction, and to encourage deductive thinking. The use of books in science instruction was not incidental nor did it 'just happen'. The books were carefully chosen and read thoughtfully prior to each class session to determine how they could be used, and to consider the concepts which could be reinforced or taught through them. A summary of the salient points in answer to the question 'How does a teacher make use of books in her Kindergarten science programme?' is presented in Tables 2 and 3.

Table 2 shows the ways books were used to teach scientific content and concepts directly and indirectly.

	TEACH SCIENCE DIRECTLY	TEACH SCIENCE INDIRECTLY
CONTENT/CONCEPTS	<p>INTRODUCING SCIENCE CONCEPTS</p> <ul style="list-style-type: none"> • the text and illustrations contextualised a variety of science concepts e.g., food chains, balance of nature, predator & prey, growth & development, seed survival <p>GIVING INFORMATION</p> <ul style="list-style-type: none"> • the content provided new information and ideas e.g., different scientific classes in the animal world, egg layers & live-breeders, <p>TEACHING VOCABULARY</p> <ul style="list-style-type: none"> • new words were introduced through the text, sometimes these are 'scientific' e.g., mammals, reptiles, amphibians, oviparous, pupa, habitat 	<p>ASSISTING VISUALISATION</p> <ul style="list-style-type: none"> • the illustrations provided the visual elements to aid understanding e.g., flight, predatory behaviour of owls <p>PROVIDING IDEAS FOR SIMULATION</p> <ul style="list-style-type: none"> • the ideas in the story were 'enacted' in hands-on activities e.g., making spider webs, planting miniature gardens, growing bean plants

Table 2: Book use for direct/indirect teaching of science content

Table 3 shows the direct and indirect use of books to teach scientific process and inquiry skills.

	TEACH SCIENCE DIRECTLY	TEACH SCIENCE INDIRECTLY
PROCESS/INQUIRY SKILLS	<p>GUIDING OBSERVATION & SELF-EXPLORATION</p> <ul style="list-style-type: none"> • the illustrations helped in identification, observation and anticipation of the developmental changes in the live creatures e.g., frog & salamander tadpoles, metamorphical change of tadpoles, snails, dandelion plants 	<p>ENGAGING THE CHILD IN SCIENTIFIC BEHAVIOURS</p> <ul style="list-style-type: none"> • the repeated phrases in the text reinforced patterning and making predictions e.g., in <i>The Very Hungry Caterpillar</i>, <i>The Very Grouchy Ladybug</i>, <i>Sitting On The Farm</i> • the text presented new ways for categorisation e.g., egg layers & live- breeders, farm animals, animal eaters & vegetarians • some books were set up as educational games which required the child to make reasoned choices, or careful deductions from the given clues e.g., the <i>Survival series</i>, <i>Guess What?</i> <p>PROVIDING OPPORTUNITIES FOR ENGAGING IN SCIENTIFIC DISCOURSE</p> <ul style="list-style-type: none"> • the shared reading encouraged participation through discussion, encouraging connections with past experiences, a webbing of related ideas

Table 3: Book use for direct/indirect teaching of science processes

6.1.2 Research question 2

Why does the teacher use books in the way(s) she does?

Megan Farrow saw the power of books to support and mediate science learning, and to motivate children to learn more about science fifteen years back when as a mother she read to her own children. Over the years, through working with colleagues at the Mackay Early Childhood Centre, research projects with University staff, exposure to a wide range of books and authors, and working on school research projects with her now teenage children, her initial commitment to books deepened and grew. Thus, underlying her careful choice of books to read during circle time and widespread placement of books at the activity centres is the belief that books help children make associations and connections with their own experiences. In so doing, the children begin to actively construct meaning as they integrate new information from the text read with their background knowledge (Daisey, 1994). Additionally, Megan liked the way in which the stories in books embedded subject matter in a human context which captivated the children, aroused their interest and piqued their curiosity (Donaldson, 1978; Butzow & Butzow, 1989). She thought that books, through descriptions and illustrations, were vivid and graphic and capable of reaching the children at the emotional level. She often used books at the activity centres to capture the attention of the children and lure them into exploring the activity at the centre. The illustrations displayed provided ideas or served as models for the children to observe and copy in their drawings, craft and clay moulding.

This teacher had two underlying beliefs which supported her use of books in the classroom. She had a personal belief and conviction that books promote constructivist-based instruction (Daisey, 1994) and provide vicarious experiences

(Smardo, 1982) which support science learning. She thought that books encouraged children to explore and provide ideas as they work on their activities.

6.2 Recommendations for Further Research

In this study, the major focus was on one teacher and her use of books to teach science in her Kindergarten class. A similar study using a multiple case study research strategy would enable the investigation of the same phenomena in a variety of contexts to obtain further empirical support for and increased understanding of learning science through children's literature and trade books.

The data collected in this study were primarily in the form of field notes written from observations of the classroom activities and transcribed from in-depth interviews with the teacher. A further study undertaken could consider the use of video graphic documentation to capture the richness of science learning supported and mediated through the shared reading of books between teacher and children.

This study shows the potential for using books to enhance science learning by Kindergarten children, a majority of whom English is the home spoken language. Another recommendation for further research is to determine if books play a similar role in the teaching of science to a class of children for whom English is not the home spoken language.

REFERENCES

- Abbottsford & Mission Primary Teachers' Association (1992) Stepping into science. Vancouver: British Columbia Primary Teachers' Association
- Anderson, A. & Anderson, J. (In press) Learning mathematics through children's literature: A case study. Canadian Journal of Research in Early Childhood Education
- Barlow, D.L. (1991) Children, books and biology. Bioscience, 41, 3, 166 - 168
- Blosser, P.E. (1986) What research says: Improving science education. School Science and Mathematics, 86, 7, 597 - 612
- Butzow, C.M. and Butzow, J.W. (1989) Science through children's literature: An integrated approach. Englewood, Colorado: Teacher Ideas Press
- Coville, B. (1992) About tomorrow. Learning with literature. Instructor, 101, 9, 20, 22 - 23
- Daisey, P. (1994) The value of trade books in school science and mathematics instruction: a rationale. School Science and Mathematics, 94, 3, 130 - 137.
- Dole, J.A. and Johnson, V.R. (1981) Beyond the textbook: science literature for young people. Journal of Reading, 24, 7, 579 - 586
- Donaldson, M. (1978) Children's minds. New York: W.W.Norton.
- Egan, K. (1986) Teaching as storytelling. London, Ontario: Althouse Press.
- Elkind, D. (1972) Piaget and science education. Science and Children, 10, 3, 9 - 12
- Gailey, S. (1993) The mathematics-children's literature connection. Arithmetic Teacher, 40, 258 - 261
- Goodman, K. (1986) What's whole in whole language? Portsmouth, N.H.: Heinemann Educational Books
- Griffiths, R. & Clyne, M. (1991) Once upon a time....Australian Mathematics Teacher, 47, 1, 10 - 13
- Jackson, J.A. (1990) I am a fieldnote. In Sanjek, R. (ed) Fieldnotes, pp. 3 - 33. Ithaca: Cornell University Press
- Janke, D. and Norton, D. (1983) Good tools for teachers. Science and Children, 20, 6, 46 - 48

- Kliman, M. (1993) Integrating mathematics and literature in the elementary classroom. Arithmetic Teacher, 40, 318 - 321
- Lincoln, Y.S. & Guba, E.G. (1985) Naturalistic Inquiry. Beverly Hills, California: Sage Publications
- Marshall, C. & Rossman, G.B. (1989) Designing qualitative research. Newbury Park, California: Sage Publications
- Marshall, G. (1970) In a world of women: Field work in a Yoruba community. In Golde, P. (ed) Women in the field: Anthropological experiences. Chicago: Aldine
- Martin, B.E. and Brouwer, W. (1991) The sharing of personal science and the narrative element in science education. Science Education, 75, 6, 707 - 722
- McIntyre, M. (1984) Early childhood and science. Washington: National Science Teachers Association
- Neuman, D. (1972) Sciencing for young children. Young Children, 27, 4, 215 - 225
- Nordstrom, V. (1992) Reducing the text burden: Using children's literature and trade books in elementary school science education. Reference Services Review, 20, 1, 57 - 70
- Ohanian, S. (1989) Reading 'rithmetic: Using children's literature to teach math. Learning, 18, October, 32 - 35
- Ottenberg, S. (1990) Thirty years of fieldnotes. In Sanjek, R (ed) Fieldnotes, pp. 139 - 160. Ithaca: Cornell University Press
- Piaget, J. (1979) The child's conception of the world (J. Tomlinson & A. Tomlinson, Trans.). Totowa, New Jersey: Littlefield, Adams & Co (Original work published 1929)
- Pond, M. & Hoch, L. (1992) Linking children's literature and science activities. Ohio Reading Teacher, 26, 2, 13 -15
- Raines, S. & Isbell, R. (1994) Stories: Children's literature in early education. New York: Delmar Publishers Inc
- Rubino, A. (1991) The science/language connection: why to make it...how to do it. The Reading Teacher, 45, 3, 248 - 249
- Sanjek, R. (1990) A vocabulary for fieldnotes. In Sanjek, R (ed) Fieldnotes, pp. 92 - 121. Ithaca: Cornell University Press

- Saul, W. and Jagusch, S.A. (eds) (1986) Vital Connections - children, science and books. Portsmouth: Heinemann
- Schoeneberger, M., & Russell, T. (1986) Elementary Science as a little added frill: A report of two case studies. Science Education, 70, 5, 519 - 538
- Smardo, F.A. (1982) Using children's literature to clarify science concepts in early childhood programs. The Reading Teacher, 36, 3, 267 - 273
- Stake, R.E., & Easley, J., et al. (1978) Case studies in science education: Vol.II. Design, overview and general findings. Urbana-Champaign. IL:Centre for Instructional Research and Curriculum Evaluation, University of Illinois.
- Sulzby, E. & Teale, W. (1991) Emergent literacy. In Bass, R., Kamil, M., Mosenthal, P. & Pearson, P.D. (eds) Handbook of reading research: Volume II. New York: Longman
- Welchman - Tischler, R. (1992) How to use children's literature to teach mathematics. National Council of Teachers of Mathematics. Reston: Virginia
- Williams, D.L. (1975) On science for young children. Science and Children, 13, 2, 34 - 35
- Witherell, C. & Noddings, N. (eds) (1991) Stories lives tell: Narrative and dialogue in education. New York: Teachers College Press, Columbia University
- Yin, R.K. (1989) Case study research. Newbury Park, California: Sage Publications

Children's Books Cited:

- Aardema, V. (1981) Bringing the rain to Kapiti Plains. New York: Dial Press
- Burningham, J. (1970) Mr Gumpy's outing. London: Jonathon Cape Ltd
- Carle, E. (1969) The very hungry caterpillar. New York: Philomel Books
- Carle, E. (1984) The very busy spider. New York: Philomel Books
- Carle, E. (1986) The grouchy ladybug New York: Thomas Y. Crowell
- Carle, E. (1987) The tiny seed. Natick: Picture Book Studio

- Carle, E. (1990) The very quiet cricket. New York: Philomel Books
- Carle, E. (1987) A house for hermit crab. Natick: Picture Book Studio
- Cole, J. & Degen, B. (1987) The magic schoolbus inside the earth. New York: Scholastic Inc
- Crews, D. (1980) Truck. New York: Greenwillow Books.
- Degen, B. (1983) Jamberry. New York: Harper Collins Publishers
- Ehlert, L. (1988) Planting a rainbow. San Diego: Harcourt Brace Jovanovich
- Ehlert, L. (1989) Eating the alphabet. Orlando: Harcourt Brace
- Fleming, D. (1991) In the tall, tall grass. New York: Henry Holt & Co
- Godkin, C. (1993) Wolf island. Markham, On: Fitzhenry & Whiteside
- Heller, R. (1981) Chickens aren't the only ones. New York: Grossett & Dunlap
- Kalan, R. (1981) Jump, frog, jump! New York: Scholastic Inc
- King, B. & Slavin, B. (1991) Sitting on the farm. Toronto: Kids Can Press
- Krauss, R. (1945) The carrot seed. New York: Harper
- Lionni, L. (1970) Fish is fish. New York: Pantheon
- Look Closer Series (1992) Pond Life. London: Dorling Kindersley Ltd
- McCloskey, R. (1948) Blueberries for Sal. New York: Puffin
- Olesen, J. (1985) Snail. London: A & C Black
- Parkes, B. & Roberts-Smith, K. (1992) Why flies buzz. Scarborough, On: Ginn Publishing
- Pearson, T.C. (1984) Old MacDonald had a farm. New York: Dial Books for Young Readers
- Pragoff, F., Bown, D. & Tabor, R. (1989) Survival: could you be a squirrel? Nashville: Ideals Children's Books
- Tejima. (1987) Owl lake. New York: Philomel Books
- Tokuda, W. (1986) Humphrey the lost whale. Union City: Heian

Tworokov, J. (1951) The camel who took a walk. New York: E.P. Dutton & Co

Watts, B. (1987) Dandelion. Morristown, N.J.: Silver Burdett

Wood, J.N. & Bown, D. (1990) Survival: could you be a mouse? Nashville: Ideals
Children's Books

APPENDIX A

Interview 1 at the Mackay Early Childhood Centre

June 16 1995

- C: You majored in English Literature and did a minor in Psychology. What happened from then?
- M: I should tell you that when I was a child I had a free existence in that I was in the woods. I am a firstborn female but my parents treated me very much as an independent. They were non-sexist, so we used to do a lot of romping and observing and we grew up loving nature. So that was kind of in my heart when I was a child. When I majored in English Literature, a lot of the literature I enjoyed was literature that involved a lot of description, scenery. So I have this in my spirit. Then I got a degree in Education. I went back and got a Masters in Early Childhood Education. Science and observing and talking about it and exploring is a very strong interest in my own background, not in my education background but just in my spirit. Its a common ground and I can work with children because they naturally have that and I like to foster it. So its just a spontaneous and natural thing. It works for both of us. 5
- C: You finished your degree and went on immediately to get a degree in Education? 10
- M: No. I taught for a number of years and when I had children I stopped for ten years. Then we came to University here and I decided on some refresher courses and ended up taking a Masters. So there is a ten year gap between me finishing teaching and actually probably a fifteen year gap between my two degrees. 15
- C: How did you decide on early childhood? Because your children were young? 20
- M: Yep and also I had some substitute teaching in the day cares. I had been involved in preschool and pseudo-Montessori on Chrome Island and decided that early childhood was okay. I was told in my Practicums that I would be very good working with children but I was only 22 then and wasn't very interested in working with little kids, I 25 30

- really wanted to get into the core curriculum (*emphasis*) with the older children. Having had my own children, I ran my house like this and my kids are very into observing and hands-on. I thought I would probably do a good job, so I decided that's where I would like to put my energy and intensity and studying and I do enjoy it a lot. 35
- C: Have you been here long in the Centre?
- M: I am going into my 7th year. I started out part time as a TA. I got a TAship through my graduate studies and then when the teacher that I worked for became pregnant, they decided that I would take on her job as a full time teacher. 40
- C: Science was not formally in your background?
- M: Actually I didn't do particularly well in the formal scientific studies, even in high school. I kind of struggled on. I think perhaps I am not organised in my temperament to be a good scientist in terms of what schools require in high school education. So I dropped math in Grade 10. I did chemistry and physics but I dropped them as soon as I could. I excelled in English and the Arts type studies and I do well. So I pursued these subjects I did well in. I think that probably helps me want to do a better job of fostering an interest in math and science when children are young and particularly females because its easy for kids to do the same things I did and just drop it. I think it becomes a different thing when children are older, it becomes very lock-step and systematic and the excitement is lost. So, if they have the excitement when they are young, without the structure, that pressure to do things a certain way, then I think they have a hope of people like me who are still very interested and do a lot of reading and observing but don't necessarily fit into the pattern of high school science. 45 50 55
- C: How did all this thinking evolve about science and children?
- M: Just doing it. I learnt a lot mostly by doing. 60
- C: The Centre here also helps you and gives you that leeway to carry out what you want for the children.
- M: Absolutely and that's one of the reasons I like staying here and also its more do-able because there are two of us. Wonderful resources all around. Just having windows like these in your classroom, living 65

things outside, being able to go for walks, having the University as a resource and even the woods. So, its all right here. Its like a little laboratory.

C: So, when you were here, did you have to develop your own ideas, like what you want to see in the Kindergarten children that come through, or is it something given to you? 70

M: No. Nellie and I decided that we would like a try having a Kindergarten here, so we devised everything, the report cards, everything. There's not even a curriculum out there for Kindergarten, kind of guidelines. So you are totally free to do whatever you want. 75
There are certain parameters you hope for children to reach by the end of Kindergarten. We have a wide range of children coming in and still a wide range of children going out. But most of them are prepared for the next level. Some of them come in deciding they would do Kindergarten here and then 'real' Kindergarten in public schools. So, 80
every year I have at least two children that are going to take a second year of Kindergarten and a lot of that is, their parents see them as immature socially, their birth dates are very close to the deadline, they're the youngest in the family. I don't try to dissuade parents unless I perceive there will be a problem like boredom. 85

C: So, you were free to devise what you want to do. What were your guidelines? How did you figure out your objectives for the children?

M: We have the established objectives in terms of the 7 developmental areas- social, emotional, physical, cognitive, language, aesthetics, social responsibility. There are broad objectives and guidelines within 90
those developmental areas and then you work out your curriculum in order to foster growth along those objectives. So, you are always thinking about how what you are doing is affecting development in those areas. But you have some very broad goals. You want children to feel good about themselves especially in the early years because if 95
they don't have a good feeling about themselves, or knowledge of how they fit in this world in general, they are going to focus a lot on that instead of get on with the learning. I do see some children, even this year that have made some gains in this area but I worry about them still, about going ahead in school because they haven't got a good 100

enough feeling right here (clenched fist to heart) and I think as the years go on, less and less is given to that, more and more is given to facts, knowledge and so, they get lost. There's all these other 'knowledges' that are basic. We hope that the children will at least count to 10, will recognise numbers to 10, are learning the alphabet. 105
Risk taking is very important. That's where reading and computation and physical risk taking outside. Those things are very important in public school in order for all the other learning to take place. So we look for children who are willing to take risks in emergent reading and writing and friendships, developing friendships. 110

C: Most times when you think of Kindergarten and parents, parents talk to teachers about whether their children can read, write but people don't usually ask how their children are progressing in science.

