Chapter 1: Introduction

Figure 1: "The years of early childhood are the time to prepare the soil"

"I sincerely believe that for the child, and for the parent seeking to guide him, it is not half so important to know *as to* feel*. If facts are the seeds that later produce knowledge and wisdom, then the emotions and the impressions of the senses are the fertile soil in which the seeds must grow. The years of early childhood are the time to prepare the soil. Once the emotions have been aroused - a sense of the beautiful, the excitement of the new and the unknown, a feeling of sympathy, pity, admiration or love - then we wish for knowledge about the object of our emotional response. Once found, it has lasting meaning. It is more important to pave the way for the child to want to know than to put him on a diet of facts he is not ready to assimilate."* (Carson, 1956; 1998, p. 56)

"If we want children to flourish, to become truly empowered, then let us allow them to love the earth before we ask them to save it. Perhaps this is what Thoreau had in mind when he said, "the more slowly trees grow at first, the sounder they are at the core, and I think the same is true of human beings." (Sobel, n.p., 1999)

Drawn to Nature:

Young children learning about nature through drawing

This is a study that researched children aged between three and five years old engaging in investigations of nature in their outdoor environment at a small rural preschool in northern New South Wales. The visual ethnographic study explored how the children used drawing to document their observations of the natural world and to act as a mediator in their learning. The study was conducted over a ten week period, during which time I acted as researcher/teacher, engaging in the nature study with the children while documenting their explorations, conversations and drawing events.

Rationale for the study

In 2005, Richard Louv wrote *Last child in the woods: Saving our children from nature-deficit disorder* in which he put forward his concerns that, today, children in developed countries spend much less time outdoors engaging with nature than in any previous generation. Not only do they not know much about their natural surroundings, but, he claimed, they may actually be endangering their health by not being outside (pp. 44-53). There are numerous reasons for this change in how childhoods are spent and they relate to social as well as environmental factors affecting how and where children live. An examination of the literature reveals causes such as: increased urbanisation and retreating 'wilderness'; the danger of high volume traffic; parental fear for children's safety; increased indoor recreational pursuits generally relating to electronic media; and decreased availability of natural spaces.

The disconnect that has occurred in children's development has far reaching consequences related to health, obesity and psychological well-being (Grinde & Patil, 2009; Hoban, 2005; Liebert, 2011; Wells & Evans, 2003). There is a strong likelihood that children will grow up without an empathetic understanding of the natural environment and a decreased possibility that they will develop an 'ecological self' that is the inspiration to live a sustainable lifestyle and care for the environment (Chawla, 2009; Chawla & Cushing, 2007; Hinds & Sparks, 2008; Wells & Lekies, 2006).

Spiritually and politically, I am a committed environmentalist and lover of wilderness; professionally I am an early childhood educator. Therefore I am concerned for both the future of children deprived of the joys and benefits of contact with nature, and also for the future of the natural environment. I feel strongly that if children do not connect with nature, they will not understand the need to protect our remaining wild landscapes for the health of the whole planet, including humans. Environmental degradation and human-induced climate change are constant threats to the future stability and biodiversity of the whole planet. Already our weather and physical environment are changing in ways that will alter our lives and landscapes in ways we can barely comprehend (Flannery 2005; 2010). Humans are impacting on the Earth at the global level, and we need to understand the environmental changes we are causing in order to make changes to our lifestyles to reduce our effect on the biosphere.

My research study grew out of the need to address these problems in the way that was most accessible to me, that is, working with young children in an early

childhood educational setting. I was inspired by Rachel Carson's (1956, 1998) book, *The sense of wonder,* which provides a stimulus for adults to awaken curiosity and a sense of awe in young children. Like many who have written about or researched children's connection to nature (Chawla, 2009; Chiras, 2005; Louv, 2005), I have a passionate belief that we need to arouse children's empathy, understanding and love of nature in order to make a difference to the way that they grow up - to awaken their 'ecological self' to the intricacies and interconnectedness of life on planet Earth. As Carson (1956, 1998) and Sobel (1999) have expressed in the quotes at the beginning of this chapter, I strongly believe that children have a right and a need to experience nature and form an emotional attachment to it before they learn about the dilemmas we face regarding our impact on the environment.