M: I get a lot of support from parents. I get feedback informally that I am looked upon as a teacher who does a lot of work in science and math, so I have a bit of reputation. I didn't want to or try to foster that myself but its come about. So, parents will choose this classroom for those reasons. I suspect that maybe even though they don't comment on it directly to me, they enjoy that for their children and find it important. And at this Centre there is a very heavy movement to develop a much more complete science area in the atrium. There's a lot of argument about how monies could be best used. And so we are kind of bogged down in terms of power struggles and people's perceptions of what's necessary and what isn't. I think that generally this whole Centre is looked upon as a place where science and math is given a lot of merit. So, I think it is recognised though maybe not commented on directly. There is still a heavy emphasis on reading and math, computation but I find that science is a vehicle for all those other things taking place. So, if I can hook kids into coming to school and enjoy watching tadpoles grow, I can hook them into reading books about them. And recording their data in their journals. So, it becomes a vehicle for all the others. I feel much more comfortable with that than fairy tales where there's a lot of room for very strong emotions and things like that. I don't feel that comfortable in a classroom setting for children to explore those 135

issues. When they are 18, that's something I would do in play therapy or maybe in small group situations. But science I don't feel I have those problems although I do distance myself from some particular science themes like dinosaurs. I am not big on dinosaurs because I find that's what has happened, its been so popularised, 140 children's television and all that kind of stuff, that to me it verges on fairy tale than science. I know children have this very strong need for exploring very large animals that seem to have a lot of power and that's a part of finding out who they are also and so I would prefer to study things like Whales which are what I call 'gentle giants'. They 145 have that hugeness about them. They are also not perceived as aggressive although the killer whale has become that way, so we talk about predator and prey. Then they can explore those power issues in terms of that but I often hear children say things like 'Oh he's a mean animal' and then we talk about whether animals have emotions and 150 why they do the things they do and try and get the science back in that rather than the fairy tale 'wolf'. I think that's important because they are at an age where they can start to separate those issues. Its important for them to separate those issues.

C: Everything stems from the fact that you yourself are interested in it 155 and you know this is one area where kids would respond to. Is that the reason why there is always this emphasis on biological science themes and nature?

M: Yes, because I think its very hands-on. Its not something you have to present as facts from a book or film strip. Its something real to them, 160 something they will see later on and can explore and talk about with their parents or friends.

C: Have you tried exploring other themes like physical science topics - sound, magnets?

M: Yes I have. But I haven't done that much of it this year. I found that 165 this year's class in Kindergarten is tricky in that way. There are enough of them that aren't serious enough about pursuing that in a more systematic approach. So, if you put out things to balance and a balance weight, there is a large enough group that would just stick everything on and they are not serious enough and its still heavily 170

play-oriented or power-oriented , I am not sure how to say it, but it doesn't feel right so I decided that I would put those kinds of things out because I didn't want to foster that and I didn't want to be the grouch going round telling people they couldn't do that. So, I prefer just not to put it out. But they really enjoyed mixing solutions and trying different experiments - sink and float, that kind of thing worked well. I have done much more on rocks. I did a little bit on rocks this year but not very much, where they actually test it with vinegar, some mild chemicals; scratch it, roll it and fill in little checklists and things like that. And again I thought there wasn't enough seriousness in the group to really pursue that this year. So, I consider the group as it works, as well as the participants but if the group is heavily swayed in one way and to programme for that. And this group just seemed to work better with the kinds of things I did this year.

C: Science for children as you see it is very much to do with understanding nature, seeing how animals move and just observing them.

M: And building and things like that worked well too because the balancing... We had that Structures Day and yesterday we didn't have it. Erik's mother said, "Oh Erik looks so forward to coming on Thursdays for Structures and he was so disappointed because we didn't have it out". And yet at the beginning when we did it, they were so threatened by it. They didn't want to come to school because of it. So I thought that was pretty good. But you know I have a feeling that this atrium, this idea, if we could get going on it would work for the things we were just talking, that we could pull out groups which were able to handle those kinds of activities and pull them out and take them and they would all be there and not necessarily in the classroom. So it would be good to have some kind of a science area and mingle them with children from other classrooms too.

C: I find that in a lot of activities you always require the teacher to give them ideas, to ask them questions and to get their interest sustained.

M: To get them cohesive and focussed on.

C: Yes, because most times the ideas themselves are great, but then if you leave it to them..

- M:** they are too young to handle them.
- C:** And after a while they get bored or they are not sure what to do and they just leave it.
- M:** Or they monkey around with it.
- C:** How did your idea of using books at all the various centres come about? 210
- M:** I think it was here when I came. There was always that influence. We decided on using these book stands. I think that was about 3 years ago when we first had the Kindergarten. Nellie used to do this in the day care. I remember her doing this in the day care. She was heavily into science even in the day care. Adele Kiley in the department of Performing Arts did an action based research project on Art. She also uses books because her philosophy is children, instead of this philosophy of saying 'Just express and let it all hang out', she suggests that children really learn a lot from copy and so, giving them some kind of model to work from, they learn just as they learn tying their shoe or any other kinds of things. They learn by step and gradually get the feel of how things look and tracing. So, she used to do it also. Its something I believe in but its also been reinforced by other people that I have worked with. And it works for everything. We have books for Math, letters, everything. And the children do enjoy it and I notice that they look at the books. One thing I notice is, they don't feel free to turn the page. And maybe its these kinds of book holders but I don't know how to get around that. We've commented, "You can turn the page if you want".
- C:** Do you find that the children look at them? 225
- M:** I have lots of photographs of children looking at them while working and in this tape-slide, I've got slides too. Not all children. Some children are inhibited by it. I had one interesting child, I had him for 2 years. He finished last year. The first year, he was very threatened by the books that we used to put out. He was involved in the research, this was for Art but its the same for science. And he said, "I can't draw like that" and he would just walk away. Next year, he used them quite a bit and he's a very creative child. I think he wanted too much too fast. That's why he was threatened. But it brought him a

long way in terms of representing his knowledge and ideas, his literacy and all kinds of various things, but he had to warm up to that process. Kids do feel threatened because the books are, I mean to be able to be published, they are very good and the photographs. Its like writing a test, you feel like you have to get it perfect. You have to draw exactly what you see there. That's not what our expectations are, but some children will feel that way. But when we put them out, its just to give them ideas and also to give them a feel of the form, a substance of what we are talking about. 245

C: When we talk about teaching science, there is this emphasis on content and then there is also the process skills. How do you decide how much content to teach or what is the content to be taught in Kindergarten? 250

M: The children help us decide because they are going to sit for so much content. And then they get...like this year's class sat for a lot less content than last year's class. I don't agree on children memorising facts and I hope that I can just present just enough content to interest them so that they can ask questions of us, of each other or starting to use the resources to extend their knowledge of the things they want to know. But I don't think its important at this point to have a lot of facts and yet I hope they would get enough content that they would begin to make associations with their own experiences and have something to hook on for experiences that would happen to them in the future. 255 260

C: Do you think books can foster the content area? 265

M: Yep. I think they are excellent resources, picture books for children. There's a lot of competition in that area. So, a lot of them are very good in that they have little text, and the text is very appropriate for the age level. There's a lot of predictability. There's just enough of the fiction mixed with fact that is very interesting for children. and the print is big because there's a lot of emergent reading coming out from reading science picture books. *Jump Frog Jump*, *The Grouchy Ladybug*... There's a lot of good ones coming out. 270

C: I've enjoyed some of the books like *Fish is Fish*, and even *The Tiny Seed*, I liked that one. When I heard you read that one, I thought 275

there was a lot of science there. The kinds of questions the children asked at the end of it. Heather was asking at the end of it, now that this is the only seed that has survived, does it mean that all the sunflowers that grow from it will produce seeds that will give giant sunflowers. Its almost as though they could see that all the characteristics of the plant were in the seed. 280

M: Genetics

C: When you hear questions like this, you begin to wonder "Hey maybe there is science that is being communicated". But do you feel that this kind of science that is communicated through books is less 'strong', 'less robust' than the science that they gather from 'hands-on'? 285

M: No. There's so much more that you can do with books that you can't experience. Like yesterday, we read *Bringing The Rain To Kapiti Plain*. Something like that book, you can do an experiment with plants that show what happens to plants that didn't have water and then you can get the idea of drought. But this was much more graphic this kind of way. That's an African folk tale. Its like a legend of seeding clouds or seeding whatever. Its a very literature-oriented book and its also got a lot of science in it. We were able to talk a lot about science and I even talked to the children about how clouds are seeded with chemicals. But if there were no clouds then there would be a process they would have to figure out other ways to bring water to a drought area, and asking the children what ways they do that and one child suggested that they would have a bucket brigade. Another child said, "That will take a lot of time and energy" and then they talked about irrigation, pipes under the ground and things like that. They were thinking and all that from a simple African folk tale. You can get science from lots of books. 290 295 300

C: Especially when you see science not just for its content but the process and the skills. I like it when you put questions to them and they are forced to think and reason it out and discuss other possibilities. 305

M: Lending some seriousness to things they found very funny, like the fly on the poo. Two children brought that up, one in each class. And I 310

- think that they brought it up because they thought it would be very outrageous and they would get a reaction from the children. But I was ready. I was hoping they would say it and I was ready for it. And as soon as they said it, I said, "You're right!" and they went (*expression of shock*) This is not the reaction! And then we can talk about health issues and recycling and those kinds of things. Like you have to be ready to capitalise on those comments made and I guess that's an orientation that you have to have. 315
- C: And that comes from experience because that question has been brought up before? 320
- M: No. But I kind of thought it through before. When I am looking at books, you kind of predict what kind of comments might come up. Think of how you're going to handle or channel it right.
- C: When you choose books to read, they are carefully chosen? Each book that is chosen has a purpose to it? 325
- M: For certain you always read it ahead of time. the only time we would read a book right off the top is when the class is becoming unravelled and they need a book and you just grab one off the shelf and you're caught. I remember reading one and it was *Grandpa* and it was more about death and losing and I thought "Whoa, in the middle of..what did I choose!" But usually you would choose books in order for certain concepts to be discussed. 330
- C: When you choose a book, there are so many things you want to teach but do you find that science is... but now as I think of it, science is so much a part of you that .. when you... 335
- M: Yes, I feel very comfortable with it and I feel that I can think of, I can predict those kinds of things along those lines more comfortably than I can fairy tales. Science is just so much a big part of kids' lives, its so immediate.
- C: Even when you are teaching vocabulary, its hard to differentiate between science words and non-science words because so much of these supposedly science words are in our normal everyday usage. 340
- M: And we do extrapolate those words. We have put them around the room, on tables with letters. Children can practise them, not that we ask them to. Sometimes we ask them to, on diagrams. We do have 345

them in Kindergarten jobs. I do more this year than I've ever done. This year I expected children to do a certain task. Other years I've given them a choice of tasks. But this year's class didn't seem particularly good, generally speaking at making choices for themselves, so that's why we have Kindergarten jobs this year. And 350 a lot of the time the Kindergarten job will be based on labelling.

C: And especially towards the end of the year I notice you did much more of these worksheets and the children had to label the parts or see the sequence of events.

M: That was actually to give them a little boost to take risks with their 355 emergent writing and getting some letters or numbers or things down. We do Math that way too. We were doing graphing. The other day we did graphing with insects. I just gave them a little cup with a bunch of 3 different types of rubber insects. First they had to sort them, count them and then graph them on paper. It was interesting watching how 360 children went about it. I often do 'What's my rule?' in sorting. And then some Venn Diagram, just with string and they can reinvent their sorting groups and things like that according to... I've tried to do things like put a whole bunch of red things on the tray. Its amazing how sometimes children won't even focus on the red and focus on 365 other attributes like hardness or softness and the other guessing game is another. Now, this class has been a really hard one too because they are very competitive. So, they want to guess right away what it is, they don't want to bother pursuing how to narrow down the topic. We haven't had as much success as last year with it. 370 Last year's group was pretty good at it. So, its interesting.

C: I gathered that competitive spirit because everyone wanted to be the one to guess it and so they would just...

M: Ya and that's why things like the other activities don't work so well because they're very competitive. So, they don't focus on other things 375 they could be getting out of the task. They care about whether its the highest, or the broadest or did I do it the fastest. Part of it is that it is a group of boys but last year's class was a class of boys too but they were not competitive. Its interesting and teachers have to work with that. That's a big factor and what you can do, and what you would 380

- even attempt to try and do and the more you try to fight it, then the more you dig yourself into a hole. You have to work with them. So, I get the feeling that the children have had a good year and they would be sad to say goodbye to each other, in spite of the fact there's been competition. One mother overheard her child in play with 2 rubber animals talking about why its important to be first and she shared with me that one rubber animal said to the other, 'Why do you always want to be first?' The other animal, it was a dinosaur I think said, 'Well, it makes me feel important when I am first'. That child knew. That was interesting. 385 390
- C: Talking about the use of books again. One thing we know for sure is that books can help in your reasoning, deductive skills, how else do you think books can help in them in terms of the skill, scientific skills?
- M: Some books foster categorisation, sorting, patterning. 395
- C: I've noticed in the book *The Hungry Caterpillar ...*
- M: There's a lot of levels you can work with that..
- C: Would patterning and prediction be one of the levels...
- M: Ya
- C: After a while the children can see the pattern and before you flip the page they know what to say. 400
- M: And the words are repeated at the very end 'He was still hungry' and it helps emergent reading too. They can predict that its going to be 1, 2, 3. There are lots of science books actually that work on those principles too like *The Grouchy Ladybug* with the time and that one also repeats a phrase, something on grouchiness. 405
- C: I notice you were emphasising on this area earlier in the year where they see a pattern and then they try to make predictions as to what's going to happen on the next page.
- M: And that's not all science, that's also fostering skills that will enable them to read, those skills of being able to ... because when you think of reading, its hard for adults to break down reading in terms of skills because we can read a whole page and not even have to remember reading it but we've internalised it. So, getting kids to predict helps a lot in emergent reading because they don't work at it letter by letter. 410 415

They are working on strategies to help them.

C: Perhaps it gives them a feeling they've 'read' it even if they didn't read it.

M: And that builds up their self-confidence. Having a good level of self-confidence helps them to take further risks and so it builds on. 420

C: So, its very hard to say that there is an emphasis on science because everything is related.

M: I use it as a vehicle. Other people obviously do too. Eric Carle is one very good example because his books are based on a lot of very interesting science. He usually chooses animals. He works on a social 425 level because there is usually a little moral to his stories. So is Leo Lionni. He's another author like that. But they are also written in such a way they foster children's understanding and Math skills. So, they're actually excellent early childhood educators even though they probably weren't. They were maybe educated by their children. I 430 have a feeling they wrote some of those stories for their own children, I've read that actually.

C: If you use books like *The Hungry Caterpillar* would children get the wrong idea that this is the kind of food that caterpillars eat?

M: And that may be part of the reason, though I didn't necessarily think 435 it out that you would have a real caterpillar in your room to watch what they eat. But you could do experiments too. We have done that with snails. Put in different kinds of food to watch what they eat and what they don't eat so that you can separate fact from fiction. But I think if you ask children they will probably realise that this is not a 440 caterpillar's life. Children are very competent. But you know where that might break down is if the child is coming in with very minimal English skills. That's where that might break down although it would be lovely to use that repeating pattern because I find that works with ESL children. But they may see that as fact. I am just thinking 445 that now. That could be a problem. Who your audience is you may have to be careful because that is such a powerful message visually and it is much more difficult to express. Undoing the myths for somebody who hasn't a good grasp of English, that you could get yourself in trouble. 450

- C:** But how does a competence in the language come in? One would have thought it is the exposure to the life specimen.
- M:** Maybe their perception of books as being sources of truth.
- C:** So, their lack of exposure to the written word?
- M:** Ya, what a book is in terms of what it represents. I suppose it would 455
be influenced by the kinds of literature they were exposed to in their native language and it could be if that was a particularly different kind of book than what was generally read. Like say, if somebody was brought up on the Bible say, the truth. Then all of a sudden there was another book thrown in, they are going to see it in the same way as 460
the Bible is presented and having a confusion. So, its kind of generally speaking what their menu of books is. And the kids here get a high exposure to books at home, I can tell. And there is generally a heavy emphasis on books at the Centre - the Book Fair, going out for library time with Dorothy. Books all over the place and books at home. We 465
know that from studies that have been done here most families have quite a few books at home. They have a good library and they have library cards for their children and they get books for presents and things like that. So, these kids are already trained. We're just supporting it. 470
- C:** Do you think it would have been any different if we concentrated on life specimens in the classroom without any books, like you had tanks of tadpoles and there are no books next to it. Would it make a difference in the children's learning?
- M:** Ya. I think kids need stuff that are immediate and to have to wait for 475
all those stages to take place. I think without books to anticipate... You know, the comments when there was a frog in there was "There really is a frog!" You know, like, 'You told me it was going to be and we had pictures of it in books. We read about it, and what you told us, I can see it. It's really true!' For them to have all that happening and to 480
have to wait for 6 weeks, its too long for kids this age to have that happen. Plus there's a lot of competition. There's 18 children and 1 aquarium, so, its too much emphasis on the one activity and you need to spread. We try to have activities to do with frogs all over the room, so there are lots of choices of what you want to explore and 485

have them out for a number of days and change them around so that everybody gets exposure to a number of different representations of a given topic.

C: And the other thing I've noticed is also how they can be used to help the children distinguish between the tadpoles of salamanders and tadpoles of frogs. There were pictures to guide them so that they could see. 490

M: And lots of repeating information to them if they ask questions. They would ask the same question over and over again to test out if that was what they knew to be true. 495

C: I've also noticed, not so much this year but last year, when there were lots of these science centres where you would have a book on dandelions, snails or seashells. There were seashells and magnifying glasses, or a container with a dandelion plant for the children to explore. How effective were these centres? 500

M: They were very effective for some children and some children won't go near them. There is a real range and some children, and this is another area we try to work hard on, we do it by putting live things out there, is to emphasise respect. So, if we put those things out and they get broken by mishandling that you can talk about that. Some children like them for aesthetic reasons. Some children like them because they like to touch them. Some children, if there's not enough activity, the looking and reporting isn't enough for them, they don't even bother with them. They go right to the clay where they can pound it and make it into a shell or whatever. Its just different needs at different times and then what works for one child at one point in the year might be different from another point in the year. 505 510

C: When I flipped through the book on dandelions, I thought that was great but for the child...

M: Its a little bit too much information there, too in-depth for what they are ready for at this time. They're interested in blowing those little seeds. That's where they are at this point, although just even having the kids exposed to it makes them more ready to explore them more deeply with say, the parent later on at home. So it serves a purpose in a way. And it looks good in the Centre! 515 520

- C: You seldom see the children flipping through those books. They will just come and look at the thing, they don't even look at the books.
- M: Especially on those stands because they don't feel free to take it out of the stand and look through it.
- C: Usually, the books are opened at a specific page. Is it because you have something you want to communicate through it? 525
- M: Like we are going to do *Bringing The Rain to Kapiti Plain* on Monday morning and so, the kids are going to be drawing and painting something to do with Africa. They are using a technique of the bold lines and then the background is washed with water colour. So, there's lots of aesthetics involved there and exploring with mediums and things like that. That's why [the books] are there to give them some ideas of animals that might live in Africa, on the plains of Africa. And they get excited here (pointing to the craft table set up). They want to come to this table because there is a cheetah and they like cheetahs because they are powerful, So, there's lots going on there. A lot of it is in just luring children over into a task. As teachers you have to work hard at luring them into exploring a little bit. Because we are competing with a lot of impressive television and entertainment stuff out there. I think teachers have to work pretty hard at getting kids excited about topics. 530
- C: And its not just with topics. You find that they tend to gravitate towards the building toys. They seem to like that, where they actually make something. 535
- M: We have a no-weapons policy. We don't allow weapons and its usually something that extends their self-image and that's why they like the guns and things like that. Makes them feel more powerful. We can be exploring frogs, they'll still be making vehicles. Its not related to what we've been talking about. We do limit them in that we put that piece of paper there. We usually don't take that piece of paper off till at least 20 after 2. They've been in school from 1 until 2.20 pm before they get to go back to their space vehicles. And the Kindergarten job, because they are reluctant to explore that on their own, they won't choose that, but we kind of force them. We take liberties that way. In a lot of science, presentation helps them to foster wonderment, just 540
- 555

pure wonderment, of how wonderful things are around them and they are a part of it.

C: Do they see it in that light?

M: I think they do because the way they react to those frogs. Robbie came in and said "Its like a miracle!" "Just amazing!" "Its incredible!" 560
Those kinds of words. Same for the butterfly. They are very powerful. That metamorphosis is a very powerful image to foster that wonderment. I think with young children, those are the kinds of things you have to use.

C: You realise that nothing captures their attention as real specimens. 565
You see the way Christopher is very focussed on snails, worms. He would stare and look at them for 20 minutes or so.

M: And plants, berries and things like that and to make sure you go into the woods not just when the berries are ripening but even before that when they are first kind of sticks in the bush and they haven't 570
started to get green. And then going every once in a while to check on them and then when they are real berries, to know that was that 'dead' stick out in the bush. It just as much gives them that sense of wonderment, the process of change, accepting change too. That's a big part of science. 575

[Talking about the policy of the GVRD of not taking anything of nature out of the parks]

M: We had a discussion of that (taking berries out which were meant for the animals). We took the garbage out because we recognised that was pollution and the kids made comment. That was last year's 580
group. But to pick berries and things to study at home. The other day we went through the woods and we found a cotton rabbit's, probably part of its tail or part of a fluff from it. The kids wanted to bring it back and put it under a magnifying glass. I recognise it as a rabbit's and they knew rabbits lived in these woods because they found this 585
evidence of ... At first I thought there had been a kill in the site but it didn't look like there was any evidence of that having happened. They know there are barn owls around and that was a possibility.

C: I notice, last year, the children came up with their own mouse books and each of them had a booklet. There was also this box of books, all 590

of them on mice and the children were free to take one of the books and I noticed Newt, he was poring over it, and looking at it and it occupied his entire afternoon, even when he came to journal, he was looking at it, trying to copy it.

M: I think we had a, that was the year I brought in a dead mouse and we made a mouse hole and things like that. Mice are nice and its something the kids like. This year we haven't had much of that. The last 2 years Kindergarten, there were some children who enjoyed that activity. 595

C: These books would be helping them in their observation? 600

M: Ya, they would be looking more at the pictures. They won't be able to get much out of the text. They need to be worked with on the text. I think too that class enjoyed a series of books from the Public Library. Its about a mouse and they get to choose what they will do given a certain situation. And given your choice you turn to a certain page and it tells you what happens to them. They really enjoyed those books. We probably had one on the deer too. Those kinds of books are fun to go through with kids because there are not a lot of text but there's a lot of thinking. You have to become the mouse to decide what would be in the mouse's best interest and then take that consequence. The books are on different animals, there's a squirrel, a mouse. You have to work with small groups on that. They would go and they would get those books so many times, we were sick of them by the time they were in our classroom because they were very persistent in wanting to go over them again. And a bit competitive. Its a kind of book you can only look at with one or two children because you have to reach a consensus. The more children you have at this age, the harder to reach a consensus because they are very individualistic, still pretty centred on themselves. 605 610 615

C: I am interested in this kind of anthropomorphism where the children begin to identify with the animals. 620

M: And when they make a mouse, its more like 'my little pet mouse' and they give it a name and they have adventures with it in the blocks. Those kinds of things too. They enjoy that. That's a very needy part and that's great. You can inject the science, the real stuff in that at 625

the same time. You can even turn your Pretend Centre into a mouse hole, or something like that and read Leo Lionni's *Alexander and the Wind-up Mouse*. That's what so exciting about teaching this age group because you do all this kind of webbing and all the ideas that you can do with one topic even though it is not a scientific topic. You 630 can do all sorts of very creative and very imaginative things and the kids hop in and out of that. I think they can see the real science of it all but they also enjoy those other activities that are anthropomorphic.

C: But then would they see mice as dirty creatures, carry disease, 635 germs, bites. Would it give them a wrong idea of mice that they are friendly and cute.

M: I don't think so because given a mouse running around the class they will scream. That would be their spontaneous response. They wouldn't say, 'Oh look at the cute little mouse', so that shows they 640 know the difference between the real and the not real.

APPENDIX B

Interview 2 at the Mackay Early Childhood Centre

June 29 1995

- C: You mentioned that science, observing and learning about nature and various phenomena were very much in your childhood, your background. I would like to talk a bit more about that background. You said 'exploring in the woods', was it something cultivated by your parents? They taught you to explore, to observe? 5
- M: No. They may have modelled it. My mother was brought up in England, in Scotland. They very much enjoyed plant life especially. There were things like tapping maple trees for sap, looking for frogs and eggs. They weren't part of their, I don't think, of what they do where they come from. They were things, I don't know whether they were modelled for us by older kids or if we just found them or followed our interest. That's what I am suspecting. But they gave us free rein and when I was brought up, there wasn't the dangers that we now perceive in the woods and so my parents didn't keep tabs on me and as long as I was home for supper, that was fine. We were allowed to just explore, so I would go out and I would tap the maple trees, collect the sap, come home and boil it up and collect leaves in the Fall, and make forts out of trees, branches and things like that. So, we just loved being in the woods and we would find little bugs. 10 15
- C: Were you in other activities that encouraged this? Brownies? 20
- M: No. Well, I was in the Brownies but Brownies was more about making things from materials. All I remember was like the Toy maker's Badge and things like that. I don't remember a lot of the science kind of stuff in Brownies.
- C: Not the outdoors? 25
- M: Not an awful lot, but my Dad's upbringing in the Scouts was very much outdoors, like camping and what we now call Outward Bound stuff and so I think he enjoyed being in the woods. They obviously enjoyed going for walks. We went for a lot of walks. Canadian parents don't do that much, I don't think. But we used to go for walks in the 30

- evenings. But it was in the neighbourhood. It was more social, saying 'Hi' to your neighbours. It was still being outdoors more than indoors. And in the Winter we used to be outdoors all the time in the elements because we used to build forts and ski.
- C: And what about your elementary school background. Do you remember anything about your teachers? 35
- M: The only thing I remember about elementary school is having a nap in Kindergarten, being strapped for poor handwriting, but I don't remember learning much about content area. But I suspect, I remember actually writing reams of notes from blackboards and having them neatly done and I would redo my books before handing them in because there was a difference between writing it down really fast from the blackboard and having some kind of a neat presentation. Quite phony when you think about it. I don't remember being excited by it. We dissected frogs, I think in Grade 8. 40 45
- C: Your interest in science is solely from that experience?
- M: And I think a lot of my science is natural, maybe that's why I am not heavy into Physics. I enjoyed it but I don't know very much about it. I don't feel as comfortable but I can easily exude a high enthusiasm for nature and all little things, the wonderment part. And so, that's just part of me. I work on that. I use that because I think teachers should use their strengths. 50
- C: Just to get your professional background right. You did your undergraduate studies in Education.
- M: I did a BA in English, then I did one year of Education. 55
- C: That's where you did your Practicums. Then after that you went to teach older kids, I presume.
- M: Grade 5.
- C: You stopped when you had kids, for 10 years. You came back for refresher courses at University. You mentioned your Chrome Island experience where you taught at a pseudo-Montessori school. Where did that fit in? 60
- M: That was when Andrew was about the age when he was in preschool. He was one of the students, so it worked out really well. It was more volunteer, we didn't get paid. 65

- C: You had some experience there. Then you did your TAship at the Mackay Early Childhood Centre. What about your day care experience?
- M: I worked at the day care while I was on my Diploma in Early Childhood, just to supplement the income when my husband was a student. And I switched from that to my Masters. I have almost my Diploma but I lost it. It's been too many years since starting. The day care experience wasn't really attached to the Diploma. It was supplementing family income. 70
- C: You've spent 7 years at the MECC, does this include your TAship here? 75
- M: Yes. I am going into my 7th year. Its actually 6 years, going into the 7th.
- C: Do you remember why you and Nellie wanted to have a Kindergarten here since the MECC catered to the preschool level? 80
- M: Well, both of us were trained elementary teachers. So, we enjoyed working with older children as well as the younger children. For me, working with younger children was a new experience. I felt more comfortable working with the slightly older children. And we enjoyed the children we had and we thought it would be wonderful to be able to keep them one more year. And also for me, I suppose in the background was the idea to finish my qualification as a teacher in BC through teaching Kindergarten if we were able to pass the requirements for independent school status which we ended up doing. 85
- C: How many years do you have to teach? 90
- M: In order to get your permanent certificate which is a good idea to have - 2 straight years or 3 half time years. And one thing which I haven't got and which I have to get for my permanent certification is a lab science or math full year course which is something I have to start looking at. So, I do have to get some of that education I have a hole in. I am trying to find something that is practical for me. I don't want to just do it. I want to have something that will give me some skills I can use in my teaching career. 95
- C: We were talking about fostering an interest in math and science when children are young. You mentioned how you wanted children to 100

be filled with excitement with nature when they are young before they meet all the structure and pressure. I asked 'how did all this thinking evolve about science and children?' Your reply was 'Just doing it. I learnt a lot by just doing it.' What do you mean when you say 'By doing it'. 105

M: I mean, the first time we went out to collect eggs. I didn't know. I thought they were frog eggs. They ended up being salamander eggs. So when these creatures hatched out and they had these external gills and they didn't look like what I thought tadpoles should look like, I had to go to the books and find out what was going on. So, those are the kinds of things. And then I learnt. And next year I learnt that you probably shouldn't put the tadpoles and the salamanders in the same tank because salamanders are carnivorous and I only found that out by losing tadpoles and where did they go? Those kinds of things you learn by doing. I didn't do a research project on it and you wouldn't find those things anyway. There's no book that's going to tell you those things. You just have to learn them yourself and that's how children learn a lot of things too and to be able to admit that you didn't know that beforehand. Its the way you are making some assumptions and then you have to reexamine them and then you have to go out to some books and compare what you thought and what the book says and then you go 'Ah Huh!' So, its making some predictions and hypotheses and that's what you want the kids to do. And changing water and what do you feed them and all those kinds of things. 110 115 120

C: Are you still spending a lot of time reading? Is that how you sustain your own interest? 125

M: But I need to read when the thing is happening. I don't try to spend my whole summer reading about things I hope to do. I actually don't do a lot of planning in the Summer for the Fall. I wait till the kids come, then see what kinds of things they're interested in. This year's children really expressed a deep interest in electricity, wires and things like that which I didn't pursue unfortunately. But they were obviously interested in power. I didn't know. I was stumped. I didn't really know how I could apply it in the classroom. I could have done light bulbs and batteries and things like that. 130 135

- C: How did the idea of the use of books come about? Did you always have a strong interest in reading? Some of the books that you share with the classes, were they some books you've seen in your own childhood?
- M: No, not so much in my own childhood. But having 3 children, I mean, 140
the quality of books is so wonderful nowadays you can't but bump into these books. And my children are like myself in that they enjoy being lost in nature and in the woods. But they are with me because I can't trust this kind of world now. And so they enjoy those kinds of books. we sign them out from the library. We would go through them 145
together. And some of them worked because I've used them with my children. and then once you find one, often an author will write in the same genre and so you find others. Just thinking of themes and going to the library, just to be able to type in a subject matter, you are introduced to many books right away because its so easy now to find 150
what you need, what you want. And I can access this library at the education building. Quite a large variety of good material.
- C: So everything started right at the time you had kids. They would mention something they were interested in and you would get the books based on that theme to run it through with them. 155
- M: Ya and now my children are doing research projects in school. A lot of books they use in research projects are books that could easily be introduced to children at that young age because they are not particularly difficult. So its good. Like Kathryn was doing a project on dragonflies- and they made paper mache dragonflies and things like 160
that and those books could easily be used in here. They are very high quality photographs now. And I also like the idea of embeddedness of subject matter. Lets say you are studying *Whales*, I think that *Humphrey the Lost Whale* which is based on a true story but got some fictional parts in it and mapping. Its got so much in it. And yet its a 165
story that kids enjoy and they are caught in the story element that its easy to start bringing in the science stuff around it because you've already caught them. You've already got the audience in your hand and then they're willing to find out more about whales, or more about that area or more about mapping. They are just very ripe for 170

- pursuing those follow-up activities.
- C: When you choose a book, sometimes its hard to distinguish which comes first - whether you choose the book for the story value or for the concepts it holds.
- M: Well, its very well written, so you can choose either. I mean, it has both in them, so its easy. 175
- C: So you've drawn up most of these lists (lists of books under a related theme). If they want to do something on say, *Sea Creatures* you just take out these lists and run through the books.
- M: Actually its easier. These are nice little write-ups but its easier now to just punch in to see on the computer and there have been so many more books written since then. So these (the lists) are here for if I can't remember a title that I particularly like, I would use these but I don't necessarily use these to go to the library anymore to get stuff. 180
- C: I am trying to explore your mind when you are preparing for Circle. You have one week when you are emphasising on a certain theme. Would you choose the 4 books straight off or day by day? 185
- M: Sometimes I do that. Of course there are 2 of us planning so we have to take each other into consideration also. And sometimes you don't end up reading a story everyday, depending what happened the day before. And you may spend longer on the talking time because kids will bring in things and that will take up time. Or you may spend time singing or a slide show or film strip or something like that. But there are some old tried and true books that you know will work and those you tend to use. So you will use *Swimmy*, *Humphrey the Lost Whale*. I will use those with each class because I know they work really well and I know some activities or follow up that work well too. 195
- C: Also at the beginning of the week when you plan, there are thoughts of what you want to do in terms of math and Science and so you will choose the books and zero in. 200
- M: Yes and also we try in terms of representational work in the artistic application. We try to make sure that we use a variety of material. So if one day we do some painting then the next day we would probably want to do some 3-dimensional kind of work. And another day we do some dramatic, maybe we make puppets. We're always 205

trying to cover the broad spectrum than using the same thing over and over again with the children. That keeps the children interested and it gives them experience in working with a number of materials and with particular manipulative tools and thing like that.

C: And the things like jigsaws, sand.. 210

M: They're given and then you try and get those things within the theme. Over the years the Centre has built up a lot of materials and puzzles in *Frogs* because we do that every year. There are certain basic ones, *Space*, there's quite a lot on space. But we didn't do space this year. But I will probably do space next year. That's another thing. I have 215 the chance of having kids for 3 years. I am not going to repeat. Some of them are worth repeating like *Frogs*, I think are always worth repeating and butterflies. But some of them I don't over do. And I think that's in here (the BC Primary Foundation Document]. I noticed when I was rereading the Primary Programme Foundation 220 document, it said that schools should be cognizant of what different classes were doing so there wouldn't be too much repetition. And I can say very honestly we do not use these books that you can send away for with all the worksheets on *Apples or..* I just find them useless, so all our curricula is pretty well from our own heads, you won't find it in 225 the books anywhere. Lots of people ask us to publish our stuff. We don't have time to do it. Plus I just don't use those things myself. So, I don't believe in publishing. Its exciting to develop your own curricula. And we don't use a lot of worksheets. Not really. A little bit for the Kindergarten jobs, we have a little kind of starter sentence to help 230 them or a little kind of idea where they can do a bit of written work or math. We really don't use from workbooks or anything like that.