The impetus of my research was to encourage children to make connections with the natural world and to document and analyse how they made meaning from their observations and explorations. Drawing was supported as a significant tool in their construction of knowledge. As an early childhood educator, I have always been interested in children's drawings and the ways in which they communicate ideas through graphic media. Although the focus of the study was aimed at connecting children to nature, I wanted to encourage them to extend their concrete explorations by processing their observations and making meaning from their sensory experiences. Drawing was a useful and accessible form for them to express their observations and understandings.

Statement of the problem or 'gap' in the research

Children and nature

Environmental education is for the first time becoming mainstream in early childhood education in Australia with its recent inclusion in the national curriculum document, *Belonging, being and becoming: The early years learning framework for Australia* (Department of Education, Employment and Workplace Relations [DEEWR], 2009). As Davis and Elliott (2003) have advocated, much of children's learning is focused on education for sustainability (EfS), learning how to incorporate practices into daily life that support sustainable living (Littledyke & McCrea, 2009) and developing respect for the natural environment. Forest schools and nature kindergartens in Europe and the United Kingdom as well as 'bush kinders' in Australia are forging the way for children to return to experiencing nature in educational settings as in the past (Elliott & Chancellor, 2012; Fjørtoft, 2001; Warden, 2012a). So far there are few studies about the effects of regular exposure to natural environments on young children. An exception is O'Brien's (2009) study in England which confirmed the positive effects on young children that learning in nature has across all developmental domains.

Children and drawing

From the beginning of the twentieth century, children's drawing has been seen primarily as a staged series of developments of conceptual and manual skills towards achieving pictorial realism. In the past two decades, researchers and pedagogues have repositioned their thinking on children's drawing. There is a growing body of research studying children's drawing as a way of making

meaning, rather than just an aesthetic production (Anning & Ring, 2004; Brooks, 2003a, 2003b, 2003c; Cox, 2005; Kindler, 1999; Kress, 1997; Matthews, 1999; Wright, 2003). Drawing has begun to be considered as a "graphic language" (Katz, 1998) or a symbolic way to express meaning (Kress, 1997). Furthermore, there appears to be some studies of school children drawing their understandings of nature/environment (Alerby, 2000; Kalvaitis & Monhardt, 2012); but little research relates specifically to children before school age engaged in drawing nature.

Aim of the study

The main aim of the study was to provide the stimulus and opportunities for children to engage with nature, and then to document and analyse how children made meaning from their experiences using drawing as a learning tool. Using a visual ethnographic methodology, data were collected in the form of video recordings of the children engaged in explorations of the environment; in conversations with me and each other; and in drawing events. The children's drawings also formed part of the data and were scanned from their drawing books. Working within a framework of Vygotsky's (1962, 1997) theories of learning, sets of data were selectively analysed in terms of children's meaning making and formation of ideas.

Research questions

After review of the literature of both children's experience of nature, and children's drawing, the research questions were developed to address the aims

of the study and to be explored within a qualitative paradigm. The fundamental questions posed were:

1. In what ways do children use drawing to express their ideas, knowledge and understanding of the natural world?
2. In what ways does drawing function as a learning tool in children's construction of knowledge about the natural world?

To further inform the analysis of the data, sub-questions were formulated:

1.1 What are the different intentions and strategies that children use in their drawings?

1.2 How is drawing interrelated with other forms of expression in children's communication (physical, verbal, gestural)?

2.1 What learning is visible in these children's drawings?

2.2 How has drawing supported this learning?

2.3 How has drawing helped children connect to nature?

These questions are addressed in detail in chapter 6 and links made between the data collected and learning theories.