C: So, when people ask you to publish your curricula, its your ideas of how to bring certain themes across [ya] Its not so much the worksheets is it? 235

M: No. People are always looking for those things. I mean wherever I go to a conference, seems like that's where the big sales are, these preconceived theme things with all these stuff in it. I will wager that a lot of the stuff is never used.

C: You mentioned the 7 developmental areas, are these also found there 240

(The Primary Programme Foundation Document)?

M: Yes. I think actually in the Primary school there are 6, preschool there are 7. They've got aesthetic & artistic, emotional & social, intellectual, physical and social responsibility. They actually have 5. Emotional & social would be broken up and they would have language 245 as well as intellectual in preschool.

When you asked about 'Did we perceive the programme would be different or better than the programme offered in the public school. I don't even think of that, we just thought of them as an extension of what we were already doing with preschool children. I notice quite a 250 lot of difference in terms of attention span and ability to follow through on interest. The older children, just that 6 months is quite different. We do very similar things but working with slightly older children, you're able to go in a little deeper and that's make makes it exciting for us to work with them too. You can really get in, you can 255 really stretch them and their thinking is much more. They're able to articulate much more inside, whereas preschoolers are beginning to get there. But what comes out is a lot of personal stuff that not necessarily interests their audience, whereas Kindergartners are starting to think about their audience, probably its subconsciously 260 and they are starting to think alike, I mean they are starting to approach the subject in a manner so that there's some meeting ground and discussions and they can eventually discuss a point somebody else made and start to argue points of view, but directly acknowledging what another person has said. Its very interesting and 265 preschoolers don't usually do that. They might say "No" and then leave it at that.

C: So they are still very much centred on themselves and what they have to say [Yes] But do you feel a sense of pressure that what you develop here has to be a little better, that people are expecting more? 270

M: I suppose they expect more in terms of attention to their child because there are 2 staff and 18 children. A lot of times we've been told that our programme is very rich. But at the same time I've also had comments that we don't do as much literacy work. I think we do a lot of literacy work, but we don't do a lot of direct teaching of 275

alphabet, reading etc. We don't believe in that so we don't do it - a day for 'A' and a day for 'T', do a lot of worksheets and connecting sounds and letters and all that kind of stuff because we think they do a lot of that later on anyway. And that's not necessarily how lots of children learn to read. So, we do a lot of presentation of literature and we do a lot of chanting, do a lot of follow-up based on themes that we work on but we don't do teaching of it. Its probably a perception of how reading takes place. Because we work in a place like this, we follow our own intuition about the way kids learn and how to do certain things, so we're lucky. 280 285

C: Last year when I did my observation, I had done some observation in another Kindergarten previously and in that class every morning they start with 'Today is Monday, Yesterday is Sunday, Tomorrow is Tuesday' and then they would go "Today is the 20th and they count 1, 2, 3," every morning. 290

M: Ya, and sometimes they break balloons on calendars and we have 100 days, lots of stuff like that.

C: When I came and noticed that you didn't have that at all, I thought it's because the children coming here had that from their home backgrounds already. 295

M: No, its my idea of what kids want to know about their world and I don't think they care if it is Monday or Tuesday or Wednesday or what time it is. I don't do Time either. the only time is when they say, "Can we open up the Toy Centre?" and I say, 'When the big hand is at 4, it will be 20 after 2 and that's when you can do it.' When there's something meaningful and they look at the clock and its meaningful to them. But to go through a bunch of clocks! There'll be a time its important and they will learn it just like that (snap fingers) But I don't think its that important for them. If they ask we tell them. We don't try not to let them have that information but we don't think its worth taking 15 minutes of Circle everyday to talk about the date, the weather and the time. So we don't use our group time for those purposes. 300 305

C: The books that you choose to put out on the tables, would they be books you know children may not be familiar with? Books that 310

- children may not get at home?
- M: Yes, I think they are too because a lot of parents ask about those books or a lot of children say, "Can we take this book home today because we especially enjoyed it?" and I say, "You can get it from the public library, that's where I got it from and they get their parents to take down the title and Ya, we get a lot of comments that tell us they aren't aware of these books. A lot of parents will get Dr Seuss, the kind that is given a lot of publicity. 315
- C: I noticed you only use *The Berenstain Bears Go to the Doctor*.
- M: Rarely do we use those kinds of books. 320
- C: These are very popular with children.
- M: We think they are a little bit too cute so we don't use them.
- C: So you would use books where you can communicate some kind of concept through them.
- M: Yes, but you can through those books as well. Its just that I think kids get too caught up with say Curious George as the character and some of the other stuff that would be interesting isn't really strongly enough presented that its worth pursuing. I have used *Curious George* for making those paper hats, boats when he rides a bike, I think that is. When we go to the fire hall, sometimes we read *Curious George*. But usually we don't use them. 325
- C: How do you get to know new books?
- M: Just by reading. I spend a long time in the libraries just reading those books. So, going to get books is like an hour, 2 hour job. That's why we get prep time on Fridays. Dorothy is really helpful too. She will tell us, "I noticed you're doing this" and she has a very strong background in children's literature. She would give us some ideas too if we asked her, but she's not around all the time. She doesn't know what all of us are doing. So mostly we just read them off the shelf and put them back in. I'll open a book and know almost immediately if its going to work or not just by the kinds of pictures and the amount of text and the size of pictures and I just discount those books just on those grounds without reading them. And others I think "This looks interesting". Then I'll read through those and decide. 335
- C: The new series that Marcia used once *The Magic School bus*, do you 345

like them?

- M: Yes, but there's a little much in them and very difficult to see the pictures and unfortunately with this age group, that's a big factor because you have a lot of 'I can't see the picture'. Its very important still that you have that contact with the book. Not many of them are 350 able to sit and listen without seeing something.
- C: You mentioned the incident about the 'fly on the poo'. How did it come about? Was it through a book you were reading to them and the children saw an illustration and then they highlighted that?
- M: No, I knew that this was going to come up and I had this book and I 355 thought it was near the end of the year and we weren't on any particular theme. We finished *Frogs & Butterflies* and its a beautiful book called *Why Flies Buzz*. Its an African folk tale and its like *Why Mosquitoes Buzz*. Its exactly the same folk tale but its got the fly and it builds, good for kids learning to read because its got lots of 360 repetition, predictability and it builds. As I was reading it I was thinking 'What can I do with this book?' and then I thought, we just talked about insects and a fly is an insect. 'Now why are flies important?' This book presents flies as a nuisance. I wanted also, everything is on earth for a purpose and I wanted to highlight the 365 purpose. I asked the question that I knew would centre the kids on that concept of flies being useful in the world and it worked. It worked because both classes brought up this idea - flies on poo and so we can work on that idea of recycling.
- C: So, that is one of those books you would choose for the strong value 370 and then because of the story that you wanted to communicate, you wanted to extend that story to something else.
- M: And I don't think the authors when they wrote that book they thought of the usefulness of flies in society. Its actually kind of like an allegory. Its not written for environmental studies or anything. But it 375 can be used that way for lots of concepts. It can be used for counting and patterning and all kinds of things as well.
- C: It shows how you can take a book any way you wish. Do they often bring in their own experiences?
- M: There's a lot of association that goes on and that's what you want to 380

happen in conversations. That makes it two-way and very connected. That's what happens mostly with this age group because they connect. Something in the story connects with something in their previous experience and then you can also help them examine some general concepts. 385

C: Can you recall any of these incidents- like one of them is the fly on the poo incident because they must obviously have seen flies buzzing over the poo.

M: And talking about scavengers- creatures that help clean up the earth. So, you can do a whole unit just on scavengers right from that one unit. If you were the kind of teacher who didn't, and that's the kind we are, that don't plan so far ahead that there is no allowance for these kinds of things to broaden then you could, if they got really interested in it. If another child said, 'Ooh, I know something about vultures. Vultures eat dead things in the desert because they watched it in the Lion King or something like that, then you could just develop quickly a whole unit on scavengers. It happened with us one year where I can't remember how it started but we got this idea of predators and prey and it kept coming up. If you think about it, a lot of these things are just permeated in a lot of the books and they come up. We did a whole unit on predators and prey. We got the parks people to come and guide the children through the forest and we told them we were especially interested in predators and prey and so they did this whole thing on predators and prey. they divided the kids up into predators and prey and they had all these collars that they made and they all hid behind trees, and the predators came after them. And it kept popping up through the year. That concept was so strong in them, even when we weren't thinking about it, the kids would say 'Oh that's a predator!' They started categorising and generalising and making associations. That is what I consider the process of scientific thinking and that's what you want to foster. You are not that interested in fostering facts, a big bag of facts, but thinking in a scientific manner. This year I can't think of anything, they were into power. we could probably have done a very good, strong unit of *Predators and Prey*. 415

- C: Its interesting that for this class, this thing on power keeps popping up.
- M: Ya, they're interested in powerful colours, like they all like red.
- C: Can they describe it as powerful?
- M: No, I don't think they would describe it as powerful, I interpreted that 420 as powerful, their personality.
- C: In the book *Bringing the Rain to Kapiti Plain*, you talked about seeding. What was the story about such that you could bring this in?
- M: There was this big black cloud that covered the plains and it wasn't breaking and so the fellow, the eagle flew up and a feather dropped. 425 This guy was an inventive thinker, he made an arrow, dropped the arrow in the cloud, the cloud burst open and the kids thought of it as a cut and blood coming out. But then I talked to the children that clouds could actually be seeded. I didn't talk about the chemical stuff but that scientists could make the clouds burst and the rain happen. And 430 that's all I said. Of course, I said there had to be a cloud there, you can't do it in a blue sky. There is some chemical, all I know is that, I didn't research or look into it or anything more than that. It must help condense water, there's some chemical reaction.
- C: I thought the seeding would be in the formation of the clouds. 435
- M: No, they drop something into the cloud, air planes do it. They drop something into the clouds, must make it heavy or something, to the point that it is going to break. I don't even know how rain, I don't know the whole scientific thing of, what the critical factor is in causing rain from clouds. Why some clouds don't have rain. I know 440 cloud formations of cumulus, stratus and all that kind of stuff but I don't know much more than that.
- C: That's how children see clouds. Wen E sees clouds as bags of rain and then if you break it everything inside spills out.
- M: But some clouds don't break till they reach a point. 445
- C: Will they see it as breaking point?
- M: I told the kids how I flew in an air plane as a child and wanted to jump out and play in the clouds with a bucket and spade because they're so fluffy. And the kids, they have so much knowledge than I have at that age, because they said, "Oh you couldn't do that!"and I said, 450

- "Why not?" and they said, "Because you would fall right through the clouds. Clouds are just a bunch of like steam from a kettle". I would never have been able to say that at that age. To me they were just nice fluffy things, appealing but I didn't know anything about what they really were but these kids do. 455
- C: The other thing I worry is, they know it as a bunch of words and then they just say it.
- M: We've brought the kettle into Circle and we've done all that stuff with them. I didn't do it with them because other teachers have done it with them in the other years. But we've done that and I remember I brought it up in this presentation that I did, where I was cleaning out a hamster cage one day in the class with the children. They noticed that one side of the cage was really smelly and they said, "What was that?" and I said, "That's where the hamster goes to the bathroom and they were very into peeing and pooping as most kids that age are. And so she kind of looked around and said, "Do plants pee?" And then we did an experiment with a bag over it, to find out whether plants pee. So, I would see a child like that, starting to wonder about clouds and finding out more about clouds. What is it that makes them drop their water and things like that. 460 465 470
- C: That's why you need a small teacher-student ratio.
- M: Ya, to catch those moments. But then there's a beautiful book called *It looked like spilled milk* that has shapes of clouds. But if you used that with children, you could talk a lot about cloud formation and what makes clouds work. When we talked about this unit, we talked about the flow and the recycling and we did some experiments that demonstrated in a small situation how that works in the environment in general. 475
- C: When you come into a classroom like this in the beginning of the year before the schoolchildren come in and everything is all bare and empty walls, what goes on in your mind as you prepare the room for the children? 480
- M: Actually before they come in, we don't do an awful lot. But we put up a lot of pictures of children in relationship with each other or in relationship with people, grandparents and parents. So, what we do 485

- the first week is try and begin to foster a community spirit so we work heavily on the social. We don't do a lot of science right at the beginning. We don't try to encourage them through presentation of exciting material to come back again because we think the first and foremost concern for them is 'Who are all these people?' and 'Am I going to be liked?' and that kind of stuff. That's what we work on. In the Summer programme, I think they will, they have such a short time of 2 weeks to get them ignited that they will be putting a lot of posters up on the wall. 490
- C: Even then, your walls were not bare. 495
- M: No, we will have the alphabet and pictures of kids playing but we don't have a lot more than that.
- C: And then you slowly build it up. (Ya) And how would you begin to build it up?
- M: Well, we'll probably ask the children within the first week, maybe even the first day because we'll have small groups because only half the class comes in at a time, what their interests are and a lot of them have been in the centre before, so they expect themes and they'll be telling us what they like. Some of them will be telling us exactly what they like last year. Some of them will think of some ideas that they don't know about, what they presume to be enough about. 500 505
- C: Last year you started with *Berries* and when we came in there were a lot on berries and you used the berry book by Bruce Degen.
- M: That's right because they've just been doing this with their families and its also a very social experience, picking berries. We did *Blueberries for Sal* because its a story about fear and separation as well as a story about berries and then we do some social activities of baking and picking together. And then we can talk about what apples and berries are made up. But that's kind of like already 2 weeks down the line. 510 515
- C: What do you want the walls and the posters to communicate to the children?
- M: That this is a safe and fun and caring place to be.
- C: Right at the start. And subsequently? 520

- M: Its an interesting place to come. You can feed your curiosity on things. You will learn about things.
- C: Do the children actually see the things that are up? Or do they just glance and walk away?
- M: I hope so. It depends what it is, it depends on the subject matter. I 525
am sure if I had pictures of dinosaurs up, they would see those pictures. If I put pictures of people exploring caves, then maybe not all of them would see them. Some of them would comment on them.
- C: One incident was when you did skeletons and the task was to label 530
the parts. I think there was a book, and the teacher as the resource in each small group. Stephen saw the poster of the skeleton up on the wall, gathered up his things and went there and used it as a resource.
- M: Ya, they get pretty good about using the classroom as a resource, 535
either asking teachers or going to the bookshelf to find a book to read more about it. I have a special needs child in the morning who uses books like that all the time. He just goes in there and looks through them and he looks through the same ones all the time. He just wants to know more and more. He is very intense, a need in terms of emotional and social. It has made such a difference. I got a card from his parents from his parents saying how much they've learnt about 540
science. It had given them a focus at home so it took the emphasis off the behaviour. Because they had this focus, it diffused their attention on the problems of his behaviour. So it has worked really well for him. Because he is a very bright child he has this inability to socialise. It is inappropriate a lot of the time but because his attention is so 545
focussed on the science especially the frogs, it diffuses the other problems and he will have time to grow, to take it all in gradually because the social isn't focussed on anymore. I bet that works with a lot of children with social and emotional problems. If you can get them interested in something, find out what their interests are and 550
soak them with it so that it diffuses the attention being given to the behaviour and it allows them to work very independently on their own. They're not dependent anymore on the other kids or on the teacher. Just hook them to some books or some magnifying glasses and the real thing. Like this little boy, the first thing he would do is to 555

look at the tadpoles and he would say the same thing over and over again because he would 'obsess' on this but it was still an okay thing to 'obsess' on because he was learning more and more.

C: Its so amazing, when you walk in, all the walls are covered with the children's artwork and new posters which change every 2 weeks? 560

M: Ya, I have a full cupboard with files filled with stuff I've collected. You can get quite a lot of stuff from the Education library on short term loans. So you build up a variety just by looking through magazines.

C: And there are always remnant posters from previous themes.

M: That's important. Jim was asking us about that because he had a group of students and then he was talking about the Kindergarten curriculum and some of the students asked, 'You're on to *Fish why* are some *Space* things left?' They had this idea that you should just gut the place of the previous theme and swamp it with the next. But I think its important to have remnants because there are always 565

connections that children can make. And children don't like their things to be gone. They like the familiar around and it makes it more their classroom too, not yours. If you arbitrarily gut the classroom and put a bunch of other stuff up. It says to the kids 'You are in control' and they have no say or no input. You leave their things up 570 over and just gradually, they'll ask to take them home. Then it says, everybody has ownership with the room. So, its a message people don't think about when they gut the whole room.

C: And even this thing [the air plane hanging down from the ceiling] it looks exciting. Sure looks like the Smithsonian isn't it? The Air and 580 Space Museum. There's another statement you made, you wanted to foster wonderment and you said, "in a lot of science, presentation helps them foster wonderment". When you talk about presentation, what do you mean?

M: A lot of it is pictures [From books?] From books (agreeing) and from 585 film strips or good videos. There's a really good series called *The Look Again*. Its a group of videos, very short videos made in Vancouver, very little talking. They go from the real and they make all these applications. You can buy them from NFB. We try to get this education library to purchase them. I don't think they have. Those 590

kinds of things really stimulate children's sense of wonderment and also just the pictures that we put up. And having real specimens whenever you can, so we use seashells or all kinds of things, bugs.

C: Would you think that videos are a better way of teaching science, building that sense of wonderment? 595

M: No, I think that a lot of children expect to be entertained when they turn on the TV set and that you have to use videos with care. We don't overuse them here. And we rarely only show a video of the story only after we've read it. We don't show the video first or in isolation. like those videos would work very well on a structures day because 600 they lend themselves very well to that. They would give stimulating ideas or applications for the kids to then go and start building.

C: Are you able to talk?

M: You can talk during videos, unless you Stop and Start, the kids hate that because they don't like to be interrupted once they're glued to it. 605 I think it is based on an overuse in many homes.

C: But what about after the video, most of them are not very long.

M: Yep, you can talk. The video takes up a lot of time. The kids have already been sitting a certain length of time. Their attention span is gone by the time its time to talk about it. You could talk about it 610 another day. We found some really good ones on whales. You had to Fast Forward a lot of the time because there was stuff in between that was too conversational and above their heads and we found that with those particular videos, Jim was in the room and he commented on it too, that they wanted to discuss what they had seen right away 615 and so as we were fast forwarding and stopped, they just had so much to say. There was no fiction involved and I think that's why you can have more discussion when there's no fiction involved. Its not a story anymore, its little vignettes of real pictures and then they want to discuss it right away - whale births for example. And when you have 620 knowledge of previous whale births that have occurred in Vancouver and they haven't gone on properly and they may want to reopen it up and rediscover it and talk about it. They must do it alright then. They don't want to wait for the video to be over, Then you can just stop it. But if its a story they want to finish it. You don't stop *Blueberries for* 625

- Sal*, neither do you stop a lot of books for any length of time. You have to be pretty strict about carrying on. Stephen, was always blurting out all this stuff. It was wonderful except that we lost half the class when he was doing that, so, I had to get really assertive and say, "You can tell us all afterwards" and I hate to do that because every child's ideas are valid and worthy but you also have to consider the group and attract them so you can't afford to do that all the time. 630
- C: So, generally books have that advantage in that most of the time you can stop especially when you turn the page.
- M: But you also have to have an idea of what you want the children to get out of it. If you have a child like Stephen who often starts bringing all this stuff from home that is very personal I have to cut it off at some point. You have to steer. You have to think of yourself as being the coordinator of the discussion and you have to be in charge of that. 635
- C: I want to run through some of these books too, like how would you use a book like *Fish is Fish* since I have this here. How did you make use of it this year? 640
- M: We already had tadpoles so we were looking to foster the concept of growth and development and so we brought in all kinds of things that they can observe growth and development. And we also didn't want them to generalise that everything grows in the same way, so this is a good story to show that and also in the social, emotional realm that, "This is the way some things are and other things are different. we do compare ourselves with others and we wish that we were something we are not but in the end you have to realise that you're that way for a purpose and its okay and you do what you can with what you have." That's very high level. You're introducing this and then every time its introduced, it becomes more a part of that person. It helps their self confidence and later on they will see. This is a very adult story. Leo Lionni has a lot of very adult stuff. And then the fact there is a lot of friendship involved and that one saves the other. But it also talks about metamorphosis, of how the frog actually comes out of the pond. Its very highly visual, happiness.. 645
650
- C: Do you remember any of the children's comments of what was read? What were some of the things they highlighted from the book? Did 655
660

they just sit quietly till the end?

- M: In our class this year with kids like Erik this was the highlight of the book [the page where the minnow tried to imagine the cow based on the description the frog had given him]. He thought it was so funny and they just guffawed when this part came. We talked about the 'bubbles' and this was just imagination. There was some confusion there that this person talking about how you can describe something to another person and they get this picture in their mind. That's actually how books work because the author is talking to you and you get this imagining with the help of the pictures of what the story is about. That was the highlight. As a follow-up activity, you can get them to create some funny combinations of birds and fish etc. So, that's what came out from there, not so much the science. 665
- C: Did they mention anything about the gills and the fact that the frog could live on land but not the fish? 675
- M: Ya, and they were very worried when the fish landed up on land.
- C: So they knew..
- M: Ya, they knew the fish couldn't breathe and some kids, they must have been exposed to the story, they knew how it was going to end because some kids, they said, 'uh.. he's going to die because he can't breathe when he's on the land' and another kid says, 'Don't worry, the frog's going to save him.' 680
- C: This part on the gills and lungs, did you highlight that when you read the story? Would you have used the book in that way?
- M: Yes but not too in-depth, just an acknowledgement of what an amphibian is more than anything else and also because the newts and salamanders have external gills too, so its easier because they are right in the tank and the kids ask about what are those feathery things. So, we talk about gills in that manner. We didn't talk about the anatomy, so much interior of the fish and frog, what is the definition of an amphibian. One of them, my preschoolers, he knew the word metamorphosis and he talked about it and he used the word and he talked about it. My student teacher actually went on to ask if humans went through metamorphosis cause she wanted to extend his thinking because he's already got this other stuff-caterpillars and 695

tadpoles and he said, 'No you don't. Bigger but you don't change like frogs.'

C: So, they can see this from the story.

M: Ya, but they didn't focus on that except they were worried about the fish living because they knew it could not live out of water. 700

C: They were caught up in the story itself. You must have a lot of books.

M: I have boxes of books that are my own that I've bought because I know they really work well.

C: *The Tiny Seed*, its interesting you focussed a lot on the Math, on the numbers because you had Matthew counting and you were holding the tiny seed and they had to see the relationship.. 705

M: And that also for another reason too because then they have to have something to focus on and they're thinking about it instead of just having the book and having them listen and think without the props. Props are very important too at this age. 710

Talking generally about books now...

M: *Jump frog jump* is a highly predictable book because the kids anticipate what's going to be on the next page, so a lot of children anticipate that sentence. 715

M: I don't choose books just for the science but for the literacy value and the interest and the pictures. Its good they have science in them but they must also have the other things as well or else they don't work in a group. 720

C: You once read a book *The Golden Butterfly*.

M: That one was Japanese. That was really difficult. That book was a difficult book for the kids and it was really long. I wouldn't normally choose a book like that but these children really enjoyed a long.. a story and so it was very calming to them. I probably chose it more for the length and their needing to be calm than any science they were going to get out of it because it was a bit too long. I actually skipped some of the pages. Sometimes you can do that, you can condense it for them if you feel you are losing their attention but you have to read to children a lot before you can do that with skill, I think. 725
730

- C: And you must know the book.
- M: Yes, that's right but you should always read ahead of time.
- C: There's a comment made of how books can foster categorisation, patterning. How do they do that?
- M: I am trying to think of a book. Its hard to pull these books out of my 735 head. *Mrs Wishy Washy*, *Mr Gumpy's Outing* would work for categorisation of animals and predictability of what's going to happen next.
- C: What do you mean when you say categorisation.
- M: What belongs with something else. Say you're doing *Mr Gumpy's* 740 *Outing* you could talk about animals that live in water or animals that live on the farm or wild animals. You could do a sorting exercise. I have a nice bag of cards with all these animals and we quickly make out some scapes - water, trees, in the air, on the ground. Then you quickly get out these cards. You're talking about animals and you ask 745 to sort them into where they spend most of their time or you could have animals with fur, feathers, etc. Some books like *Noah's Ark* would lend themselves very well to that kind of thing. I can't think of other books at the top of my head. A lot of books you can do that and some are better than others. *Whales*, books on whales, you could 750 have baleen whales and whales with teeth, Children know about it because the naturalist from the Aquarium brought some baleen with her.

APPENDIX C

Interview 3 at the Mackay Early Childhood Centre

July 19 1995

- C: The physical setup of the classroom, was it always like that when you came?
- M: No, it was quite different. Actually we got an extra table donated because we needed...ya, it was quite different. I can't even remember because its been so long, since I took over. I mean we moved into the new building but I haven't always been in charge of that room. 5
- C: But you've always been working here?
- M: We moved over from the old building. I've been here since this building has been here, but I haven't been in charge of that room.
- C: It is so cleverly arranged in that, I was counting, there are about 14 centres and these centres are changing all the time, they are not fixed centres. 10
- M: Ya, and next year we would like to do something like this. The blocks in the back of the room separately so that if children if children would like to start a block construction before our meeting time it won't interfere with the meeting time and it can be kept overnight for the other children to work on the next day. I like this idea. In fact I think most classrooms are going to do this next year. It just means moving water tables and sand tables in and out, which is a bit of a problem with our room because our room faces the most used part of the playground and therefore we have to bring in all the equipment. Whereas these rooms they can leave their things out and they don't get tampered. So, you always have to work around those niggly situations. 20
- C: Your discussions with Marcia. How often do you meet? 25
- M: We began before Marcia came on board, trying to meet as a team because there were 2 different TAs. We tried to meet over the lunchtime but that got a little tricky since I had 2 different programmes so the setup required extra work than if I just flip the programme which is what happens in most of the other classrooms. 30

And so we just ran out of time and we just got too pressured and we weren't very creative. So what we did was talked incidentally throughout the day. Then we decided in broad terms the concepts we would like to cover with the children and some ideas of books and art projects. then we would assign each other certain days to plan specifically for. So we knew each other well enough to trust the planning process but we didn't have to sit and discuss all the details together and that worked quite well. When I interviewed and decided on the candidate for the replacement, I took this into consideration. I hired somebody whom I knew could handle that programme.

C: So each of you would take 2 days?

M: Sometimes. Sometimes we take 3 or 4 days, depends on the ideas that we come up with. Sometimes its nicer to plan the whole week because you have enough ideas that you want to follow through on and sometimes you are quite happy to plan 2. But usually what would happen is we staggered. If I plan Wednesday and Thursday one week, I would probably plan Monday and Tuesday the next week. So its actually 4 days planning but with the weekend in between. And its really good because it gives the TAs practise in planning. They really need to do that. They are not here just to put in time and draw a salary. They are here to learn how to do the job.

C: And when you say planning, what is involved in it?

M: Getting the resources. Like if we decided to do *The Very Hungry Caterpillar*, that person would go and get the book or copies of that book and bring in resources that would be related to that and decide on what kinds of setups they want on the tables so that the whole thing will be integrated and put all the plans in the book and usually I do snack, because I have the money to buy it. So I would go and buy the snack but the other person could request a special snack that would complement the theme.

C: You 'put the plans in the book'?

M: We have a book that we have it all written down. We usually do it by the physical setups - so we have the round wooden table or the round white table or the square table or the Pretend Centre and you have your ideas in there so that if one of us was absent, then in an

emergency situation, the other would know what to do. And also it just cuts down on the amount of discussion in terms of setting it up because you just look at the book.

C: But if that person decides what they would do that week and they do a certain book, would you have to suggest what kind of concepts you would want to bring out from that book or its left up to them? 70

M: Yes. Well I would maybe give some advice or some ideas but I wouldn't say that person had to bring in those concepts.

C: So its left up to them. {ya}
Before the school term starts, you usually have these home visits. 75
What do you hope to achieve through those?

M: Just making a contact so that parents and children are somewhat at ease with coming into the situation or if some people ought to have a visit at the school. That's good for children who have never been here before and don't know what to expect. And just to get to have an idea of the temperament of the child or the learning styles and talk to parents about concerns or questions they may have of the programme. And find out about allergies and previous experience and things like that. 80

C: And in that visit would you also form within your mind goals that you have for each child? 85

M: Ya, I have written down some and I usually make a point of asking the parents about their goals for the child so we record that and often in the first interview we look back at that interview period and check what the goals were and how we're getting along in terms of the child. 90
But some parents don't have any stated goals or they haven't formed any at that point. And for us too, its sometimes difficult when you meet the child for the first time to separate their anxiety and the kinds of behaviours that come from that and what that child is really like once they're settled in at school. You have to adapt and change 95
the goals sometimes.

C: So does that help in the children's first visit to school after that?

M: Yes it does but its very time consuming and it's work that has to be done before the actual start date of school.

C: For last year you had the canaries in. How did you get those in and 100

why did you have those?

- M: Well this was the family that donated the tables too. They were former students of mine, I had taught the son and the daughter. They had got the birds from the Science Dept at the University, Gerald Bigby's department, when they were trying to cut down on the live species there. They had grouse as well but the grouse died of that disease, it starts with a c..coelyosis, something like that. And then, these people went away for a short time during the summer. When they came back, the female had lost a lot of their feathers and their children are very sensitive so was the Mum. I have a feeling that the Mum was worried that this canary was going to die and how was she going to handle this with her children. So she phoned me up and asked me if we would like them and explained that the female was a bit tattered looking and so on. And she thought it would nice for the kids at school to share in the observing and talking about it. So I said 'Yes'. We began in our room because it was a closed environment and we could set down limits with a small group of children before them in a larger area. And they really enjoyed them until Jessica died and we had a discussion about it. We did a lot of hypothesising about why she died. Kids came up with really interesting ideas. Very imaginative ones. Some children part that Superman came in and shot the bird with an arrow. Things like that. And then very much more realistic ideas like "She got too cold because she didn't have enough feathers" or "Badger bit her". It was a good learning process and we buried her. 105 110 115 120
- C: When did she die? In the night? In the day? 125
- M: She died overnight. I knew about it because the custodian had found her and told Karen and Karen called me. So it wasn't a big shock. I wasn't really attached to the bird so it wasn't a big deal for me. And then after Jessica dies, Badger began to sing. And he sang so much that we had to actually get him into another bigger space because it was interfering with Circle. It was so loud that it was distracting. So then we were talking about why he started to sing after Jessica died. Because for us it doesn't make sense. You sing when you are happy and Badger should be sad because Jessica died. So that was interesting process too because we could talk about the reasons 130 135

animals have very colourfully feathers or cry or beautiful songs, its to attract the mate and that's the drive in the animal world. So that was interesting.

M: Did you have any books accompanying this?

C: It was really hard to find books on canaries. I scoured the libraries for kids that I could find. So I did buy one from a pet store that had good pictures. I did find several thick books that were for breeders that had nice pictures, but nothing we could use for words, so that's all we have. The book that was there (at the cage) and I gave to Mollie was the book I bought, with information about canaries. It was at a level that you could read it and they could understand parts of it but it wasn't what I wanted. And there were no stories, like fictional stories on canaries that I could find. Whereas hamsters, there's quite a few fictional interesting stories about hamsters. That just motivates the kids to want to learn more about hamsters other than just reading a scientific book about it.

C: So you find that these kind of fictional books would motivate them.

M: Ya, so I think that someone should write some fictional books about canaries and budgies so that it would be in the classroom.

C: And the cage came along together. I need some help with the general layout in the first week. I know of some books that were placed on top of the Construction toys, *Truck*. I remember at the Writing Table, you had B for Berries. But I cannot remember the Art and Craft Tables. Are there certain activities you would generally lay out for the first week.

M: Well, we would probably do some collage work. That's another good idea for having the plans. You can see from year to year what you've done because we keep them from year to year. I would imagine we have collage out because it is very open-ended and it is also quite a social activity and roller painting and things like that where they have to do some cooperative work . So I have a feeling we did some roller painting in purples, the colours of berries. And maybe we cut out from those roller paintings or else we use it as a background with drawings. I am not sure. But I think it was probably something along that line. Printing is another very social an open-ended activity

rather than getting down to drawing realistic pictures. That's very threatening to kids when you don't know them and they don't know you.

C: And would there be any other books that you would probably put up?

M: *Jamberry* has some nice illustrations in it. I've often gone to the Education Library and they have the files with the large pictures of blackberries and apples. In fact, I have some they've thrown out, so I have them in my room, that they have discarded, and those kinds of things are good to put out. And then we have a picture card file in the back room that has the names of the, fairly realistic paintings and they have the names of the fruits written on the cards and we've often put those out too. 175 180

C: And these are actually small enough to put them on the book rests?

M: Or else we tag them to the shelf, like this (pointing to the shelves by the side of the room) because they are still available to look at. 185

C: Are there any other books that are used?

M: There's one in the series, I think it is called.. it has that acetate page, when the kids flip the page, there is a drawing underneath but when the acetate is on, it changes... I can't remember what the series is.

C: Its an *Ed Emberley* one, with eyes and mouth.. 190

M: Oh, I have that one too. But there's a whole series of these books and we have them in the back room. They are just small and they have a ring binder. They have them for apple and fruit and all kinds of animals and under the ground. They're excellent.

C: I am just trying to describe the room as the children come in and then I am suddenly at a lost because I can remember certain sections of the room but I can't remember the other parts. 195

M: I should look through my photographs and see if I can find some pictures of a set-up. Its hard to get the whole room.

C: There was one question which I forgot to ask the other day. In the first interview, you mentioned that the use of books. Now, we were talking about Adele Kiley and her project with you and you also mentioned that books have always been around, even the time when you were working with Nellie or when Nellie was at the day care. You mentioned that the use of books was something that you believed in. 200 205

Can you trace how this belief came about? Was it influenced by the project? Was it influenced by Nellie? Or was it something that you had even before that?

- M: I guess I liked books a lot. My children liked picture books a lot and I could see that, even before I had an academic background in Early Childhood, I could see that the pictures really did a lot to motivate the children in terms of subject matter so I had that kind of concept in my mind. But I think seeing Nellie with the books set up, jelled what the possibilities would be in terms of how they could be used other than just sitting with the child on your lap and talking with the pictures. They could actually be the teacher in a lot of instances and kind of help that association happen at the table where you wouldn't have to say anything. They would just be there. The project with Adele Kiley. That was specifically for Art. It wasn't for any other curriculum area. She not only used picture books but she used models. She would use stuffed animals. If she was doing an elephant, she'd have many different representations of an elephant in different mediums and styles, different styles like realistic, stylistic, abstract. She'd have them all there and the kids could touch them. And she would have little plays, and vignettes, and work videos. She just totally submerged these kids in the representations of whatever she was trying to get them to create in clay, painting. It was a lot of work. I mean that was just art. It had no Math, Science or anything. So I don't know that one could expect that on a day to day basis. I think it's a really good model but I think it is very labour-intensive to try to teach that way all the time. 210 215 220 225 230
- C: These were just some of the categories I was able to come up with from the observations. I don't know how I am going to approach this chapter when I do write it, whether its going to be coming up with a vignette for each one. That would be very difficult. I don't think I have enough for that. So maybe if I could come up with vignettes here and there, I will be glad to spread them out. 235
- M: And have some books, titles. If I were a teacher reading your work, I would really enjoy having some stuff that I could actually do in my classroom after reading. 240

- C: Maybe we could go on to what you have got about these categories and we could talk about them.
- M: For the first one, observation. There's so many that probably don't need so much help in. But when you had this example of the tank of tadpoles and the books around it. I found that was particularly helpful this year with a specific child named Stephen who really needed to have that visual there and he needed it so that he could anticipate what he knew intellectually was going to happen and he would come in, without fail, he would check the tank and he would check the book and he would look on a daily basis for changes. He was in fact the first one that noticed the little frog. He was so excited because he knew. He had checked those books everyday and he knew what this thing was supposed to look like. More than any other children in either class that I taught. And so, it was really important for him. And probably for many other children too. And also for them to differentiate between things in that tank so that they can see the difference between salamanders and tadpoles, with the external gills, and some of the other little bugs. 245
- C: How did he know to look out for that little frog? Because the frogs are so small when they are 'formed'? 250
- M: Ya, but he just.. he was so excited about it and he had anticipated for it, he was really closely observing and we had magnifying glasses. And as the tail started to shrink and it became more frog-like in the water, he can look at the picture and see that it was not going to be that much different but that it was going to be out of the water and we had already talked about that with him. He anticipated what would happen and I gave him some time-line because I knew that it would be within a 2 day period or whatever, so he was especially looking out close as the time drew near. It was really rewarding for him to find it first, before us even. And just to yell to everybody and everybody that came into the room, visitors, he would pull them in and he made them look at it and talk about it and that was great. I enjoyed that because that's going to be with him for a long time. That was important, to have those books. And as far as putting out books, say, we were talking about elephants for example. It would be 255

important to put out books with a picture of an elephant in it because many kids, even though they have seen pictures of elephants or maybe have really seen an elephant, they can't pull that out of their heads in order to craft something and they get anxious about it. So to have the book in front of them, it just frees them. It doesn't help them go about making an elephant in terms of where would be a good place to start, that's where a teacher has to come in and help, and Adele has a particular way of showing them how to create an elephant out of a block of clay. She has a particular way of doing it and she shows them how to do it. Basically you have a block of clay and make a cross and from there pull out the legs to begin with and then work on the rest of it. But just to have that connection, that visual connection of the subject matter is very important. If you can help it happen. And I think you get more product if you give a specific intention of putting out the material. So if you just put out a bunch of material and say, 'Make whatever you want', you're probably going to get less work, product than if you say, put out the clay on the table and say "Make an elephant", because the kids are again, free, not to have to decide from all the many things that they could do, what they should do. Often that's where they are stymied. This goes against what has normally been thought as, freeing is to let them do anything but I think that actually not. Its like discipline. Its actually more free if you have some limits and ideas that you can then centre your energy doing that. Because you know you are not going to have to do it everyday. this is just today.

C: When you ask them to make a caterpillar and you provide sequins, I wonder when those children use the sequins, whether they saw these sequins as breathing holes?

M: They could have or scales if they were doing snakes.

C: You were doing snakes? 305

M: Some of them did specifically use them for that. You could see that in their work. Because we had discussed the parts of the body before that. But others just use them for decoration.

C: There was this book by *Denise Fleming* that had the picture of a caterpillar with all these dots. 310

- M: And the learning of symmetry, I can't remember how that came about but *The Hungry Caterpillar* has a very nice end picture that is not ...we have lots of photographs of butterflies that are symmetrical, but this one is a little bit easier for them to see the symmetry because it is abstract and its also on two pages. 315
- C: And the colours are so brilliant.
- M: Ya. And so we would do, just for the art part, you could just have them put blobs of paint on one side of the paper, fold it over and that's the simplest way of doing symmetry. I think we also have the 'Parke' symmetry cards out and they found that more challenging because a pattern is on half the card and its in black and white. And what they have to do is follow the pattern on the half side and then they have to replicate it on the other side. So what a lot of them did in this year's class, the last year's class, a lot of them got it right away. This year's class, they copied the pattern but they copied it like this (showing me), they didn't reverse it, so it wasn't symmetrical. So we had to interfere, ask them questions that would show them what they had done wasn't actually symmetrical. With your hands, we did it with our hands so this isn't symmetrical (One hand facing down and the other facing up), this is (both hands down). 320
325
330
- C: When you were doing *Owls*, you used *Tejima's Owl Lake* and there was a lot of description of owls and a lot of information came across and how you used the book was you showed the owls in flight and how they would reach out to grab their prey.
- M: With their talons and the fact that their eyes don't move around. That was a good one. We did that one the year before last. Last year we did *Good night Owl* because these children seemed more interested in fictional stories and not so much in that more... because *Tejima's* books aren't that colourful. They are quite plain in terms of those images. They are very appealing to adults because you know how much detail there is. So this year I did *Good Night Owl* . And then probably that year we did the woodcut pictures with the Styrofoam which is something Adele had showed us how to do. She did that after going to the Museum of Anthropology, saw a lot of the actual carvings and things there. 335
340
345

- C: Because you had those rollers.
- M: Ya, the brays, the ink and the glass. But a good one for camouflage is the 'Hide and Seek' books and its kind of like *Where's Waldo?* because they have to find but they are actual photographs so they are very good, like moths on bark and things like that. The kids are really motivated by that hide and seek quality so you can bring out the idea of camouflage. Another good book is *The Crafty Chameleon* and it appeals to a lot of children because its that theme of strong and weak and that weak can be very strong. And the strength with the chameleon is that he can change colours and that he hides and in the end he's fighting with the leopard and he hides in the tree. He's hiding here and he attaches them to each end of the rope. So he's actually not doing the pulling but they think he is. So that really appeals to them because they have to find him on each page too and he's also different colours. And its got the story element that some children love so much and s/he has written some other ones too. I didn't use that one this year but I have these. And the human body.. they were really into body parts. The kids before weren't.. it wasn't a big deal with them. That was probably because there were so many boys in the class and it didn't work so well so... that's okay. They got the basic idea and we got the skeleton puzzles that they could put together. I think they enjoyed the skeleton part of it, more than the other parts of it. There's lots of really good books on the human body though. Some interesting facts about 'when you lay all the capillaries out, they go all the way around the world' and all those things. Very fascinating.
- C: Do you often get questions from children such that you find that you can answer them through a book, like you mentioned once the children actually asked, 'how much blood do we have?' and then you deliberately chose a book which answered that question and you read it to them. Are there many such instances where they ask you questions and you find that you can read them a book?
- M: Ya, often if they're questions related to the theme because you would have a lot of resource books so then you would hopefully have some books that were more encyclopaedia books or books that you could

find lots of facts in them. But if they ask a question that is not related to the kinds of things you have in the room, you would have to of course stall them and look it up or go to the library and look inside encyclopaedias we have here. 'I'll look it up for tomorrow and tell you' or ask them if they can get their parents to help them figure it out. And the 'guide self-exploration'. One author that has a lot of good books that you can put out is *Henry Pluckrose* and he has written the ones on sorting and lengths and counting. He's got quite a few books, *Patterning*. He's got quite a few but they are hard to get. They're out of print. But most of them are in the libraries.

C: Do the children use them? Do the children flip through those books when they're doing some kind of sorting or ...

M: They might if I had them not on those stands. But the stands seem to, we've talked about this before, the stands seem to prohibit them turning. We know what's on those pages and we could turn it for them and bring their attention if they're working on a specific manipulative. But usually they don't take them off the stands and use them. And then there are all kinds of counting books. I didn't bring many in here but this is one, *One hundred by Pat Hutchins* and its got lots of counting. Its got a page that could be used very well for putting out. And this one, *Animal numbers* by *Bert Kitcher*. Its really good for older children because it has very large numbers and lots of the themes we talked about. There's the 100 and there are 100 eggs here and tadpoles. If the children wanted to call the book on it they would count them and they would find out there were in fact...realistic pictures too. I like this because it has some newts, salamanders. But there are many many books that work well with children. We have lots of them at the Centre.

This is great, it gives them an idea of the largeness of the number. And they're not too distracting. There's not so much on the page that their mind isn't drawn to what you want them to see. That's one of the problems with some books is that they are so packed that the kids are distracted away from the concept that you think the book is hoping to present. So there's overkill in some books. And the *Snail* book. Things like that we would usually put a live specimen near the

books. So Dandelion, there was a dandelion there and the book. Same with the snails and the exploring lengths, we have some Cuisinaire rods or unifix cubes or string labelled with a number or letter and the masking tape with the coloured dot and they have to match the correct string to the masking tape and then there are sheets that they can colour in, they can code so they can self-correct. They enjoy that. And this year when we did the whales, we had different photocopies of whales and with the cubes next to them, and some kids strictly did it by lengths but a few children, filled in the space so they did area, rather than just lengths, which was interesting, the way different kids go about doing that. But its all still comparative no matter which way you choose to do it. So you work a lot with non-standard units in Kindergarten anyway. And then they always measure the teacher with the unifix cubes and make you lie down. And then we've done it in the hallway with string, measuring what a blue whale would look like. So they get a visual picture of what a blue whale is. Its quite a humongous animal when you see it in terms of the building. And then the 'stimulating ideas', its pretty well in there. One of the more successful ones was that making a garden like The Little Mouse in *The Little Mouse Makes a Garden* series, they really enjoyed that because its very concrete. What you see is what they do. You just follow it exactly. And still its quite artistic. They can put their own twists to it in terms of making that garden more colourful by adding pipe cleaners and things like that and how it grows.

C: And so did they actually put seeds in them? 440

M: They put carrot tops and they put bean sprout seeds. It asked for water cress but its hard to get in this country. But you can use bean sprouts and they had cotton batting that were soaked. They had rocks so they could made little gardens. They really enjoyed it. All the kids did it and they all enjoyed it. 445

C: Did the plants grow?

M: Ya. The plants grew. They took them home. We got them to take it home right away because it was too big a project to have everybody's sitting in the window and those who were faithful, most of them were because they went home with an instruction sheet and they were 450

asked to keep a little journal. They enjoyed doing it. It does get a little mouldy after a while if they put too much water. Just the effort that they put into it taught them a lot. Whereas something like *Tejima's* art is more abstract. And so their pictures are not going to look like the ones in the book. For some children, that's disappointing, a turn off whereas this garden looked just like the one in the book, so they enjoyed it. They felt very very successful, in terms of comparing what they did in the book. And *The Very Busy Spider* is a very good book to use in making a web because each picture is incremental, so each picture.. and this is the scientific way the web is made. So you can talk about that Y-shape and each picture builds up another strand. You can actually do this with kids. They can do a real web and then when they go and do it at another table, they can do it the way.. they get more abstract about it. And we've done... did you watch when Marcia did it in Circle? That was really interesting. She had a ball of wool and she had all the kids in a Circle and she would bring it from one child to another so that the web was made. The kids were the branches around and the web was made and they really enjoyed it. It was a group process, inclusive process and then later on, they did their own webs out of string on a piece of construction paper and that's really tricky because it doesn't want to stick down right away. Its really hard to do it. And then some of the children did it on a very large quilting hoop. That's another way of doing spider webs.

C: I once saw on a TV programme, the children used glue to make the spider web and later on, to add sprinkles.

M: Ya, we did that. But you know what I found. Whenever you use sprinkles, they get so carried away with the sprinkles that it just ended up being this big mess of glue and sprinkles. It would be something that would work with older kids but does not work that well in actual fact with younger kids. But one thing I did do is I took, this isn't very environmentally friendly, but I guess spiders can remake their webs, we didn't kill any spiders. But I took a can of spray paint out in the yard and we found often there are webs in the play equipment, so I would spray the web with paint and then take

black paper and quickly put it on it and it would capture the web. So the kids could see that web and then that spider would have to make another one.

C: The one that you did with the eggs too. *Ruth Heller's Chickens aren't the only ones.* 490

M: That one was good for categorisation as well and showing odd animals that they wouldn't.. like turtles.

C: How would you use this one for categorisation?

M: Well, just basically all the animals that would fit into egg-layers. And I suppose what you can do is to divide them into feathered, reptiles and birds, fish. And then the odd ones. There are some odd ones that don't fit, like the platypus and the dinosaurs. They are reptiles but some children think that dinosaurs have live births. And it is very colourful. But I find this book is very long for kids. They usually lose interest before you get to the really interesting ones. So it needs to be shortened a little bit for a lot of children. But its very nicely laid out though. And there's a book *Animals born alive and well.* The one about mammals that she did too. 495
500

C: Now can you think of any other books where you would use to teach patterning and making predictions? 505

M: *Good night Owl* is another good one because each time a different animal is added to the tree on each page and there's always the recurring phrase 'And owl couldn't sleep' and they are all animals that are awake during the daytime except for owl who is awake at night. And *Jump Frog Jump* is a good patterning and prediction book. Its about the frog and the pond at the beginning and all the different predators that come his way and then the reader is given the cue, 'How did the frog get away from the snake?' and on one page are the words 'Jump frog jump' and the children are meant to read that. And then the final predator are the children who capture the frog and put him in a basket and one little boy can't take the idea of the frog being in the basket so he lets it go, and the kids whispered 'How did the frog get away from the kids?' "Jump frog jump" That's a good book. Those are ones that came to mind and *Today is Monday,* you already have that and *The Hungry Caterpillar.* There's lots and 515
520

lots. *The very busy spider* is another one and this *Sitting on the farm* is another good one. And *Fish eyes* .

C: This one is really good for the concept of one more.

M: Ya, and it is also good for patterning too and different kinds of fish. And *Sitting on the farm* is another pattern book that is familiar and I sing it to my own tune but it is another one about predators and prey too because he asks, one animal is bothering him eating his lunch, so he asks an animal that would eat that animal to come but the animal eats more of the snack instead. Its got this part that, actually a lot of it is a refrain. But it also fits well into the science area because of the predator and prey. 525 530

C: So do you highlight that?

M: Ya, often I would highlight that. Sometimes I will use these books at the end of the day when there's the kind of fill-in time so I would sing it. and *The ants go marching* , that's another good one. But its not as much science in that one. It is used for a spin-off. 535

C: This category on science vocabulary, this one is difficult because its hard to dichotomise science from non-science.

M: Ya. The things that came to mind were like the dinosaur books where they actually name the dinosaurs, those are the ones that would be very easy to find and a good example of how you would use a book because they are very interested in dinosaurs, they wouldn't find that boring to go over the names of those dinosaurs. But for some other books like this one here, if you just dwelt on the names of the animals, I think that would be kind of boring. But because there is so much else in the book, its so colourful and the language is poetic and there is a lot of comparison that I think they find that, the fact that there are these words like ostrich and hummingbird , they don't find that that is a pressure for them to remember these words, that's a plus in books like that. And *Over in the meadow* is a nice singing book that talks about all the animals you would find in a meadow, so it lists them but it is in a song and so, its got that nice contextualised feeling that makes those concepts easier for them to absorb. And there are lots of them like that. There are lots of books that list or name animals or other scientific things that are couched in verse or 540 545 550 555

song that make them easier to absorb.

C: Do you recall any of such books?

M: *Old MacDonald*. If you wanted to do a very simple one, *Old MacDonald* would be one of farm animals. And *Over in the meadow*.

C: Then the one, *Dem bones*. 560

M: *Dem bones* is another one. There's a lot of growing songs, garden songs that have oats and beans and barley growth. those kinds of songs that have the list of kinds of things we would find in soil. *Planting a rainbow* is a book that has a lot of names of plants but its done in a very easy to absorb way. A lot of the Lois Ehlert books with the names of the birds, and things in them. 565

C: This song *Dem Bones*. They are just making a song out of it. Would it sometimes give children wrong ideas like how they are attached. They talk about 'chin bone' [the shin bone?] 'chin bone' [Oh, do they?] I don't know the actual words but the children begin to make it up and so they talk about the nose bone, and the ear bone..[oh, because they add those up?] Ya [Oh I don't know. I haven't heard them making the words up. But maybe you would at home] I was just wondering because certain parts are not bones [Ya, connective tissue..] .. the associations that they make. 570 575

M: Ya and they like to do a lot of language play at that age, so they will substitute and be silly. But often they know the difference between silliness and reality. And the teaching reasoning, deduction, thinking. *The Survival* series that I was telling you about, *The Survival Mouse*, *The Survival Deer*. They are in the library. 580

C: Do you know whether they are still in print? Sounds interesting.

M: I am not sure if they are still in print. But they were really motivating for kids. They would read those over and over again and they get to guess the answer or to choose the answer, so it is a good learning experience. They want to do it over and over again. And they forget from time to time what they chose so it is not as if they are practising particularly, but they really enjoy that. And then there's lots of riddle books on animals or insects that you give a few clues and then they guess what the animal could be and the one that I have, it does not say, its called something like... I just got it from the 585 590

discard from the library, but there's lots and lots in the riddle section of the library. There's lots of books that would fit. And there's one with a mouse in it. *Hide and Seek mouse* I think it is called. Its a big book where they have to find the mouse in the picture, its hidden and then they give a few clues.

595

C: Like the Waldo books?

M: They are actual photographs of a real mouse in a room of objects. They are not drawings. It is not cartoon. And then we play those games with the kids. They bring in something and they try to get the kids to guess. And sometimes, I mean this is a strategy that teachers use in introducing new literature to the classroom, is that they would take some key concepts and they would have them on a card in pictorial form. Like say, we were doing Cinderella, they will have some pictures of the pumpkin and the mice, maybe a glass slipper or something and they will get the children to predict what the story might be about. And it gets very interesting with stories that are not well known to them. It gets them thinking about how these elements could be put together to make a story. So the same principle carries over to scientific thought too. And it also sets their thinking in terms of introducing new material.

600

605

610

C: That's how you introduced snails last year. You came in with a snail and you got the children to guess and they asked questions which required Yes/No answers. One was 'Is it hard?' 'Is it soft?' and it was both hard and soft or 'Can you eat it?' 'Yes you can' and later on when they found out that it was a snail, 'You can't eat a snail!'

615

M: Ya, they will always be thinking about all those things which is good. It helps centre their thinking. Last year's group was different. These guys were very sharp. It would be interesting to see what would happen next year. Every class is different. Contrast of different modes of growth in *Fish is fish*, all I can think of there is when we did the story of *The Tiny Seed* is that I had some actual sunflower seeds.

620

C: Did you have one that was particularly tiny?

M: Yes I did. I had one that was particularly tiny and I kept losing it. While I was handing the seeds to Kieran, who was the counter, I kept forgetting to keep the small one so you have to really think while you

625

are doing this. I mean you're thinking about reading the story and keeping an eye on the kids so it can get a little difficult and I did have a tiny seed. And they enjoyed that and they thought, I think it brought home the fact that there is a lot of seeds that don't germinate and for a lot of different reasons and that's why they would deduce that that's why a plant has so many seeds. 630

C: What I had tried to do was to get Wen E to tell me the story and she could tell me every instance and said that 'They didn't survive except the tiny seed' and she could see it as survival.

M: And the interesting thing the author did there was the same thing as the weak and the strong which is very appealing to children and that really is a bonus book for the book, is that the little one survived. Because they feel little themselves. Those kinds of story appeal to young children because it makes them feel strong and worthwhile and that's really good for them. It probably wouldn't have been as wonderful if the biggest seed was the one that survived. And stories like *The Ugly Duckling* would fit in there too and they are especially appealing because it is not the beautiful that happens to reign. The other ones like *Fish is Fish* is about a fish and a tadpole that makes friends. Another one that fits into that category is called *The Polliwog and the Butterfly* I think it is called and its a book that is similar to *Fish is Fish* except that it has a tadpole and a caterpillar and they grow up together as friends but they grow in different ways. They discuss it in the story. That one is by, it is the same author that wrote *Round Robin can..* His name escapes me. And we've already discussed the reference books, encyclopaedic books and for teaching categorisation, *Mr Gumpy's outing* was okay but one that was good that came to mind after was *The Camel who took a walk*, it is an African folk tale and it just starts out with this camel walking through the woods and the tiger is laying in wait and as the camel gets closer, various other animals are up in trees and it is one of these, its like the domino effect, this animal is going to drop a coconut on the tiger's head but this other animal is going to pull the monkey's tail and so it is this chain reaction but it is also about predators and prey and it is a good one for categorisation because you can do meat 635
640
645
650
655
660

eaters and vegetarian animals and it is always a spellbinding book for them. And it is not particularly colourful at all. Its not a colourful book. Its by *Marcie Brown*, I think. But the kids are just..., there is so much suspense because this camel is getting closer and the day is getting brighter and when the day is bright, the tiger stays in the woods and the camel is safe because the monkey drops the coconut and the camel is alerted before the tiger jumps. Its a good one for that. Then there's quite a few others probably that fits in that category too. Lots of animal stories that take place on farms that are good for categorisation like *Old MacDonald had a farm..* This *Wolf Island* is a really good book that would fit in 'provide information' but it is written in a very motivating way for young children. They really enjoyed it. 665

C: *Celia Godkin* has a new book, *The Ladybug Garden*. 670

M: Oh yes. Dorothy read it to the kids this year, about the aphids. They were really interested in that. In fact Kathryn is really interested in that because she's been feeding the ants and watching the ants 'milk' the aphids on some bushes near our house. A lot of red ants on this bush that is just covered with aphids. Yesterday we were looking at the plants and vegetables in the garden below this bush and we were realising that this bush was covered with aphids and that her aphids might end up on her plants. We were cutting back the bushes and as we were doing that, she was again noticing how many ants on the bush and wondering how that would upset the balance of nature now she's cut the bushes away and there wouldn't be so many aphids. They would have to find something else. Then she went in the house and got some sugar and water and put it down the crack in the concrete where she could see the ants living so she would feed them instead of having the aphids. 675 680 685

C: Wen E was playing a game and she wanted to be the ladybug and I will be the aphid so that she will feed on me. I said, 'No, I wanted to be the ladybug and she be the aphid'. She said, well, she'll only be the aphid if I am the leaf. 690

M: That's the same motif of wanting to be strong. So I'm sorry I couldn't remember particular conversations with kids. Things like the one 695

with the hamsters I remembered.

... preparing the room and setting up the environment so that things can occur. That accidents in learning will take place that you can take advantage of the moments is much more useful than spouting off a bunch of facts to kids and hoping that they are going to catch something. 700

C: And is that something you keep in mind as you set up the room?

M: Oh ya, for sure. And things that excite us so we can get as excited as we want our kids to be.

C: So what kind of things might these be other than just the live specimens. 705

M: Number work. I enjoy in the Pretend Centre things that have to do with exchanges like things that have to do with money and buying and selling and weighing and produce and washing babies, or baking, things that are active, going on things rather than all those kinds of stereotype activity, set up the Pretend Centre as a doctor's office and in some science areas having seeds to measure because often they will want to categorise those seeds or so they will want to discuss those different shapes and colours the seeds are, to sort the seeds and those.. we didn't ask the seeds to do them, they just naturally do them and they just like the texture of them running through their hands. And sometimes the seeds accidentally get into the sand table and lo and behold a week later when you open up the sand table the kids go "Ahhh (gasp of surprise)" because there are all these sprouts coming out of the sand table and that just happened by accident. But you can see how it could happen. And having various materials, interesting materials, to put in the scales instead of just having the weights but having things like having different kinds of seeds, or mixing keys and seeds or blocks or having your toy animals and having do some comparative weight. 715
720
725

C: But do you feel hindered simply because the children can't read and write on their own right now?

M: Ya, sometimes. But the pictures help them to read. They are reading it and writing in their own manner. They are doing a lot of approximating and they're learning how to gain meaning from the 730

context of what you are looking at which is reading really without actually deciphering words. And that's why its important when you put things out, is that picture as well as the words because most children in Kindergarten won't be reading and if they are reading, they are reading at a very minimal level, so you can't depend on words for sure and you can't be there for every child and every centre to decipher them for them. So they have to get the meaning from the visual or from actually being able to manipulate the props. So you have to have that kind of environment for them or symbols. Another one that I am interested and they are interested in is road work and building and traffic signs and making their own routes and designing their own routes and mapping and things like that. I like to put those things out because I am interested in that also and lots of art and colour blending and cooking and just putting out a number of materials that when you mix them you get different effects. They love the potion idea where you put baking soda and vinegar. Those are some of the simple ones or cornstarch and water and the kind of gooey stuff and that's chemistry for them. We've also made our own litmus with the red cabbage, dye and things like that and learning how dyes are made like using onion skins, beet juice and coffee and tea and things like that to dye material. Working at different ways rice is used, making paper. This year wasn't a success. Marcia did it. I was trying to explain how we had done it before but she had her own way of doing it, so it ended up as this big blob, it didn't actually break into small enough particles that it actually spread out into the paper, the fibres. You have to actually break down so that the individual fibres are floating and then they can actually see that very small sharp line of fibre that when all together forms the paper.

C: Do you use a kit for this paper making?

M: No I never have. We encourage the children to bring in different forms of paper. Some will bring in napkins, or doilies or paper towels, rolls or newspaper or cardboard, egg cartons and break it up into very small parts and let it soak for long enough than whisk it and put a little bit of detergent in there, helps to break down the fibres faster and soften and then whisk it and then you can actually add things to

make it colourful like sparkles, coloured dots like when you punch holes and you get those coloured dots and out it in and you strain it through a screen.

769

APPENDIX D

Samples of observation field notes

16 March 1994 Wednesday
12.30pm
Megan's Kindergarten classroom

After the last observation, I decided to go early to check out all the centres to see what was available for the children that day.

- Science table

Dandelion plant and book *Dandelion* by Barrie Watts

Jars of snails, the terrarium with a number of snails inside and book *Snails* by Jens Olsen, magnifying glasses were available

Tray of seashells with one huge gigantic shell with book, *A House for the Hermit Crab* by Eric Carle

- Listening Centre

The cassette was on *Arnold Lobel's Owl at Home*.

- Art table

They were making butterflies with food colouring on kitchen roll paper and using pipe cleaners for the feelers. But opened out in the middle of the table was the picture of a beautifully illustrated multicoloured butterfly that finally metamorphosised from *Eric Carle's The Very Hungry Caterpillar*

- Spelling Centre

Magnetic letters and boards were provided to make words. On the table were three books, *Owl Lake*, *Forest Woodpecker* and *The Sleepy Owl*. Pat later removed these books and brought them to Megan to show to the children and to read during Circle.

• Writing Centre

Writing materials and 2 books, *100 words about animals* and *The Hayes Book on Birds*, turned to the page on *Owls*.

At another centre in the back were photocopied pictures of trees with a guide given for the children to fill in the parts of the tree and to colour. A book, *500 words to grow on*, was placed on the table and opened to the page that said *Country words* showing words like tree, branch, meadow, hill, flower, grass....

• Mathematics Centre

There were some number puzzles on another table

• Jigsaw Puzzle Centre

At the last centre were jigsaws on owls, Noah's Ark, Life Cycle of a Butterfly and one on animals.

OC: *The materials laid out were varied and communicated the focus of the day. They were concentrating on birds in the woods and especially on Owls. Books were laid out everywhere. Every table but two had at least a book and then there were books left standing on shelf tops, books at the reading centre. Even as the children were doing their art activity, placed in front of them was an illustration of the brightly coloured wings of a butterfly. Do the children browse through the books as they do their respective activities? In the time I was there, I have not seen the children looking at the books laid out at the centres. They flip through the books at reading time at the reading centre but not when they are doing their art or at the science table etc. The only centre where the books laid out are referred to is the writing centre where they copy out the words in the books.*

Perhaps aware of this, Megan always has the book turned to a specific page, placed on the table. Unconsciously the children will see that page even if they do not turn to

any other page. What is the significance of that? What is Megan's purpose?

The children came in and started at the Art table with the droppers and coloured liquids but having done it on their own initiative without instructions had made the paper too wet and mushy. Upon seeing the result of the activity, Megan changed her mind about this as a suitable activity and then together with Pat decided on an alternative activity, which left Pat busy in preparation through the entire Circle time.

The children were rather curious with the Science table. They went to it and saw the huge shell which was new, "A parent just brought that in", Megan told them. As the last time, inadvertently, each child that came would hold the shell to their ear. "You can hear the water with this one," said one child to Megan. (Presumably, they could not hear the waves as clearly in the other smaller shells) They looked at the jars and the terrarium too.

OC: At the science centre, the children tend to be rather unfocussed and unless guided, will only give a passing glance to see what's available or what's in the jar and that's as far as they go. The books are there. I flipped through the book on Snails and thought it quite excellent in guiding the children to observe the parts and the movement of the snail, but none of the children even touched the book. Perhaps they do not know how to read on their own? Would it have helped if someone sat at the Science table just as a helper sometimes sits at the reading centre to read the books to the children, to read the guide to observing snails as the children looked at the snail?

The children were very comfortable playing at the centres even before class

began. Some had already been round the Art Centre, the Science table, the Writing and Listening Centres before Circle. The children love the wooden blocks. They are out each day I have been here. Today, they took out a tray of teddy bears to add to the wooden towers and castles they built. This was to later create some distraction problems for Megan during Circle because the children wanted to finger and continue playing with these blocks and teddy bears instead of paying attention during Circle.

At Circle, they talked about the thunderstorm last night. Megan tried to hear from everyone. Some volunteered, and those that didn't were asked. They sang two songs, *Eenie Meenie Minee Mo* and *Astronaut, Astronaut, What Do You See?* This song was interesting because the children illustrated a page of the song book each, filling in what they saw in space and then drawing a picture of it. As they came to each page, Megan would say, "Oh, (child's name) did this."

Megan began the discussion with, "Today we are going to talk about a creature that makes its home in the tree. The tree is a home to..." and the children made suggestions. In their typical manner, the teachers added brief words to the children's suggestions and through the introductory period, they had covered:

dormice are nocturnal creatures; woodpeckers make holes in trees for their nests but owls find abandoned holes in trees; foxes and bears make their dens in the roots of trees whilst robins build their nests of sticks and twigs in the branches.

This continued with, "Today we are going to talk about owls."

As she spoke, she brought out posters with pictures of different types of owls, snowy owls, barn owls; and mentioned the distinguishing tufts that looked like horns in owls. The children shared their stories and experiences with owls.

The book read was *Owl Lake* by Tejima. Megan discussed the beautiful illustrations in the book and explained how these pictures were actually printed from wood cuttings; and recommended the other books by the same author. The book itself had few words but facts about owls were being communicated both from the book itself as well as Megan's own contributions about owls. The story was simple, about a Father Owl who went out in the night to hunt, he heard the swish of the fish in the water, swooped down caught the fish and flew back to his nest to feed the owlets. But through it all, a lot of information about owls were communicated:

- Owls hunt at night 'in the evening sun'; nocturnal
- They have great big eyes
- They eat rats, mice, rabbits
- Owls have special feathers that enable them to swoop down to seize their prey with their talons without making a sound
- When they see their prey, they stretch out their wings (an illustration in the book) like brakes, feet down, like an aeroplane
- They make the sound Whoo...hoo...hooo
- The owls have such keen sight that Father Owl could see the fish under the surface of the water to catch it
- Owls only lay one or two eggs, chicks are also called owlets
- The father and mother owls take turns hunting and babysitting their young

With the close of the story, Megan went on to making words ending in o-w-l with the children. Chalkboards and chalks were passed around with the instruction to draw 5 spaces, with the last three filled with o-w-l. "Think of letters you can put in

front to make a new word," was the direction given. The children came up with s-c-o-w-l. Megan suggested f-o-w-l; and gave clues like, "sound a dog makes" - h-o-w-l; "you saw this one in Goldilocks in the house of the three bears" - b-o-w-l.

Pat now joined the Circle to demonstrate how the illustrations in the book were done. "In this book, the pictures are done in a special way called a woodcut. We can do something similar but we can't use wood because it is sharp, so we are doing it on Styrofoam. But you have to press it hard, like this..." and showed them how to apply paint on the glass plate and roller and then rolled over the Styrofoam picture before pressing a piece of paper over to make the print. This craft was particularly appealing in that all the children wanted to do it, unlike the other times when there were always a few children who chose to do the craft activity. They had to take turns as the station could only accommodate 5 children at a time.

OC: The rest of the children just went to the centres that attracted them. It was interesting noting that none of the children went to play with the number puzzles, magnetic letters. The science table received only passing glances, a quick look at the snails in the jars and then holding the shell to their ear, before they went to to something else. The children seemed to prefer the building blocks and the toy planes and train, with which they played almost the entire time before the next activity which was reading and then a time of writing in their journals.

Some of the children did the jigsaws, some went to do writing and Megan seemed to be doing some sort of an interview with the children as they played. She was asking them questions, like "What are some things you are proud of?" Later I heard her tell Jim who had stepped into the class how she was doing some kind of a

self-assessment with the children.

OC: So far in the three observations made, there's always something on science. Through the Circle discussion, facts on the animals, their uniqueness, their habitats, feeding habits are shared primarily. There are some hands-on tasks - like with the snail. But thereafter, although a science table is put up, I feel that insufficient guidance is given on that score and the children, apart from doing the more obvious like looking and holding the shell to their ears, do not seem to know what else to do there and move away. The children receive a lot of demonstration and guidance in their craft, perhaps because it is messy; reading and writing but often science is left to their own devices.

Wednesday 30 March 1994
12.30 pm
Megan's Kindergarten classroom

Came in early and caught Megan in the classroom preparing for the day. In the midst of it, I was able to maintain a casual conversation with her. When she saw me, she mentioned that they (the class) weren't going to do much science that afternoon. They were going to do puzzles with the children. Then, as an afterthought she remembered that the book she had planned to read was *Chickens aren't the only ones* (that lay eggs) which "had some science".

C: "I notice you always have a science emphasis in your classes."

L: "In fact, I've built up a reputation of doing a lot of science in my classroom and its hard now not to do it."

C: "Do the children expect it? Do they know its science? Or is it just a reputation amongst the adults?"

L: "Amongst the adults," she clarified.

As I walked around the classroom, there was this aquarium with the newt 'tadpoles' wriggling about in the jelly mass (Megan showed me where to look at) about to hatch out. There was the tank with the snails inside, some crawling about and some dormant in their shells held on to the plastic wrap ceiling. In the other corner of the room were the scarlet runner beans the children had planted, now with bean pods hanging down. Asked Megan about her practice of opening books to a certain page at the various centres, what was it for? What did she hope to achieve in that practice?

"I encourage them to take the books out of the book stand to flip through too. Sometimes we do that with them too." I spoke of how the children were using the word vocabulary book to practice their writing and she agreed that it provided them opportunity to mimic writing the word even if they could not read or

subsequently recognise the same word in a different context. As we walked past the writing centre, I tried again, this time pointing to the book there, "Why is it opened to that specific page?" It depended on the theme, or what was currently being taught, and the books are then opened to that specific page. As for why the book was turned to 'bushes and hedges' at the writing centre, it was simply because the teacher in the morning class was doing spiders that day, and on that page of the book were pictures of spiders on their webs.

OC: I think here Megan was referring to those books which may cover several topics and thus depending on the current theme, the appropriate page would be turned to.

Talking about themes, I asked about the children's negotiation of the themes and how she managed to coincide the same themes for both the morning preschool class and the afternoon kindergarten class, especially since the interests of the two sets of children may differ. Her solution was really that the negotiation of themes was mainly with the kindergarten children only, and with the preschool class, she did not give them much of a choice. In that way, she could easily cover the same themes for both groups. The children she felt were familiar with this idea of themes and water, sea life was a common requested theme. This year, the children actually asked for electricity, but she wasn't as yet sure how she was going to do it with them. Sometimes the focus for the day depended on what the children brought into class, like one of the children brought in a snail one week and that was what led on to snails.

OC: So that was not planned for! I had thought otherwise. But it was interesting how she had introduced it as a guessing game to arouse the children's curiosity.

I asked about their walk to the high-rise at the previous observation, and why she had it. I suggested if it was just for the children to sense the different a high up

perspective when at the top. She said, "That, its just to give the children an idea of the location of the Centre in relation to its surroundings." I felt I should learn to just keep quiet instead of putting words into their mouths because now I do not know if the suggested idea was her intention in the first place. Megan added too that the children went for walks quite often and just the day before had gone into the woods and had seen a bird building their nest. She checked it up at the end of the walk and from the shape of the nest, felt it was a titbush (?). She was excited that the bird was just oblivious to them as they watched and just continued building their nest.

All sorts of puzzles were laid out for the children today. Circle started with songs, *I have a dog named Rex, When Goldilocks went to the house of the bears and She sailed away...on the back of a crocodile.* That was the starting point she wanted to introduce her book and thus, 'lesson' for the afternoon.

"How do crocodiles have their young? How are they born?"

"They hatch out of eggs."

"Do you know any other animals that hatch out of eggs?"

The children made suggestions and these were written on a chart up front for all to see.

"Lizards" "Chickens" "Dinosaurs"

Megan gave a clue, "We have two things in this room that hatch out of eggs."

"Tadpoles/Frogs" "Newts" "Snails" "Slugs"

OC: Its interesting to note the associations in the children's minds. As they think of the tanks in the classroom, they think of tadpoles and the newts. When they think of snails, they connect it with slugs too.

Megan gave another clue, showing a song sheet with the picture of a spider.

"Spiders" "Fish" came another suggestion and for that one, Megan was careful in cautioning that it was 'some fish that laid eggs'. "Snakes" was another suggestion that warranted the cautionary note. "Deer" came one suggestion, to which Megan reminded was a mammal and thus had live births.

With the substantial list behind them, Megan now showed the egg she had.

"Can you tell me something about eggs before I break it?"

"Comes from a chicken." "Yellow colour inside."

"Do you know what it is called?"

"Yolk."

Another contribution was "Different kinds of eggs, there is brown and white."

Megan asked, "What about the texture?"

"Hard"

"Are they all hard?"

The children managed a "No" and Megan gave them the example of the newts eggs in the aquarium behind where the eggs were a soft jelly; and turtle eggs had a soft shell.

She now cracked the egg and described it as like when a window breaks or the earth breaks when it gets too dry.

"Is there a chicken in the egg?" one child asked.

"No. The egg has to be fertilised first, before it can hatch." This evoked memories for the children because they brought up how the egg had to be kept warmed.

Megan introduced them to the word, 'incubation'.

With the broken egg, Megan pointed their attention to the membrane lining the shell, pulled it out for the children to touch and feel. "The outside shell is like the skeleton, prevents the egg from being bumped; and the membrane keeps the egg

from drying out."

She went on with, "Turtle eggs have a thick membrane. Its thicker, rubbery; that's why it is soft."

"Like your skin?" came a question.

"Yes, the membrane is like your skin."

Now, Megan focussed on the contents of the egg. Pointing to the yellow part, "This is the yolk. Outside is the albumin, the clear part. That's the part that becomes white when cooked. There is another part. Do you see it?" and she showed the bowl round to the children.

"A white part."

"That's the part that attaches the yolk to the chick if it is fertilised, just like the umbilical cord, the life line between the baby and the mother. The yolk provides food for the young chick as it is developing. As the chick gets bigger, the yolk gets smaller, and a little yolk sac is left over."

With that introduction, Megan now read the book to the children.

OC: It was a rather factual book that gave information on the animals that laid eggs - every bird, wild or tame; the largest egg was the ostrich egg, the smallest, the hummingbird's; reptiles; amphibians - these she explained were animals that lived on land and in the sea; fish, seahorses which had a pouch. Megan referred to the list of egg layers the children had come up with earlier and as they went through the book, complimented them on how they had covered many of the categories of egg layers. The book highlighted how eggs were different and how these were protected - as in the sea where the eggs were in a foamy mass of bubbles which camouflaged it so that other animals could not see them or how some fathers in the animal kingdom guarded their young. Sting rays, sharks, had a

'mermaid purse'. Octopus eggs were hung in a string. Moon snails hid their eggs in the sand. Spiders wrapped their eggs in a sac. Insects had eggs, like the butterfly eggs. The book ended with mammals, animals with fur, that differed because these were live breeders who feed their young. The exceptions being the duck-billed platypus and the spiny anteater. And right at the end, 'Everyone that lays an egg is OVIPAROUS'.

OC: Megan had thought there was not going to be much science yet that I felt was a science lesson. There was a discussion with the children as they threw out what they knew of animals that laid eggs, there was the concrete egg which the children could see and touch, and the book added information and confirmation of what the children already knew.

Circle ended with the children given the task of completing one puzzle which was challenging to them. Another suggested activity was an two paged egg-shaped booklet the children could do entitled 'Out of an egg hatch a ...' and the children could fill in all the animals they had brain stormed as a group or learnt from the book read.

As the children went to the different centres, Megan placed the broken egg in the bowl, the shell and the membrane at the science table and labelled them - yolk, albumin, shell and membrane, for the children to subsequently examine.

Thursday 1st May 1995
1 pm
Megan's Kindergarten classroom

"We've been doing *Frogs* for so long. I hope we will do a new theme now," lamented Wen E as we walked to school. The moment we entered she was greeted by Megan and off she ran to the Home Reading Programme table where books were laid out all over for the children to choose their books to borrow home to read.

The classroom looked different. There is definitely a change of theme for the new week. On one table are jars of fresh colourful flowers, around it are white sheets of paper with coloured markers for the children to look at and draw. Christopher is there with his mother drawing a flower. Robbie, Lilly and Erik were excitedly playing at the *Pretend Centre* which had been set up as a Garden Shop. On the table were flower cards, planting pots, seed packets, monopoly money and a list of items sold with their accompanying prices. The wall at the centre too had new posters of fruits in a bright splash of colours and pictures of flowers made from coloured shapes done by the morning class. There was a Big Book there entitled *The Carrot Seed*. Over at the *Writing Centre*, the task was to design a seed packet. To give some idea, *Lois Ehler's Painting a Rainbow* and another book with photographs of flowers were opened to the page showing seed packets. At the other centres were games like matching flower cards, making a pattern using colourful beads in the shape of flowers, jigsaw puzzles, a nail and hammer activity, a seed sorting activity with the book *Sorting* opened to a page on sorting seeds. Another centre that was popular was the centre with a trough of potting soil with accompanying rakes, shovels, a leveller, rollers where the children were to weed and later plant seeds in. On another smaller table was a pot of dandelion plant with a self-exploratory book *Dandelions*. At the *Reading Corner* were books on

seeds placed upright so that their covers were seen, one of which was *Eric Carle's The Tiny Seed*, a small jar with some sunflower seeds and a jar of fresh cut flowers. Opened on the side was a big book which showed the growth of a seedling from a seed. On the shelves were more books opened and placed on book rests, one was *Anita Lobel's Alison's Zinnias* which showed beautiful watercolours of a variety of flowers. A new poster was on the wall, titled '*Anatomy of a Tomato*'. Later when the books for the home reading programme were cleared, items for the craft, to construct a flower from the cut shapes of petals, leaves, stalks etc were laid out.

The book read for Circle was the book displayed at the Reading Corner, *Eric Carle's The Tiny Seed*. To provide a more concrete visual impression, a cup with ten seeds, one of which is 'very special' because it is very small, was given to a child to put each seed in successively as the story was told. The tiny seed was held in Megan's hand lest it got lost.

The book was interesting because there was within the story several concepts covered. Foremost is the concept of number, as one by one something happened to the seeds such that they failed to grow. This concept was reinforced with Megan asking at each stage, 'How many seeds are left?' 'How many seeds does Matthew have now?' But it was made tricky because Megan also held one of the seeds, the tiny seed.

OC: Seems to me some other concepts communicated are the conditions for the seed to germinate, and the perpetuating life cycle of the plant over the changing seasons.

The story begins in Autumn when ten seeds are sailing in the wind, one of which is very small and wonders if it is able to 'catch up with the rest'. Thereupon begins the tale of the fate which befalls each seed and in the course of which what

is communicated is that the harsh conditions of extreme heat, cold, dryness, flood, destroy the seed; seeds fall 'prey' to birds and mice. The remaining seeds stay buried and dormant in the Winter. In the Spring, seedlings sprout but one grew amongst weeds which 'take away the sunlight, rain from the seedling' and it dies. Another grows faster but the flower is picked by a boy walking in the park. Finally only one seedling from the tiny seed grows and into a giant flower. The birds, bees and butterflies come visiting. The next Autumn, the petals are blown off, the seed pod opens and seeds are scattered once more.

OC: Very subtly transmitted is the understanding that from the sheer numbers of seeds dispersed, only a few will eventually take root, sprout and produce new seeds for the next cycle. Its interesting that as Megan read the story, these points were not emphasised except for very few expansions e.g., the weeds killing one seedling because of competition for sunlight and water, she added "That's why we have to weed the gardens'. The emphasis seemed to be on the numerical challenge the story posed. It tells that a book can be used in so many ways and it is up to the teacher to decide how to use it for the class and the purpose for it.

OC: However what was interesting were the children's responses to the story.

Kieran in response to the competing weeds said, "That's not going to happen to the seeds in my garden. They are stronger!"

OC: An anthropomorphic identification with the weeds as bullies?

At the end of the story was a question raised, "Do you think all the seeds will grow into giant flowers too?"

OC: Did this child see that since all the other seeds which presumably gave normal sized flowers were destroyed and only this giant flower gave seeds, the next generation would show only the giant flowers? Latent in this question too is the understanding that seeds give rise to plants identical to the parent plant.

Circle ended with an activity where the children were to fill up a sheet entitled, *From my seed would grow a* with drawings and spellings of any 3 things. The teachers were there to assist especially with the spelling part. Whilst Megan helped some children with the phonetics to help them arrive at the spelling on their own, another mode of instruction was (when one child asked how to spell *watermelon*) "This book was watermelon in it. Take a look at it. (She turns to the page to find it) Here it is!"

The children scattered to the different centres to work on their 'jobs'. While moving around the classroom looking for some activity to engage herself, Heather stood by the book *Alison's Zinnias* placed on the Building Blocks shelf, took it off the book rest and browsed through it on her own before going off to the Pretend Centre to play with her other friends.

OC: *At home, I asked Wen E about the story and she related it to me remembering the different situations which had hindered the growth or development of the other seeds and said, "Only the tiny seed survived".*

APPENDIX E

*Excerpts from newsletters*¹

1. Newsletters written by Ms Farrows to parents of Kindergarten children

October 6, 1994

Dear Parents:

Three weeks and we are settling nicely into routines. Many new friendships are developing. We have an exuberant group in the Kindergarten. Negotiation and a spirit of co-operation is increasingly evident. The classroom hums in every corner with the active involvement of your children. We welcome any feedback and/or ideas regarding all areas of the curriculum. Indeed, we need to know if you or your child is experiencing difficulty with some aspect of the program.

We have spent the first three weeks of this term on the familiar themes of Berries, Apples and Fall. The children have enjoyed many songs, poems and stories connected with these topics. We have cooked some delicious snacks together and learned about how we use parts of fruit to create jams, dye, applesauce and juice and how to plan for future fruit. We have played counting, guessing and patterning games and are learning about rhythm and creative movement. The children's prolific and joyful representations are examples of their growing awareness of the world around them. They should be very proud of their work! We would like to thank the children for trusting us to keep many of their creations at school to share with others.

Please ensure your child has inside shoes or slippers and a change of clothes. We will be playing outside daily unless the weather is really inclement. We would like to go to a local playground-Dinosaur Park or into the woods across the road on Thursdays. This gives us a chance to explore outside the Centre's boundaries and also to practice how to safely conduct ourselves on field trips.

We would like to take the children on a field trip to the UBC Botanical Gardens to see the apple orchard, beehives and pumpkin patch.

¹ Used with permission

May 1, 1995

Dear Parents / Nannies of Kindergarten children;

Such a short time left together, and yet so many interesting subjects to commonly explore and discuss! Your children have grown so over the course of the year. Not only have they matured physically (big changes from their Sept. pictures), but they are much more focused, co-operative and able to take turns. So many good friendships have developed among the children!

Spring provides a wonderful opportunity to study growth and development. As many of you know, we are currently observing daily changes in the pond water aquarium. The bugs, tadpoles and salamanders have been the source of much enthusiastic interest and artistic representation. The children are also noticing the habits of local birds as they build nests and hunt for food. Our seedling plants are growing and this year's outdoor garden will soon be planted (any transplants are welcome). This week we will set up a vivarium for earthworms, slugs and snails. We will continue a study of garden-related themes. If you have old seed catalogues, Harrowsmith magazines or empty seed packets, we would love to receive them!

Next week we will talk about human development, growth and healthy living as it relates to ourselves. [REDACTED] ([REDACTED]'s mom and instructor at Emily Carr College) will be working with small groups as they undertake discussions and representations of the human body. We would also like to welcome you to a Mother's Day Tea on Thursday May 11th at 3:30. Tea will be served in the activity room. Watch for your invitation!

On May 17th, our butterfly kit will arrive and those very hungry caterpillars should transform into pretty, Painted Lady Butterflies in about 10 days. I'm quite sure there will be active interest in a variety of insects and their habits (Would any of you be able to bring in a dragonfly larva? Word has it, they may be found by dragging a small net among the water plants in the big pond in Van Dusen gardens). About this time also, we will be welcoming a final practicum student from Capilano College.

2. Mackay Early Childhood Centre weekly parent newsletters

A WEEKLY NEWSLETTER FOR PARENTS AND VISITORS

October 31 - November 4, 1994

HAPPY HALLOWEEN

- Please remember to bring back your
SAVE-THE-CHILDREN boxes beginning Nov. 1

FROM [REDACTED] A.M. 3/4 AND KINDERGARTEN CLASSES

Well, we are five weeks on our way through the year and both classes have settled nicely into the routines of the program. The classroom hums in every corner with the active and excited involvement of children eager to explore. Many new friendships have developed. A spirit of co-operation and community is steadily growing. These rewards can be credited to the shared efforts of the teaching team, children and parents.

The first three weeks of this term were spent on the familiar themes of Berries, Apples and Fall. We enjoyed many songs, poems and stories connected with these topics. Delicious snacks were concocted in the classroom and we learned about how parts of fruit are used to create jams, dye, applesauce and juice, and how we plan for producing fruit for the future. We have played counting, guessing and pattern games and are learning about rhythm and creative movement. Turn-taking and respectful listening are developing marvelously. The children's prolific and joyful representations are examples of their growing awareness of the world around them. They should be very proud of their work! Enjoying and re-reading many predictable stories such as Jamberry, Henny Penny and Sitting on the Farm has led to increased awareness of the pattern of written language. The Kindergarten children have been busy entering their ideas in a daily journal. We began the Home Reading Program in the Kindergarten after Thanksgiving. We have also taken the opportunity of doing some more structured, "hands-on" activities in the area of mathematics with small groups. Thanks to [REDACTED], both classes are enjoying a trip to the library for a special story-time on Tuesdays.

More recently, we have been exploring the garden-related topic of Spiders. Both classes visited the [REDACTED] Botanical Gardens this week and celebrate Halloween with events and a special snack on Monday, October 31.

January 23 - 27, 1995

CURRICULUM THEMES IN THE CLASSROOMS

As most of you are aware, the teachers at the [REDACTED] frequently add special centres in their classrooms relating to the themes that are introduced during the year. These themes, or extended study projects, focus on a particular area of learning or subject of interest, usually initiated by the teacher or coming about in response to current events or other circumstances that spark the children's interest and imagination.

Examples of these themes include: animal studies, learning about the city, transportation, the seashore, the forest, volcanoes, the solar system, dinosaurs, etc. When the class studies a theme, the teacher organizes various related projects which involve learning concepts and operations in several different curriculum areas - mathematics, science, literature, social studies, and the arts. In this way, a theme is usually concerned not only with a central idea but also with the interrelationship of many areas of the classroom. Thus the classroom is really an integrated learning environment that can support children's development on many different levels and involvement in a great variety of tasks.

The current theme in [REDACTED] AM class is focussed on snow, ice, winter and the Arctic. Activities include: looking at animals in winter, how people live in cold climates, investigating the phenomenon of hot and cold, freezing and melting, and how nature responds to changes in temperature. Last week the class made bird feeders and discussed how birds respond to winter weather.

[REDACTED] morning and afternoon classes have started the new year focussing on "change" as their opening theme. This theme involves the children being introduced to some experiments that result in observable change using ice, water, cooking and heating. [REDACTED] is taking the opportunity to help children make and record their predictions before conducting various experiments. The children are keeping a daily journal of their activities and some are keeping a "Woods Walk" journal which is completed after the class returns from frequent forays into the surrounding forest area. [REDACTED] classes are also learning how the postal service works by addressing and mailing letters.

[REDACTED] classes are currently studying dinosaurs as their first theme of the term. They have been discussing dinosaurs and the world they lived in, why they disappeared, what they looked like and how they moved. Studying fossils as a way to better understand life on earth in earlier times is an activity that will unfold as the theme progresses. Both classes will do drawings of dinosaurs and learn dinosaur songs and chants.

[REDACTED] classes are focussing on the Arctic this month. They have discussed polar bears, snow and ice, and have already made miniature icebergs and written a class Polar Bear Book. Science experiments with fresh water, salt water and eggs have been undertaken, the class has studied animal tracks and tried to imagine what it would be like to live in the vast land of the Arctic.

These themes are good examples of what we most often refer to in the field of early childhood education as developmentally appropriate curriculum practices. These activities are designed to accommodate children's different learning styles and means of expression, as well as developmental differences found across the age span of the children in each class.

- [REDACTED] Director