Sophie's drawings: Inspiration for a research study

In 2006, I was employed as a teacher-director at the preschool in which my current study was undertaken. Concurrently, I was studying for my Bachelor of Education in Early Childhood. I became interested in the Project Approach to teaching and learning devised by Katz and Chard (2000), and instigated some in-depth learning projects, one of which involved studying the development of silkworms. As part of the project, the children made observational drawings of the silkworms' lifecycle from eggs to moths. The silkworms were displayed in an

open box on a table where the children could watch them and engage in drawing if they chose. Sophie, one of the children engaged in this process, made a series of drawings of leaves (Figure 6, p. 62), which is described and analysed later in this chapter (Figure 7, p. 73). Studying the children's drawings from this and other projects aroused my interest in the topic for my current research study. In particular, Sophie's sequence of drawings demonstrated the learning made possible using drawing as a mediator between observation and thought. This event was significant in the development of my understanding of the role drawing plays in children's thinking and learning.

From my interest and involvement in this earlier study, I devised my current research study. I decided to return to the preschool where it had occurred as I considered that the staff, families and children would be supportive of, and interested in, my study. I already had an entry into the research site as I knew the staff, and some of the children and families. Thus I had some familiarity with the culture of the preschool.

I based my research aims and design on my previous study of Sophie's drawings. I assumed that the children involved would follow a similar course of development towards a more complex way of depicting elements of the natural world as they increased their understanding of the specimens they explored and observed. I was prepared for a linear progression of development and complexity that would be relatively visible and straightforward to analyse in terms of what children were learning, as Sophie's drawings had been. The results of my study proved to be much more diverse and complex than I could have

foreseen and thus demanded to be analysed in a more complex manner as presented later in chapters 5 and 6.

Situational analysis

Situating the researcher

The environmentalist Rachel Carson (1956; 1998) spent much time introducing her young grand-nephew to the wonders of sea and forest near her home in Maine, USA. She described this co-construction relationship of child and adult in responding to the natural world when she wrote:

> If a child is to keep alive his inborn sense of wonder … he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement, and mystery of the world we live in (Carson, 1998, p.55).

Over many years of working in early childhood education and bringing up my own sons, I have experienced children's reactions of excitement and wonder as they make their own discoveries in the natural world. I had developed nature based projects in previous work in preschools, and found that children responded enthusiastically to investigations of natural phenomena, especially living things.

My interest in children has been a focus for my work and study for my whole working life of forty years. The last twenty years has narrowed my gaze to the early childhood sector through my employment in preschools, working predominantly with children from three to five years old. I was employed

initially as a childcare assistant and progressed through on-going study and experience to become a teacher-director of several small rural preschools. Over my career I have related to many children, watching how they learn and supporting them in their development. Through my contact with numerous children over the years, I have been able to integrate my observations with academic theory, which has broadened my horizon of what and how children learn.

The arts have also been an abiding interest for me from my own early childhood. I have always drawn, sometimes painted or printed, have been involved in dance and appreciated (though not played) music. Consequently, my enjoyment of the creative arts has carried over into my professional life with young children by introducing them to various forms of music and dance, as well as nurturing their creativity in the visual arts. I have studied and collected children's drawings since I first started working with children, so a theoretical investigation of children's drawings was a logical development from my interest.

The third aspect of my research is my relationship with the natural environment. I live on a rural property, which harbours many indigenous species of plants and animals that we endeavour to protect and regenerate. I have always enjoyed a passionate connection with the natural world through bushwalking, camping and living surrounded by nature. I have an abiding concern for the conservation of wild places, plants and creatures.

From this background, I chose to integrate my three most absorbing passions into this study, examining the role of drawing in children's learning about aspects of the natural environment. I feel strongly that young children need to connect emotionally with the natural world in order to develop a deeper understanding of the environment. Research has shown that adults who have a commitment to environmental action and a positive attitude to sustainable living have had affirmative experiences of the natural world in childhood (Chawla & Cushing 2007; Chawla 2009).

The study site

The study site chosen for the research was the preschool in which I had worked some years previously as teacher-director where I observed the leaf drawings of Sophie. As mentioned previously (p. 7), I had instigated some in-depth investigations using the Project Approach developed by Katz and Chard (2000) on the development of silkworms and growing a vegetable garden. From these experiences, I felt confident that I would be able to engage children at this preschool (most of whom I had not taught previously) in a series of nature study sessions for a larger research project.

The preschool is situated on the outskirts of a village with an approximate population of 500; it is 15 kilometers from the nearest city, itself a small city with a population of 16,000 (Australian Bureau of Statistics, 2011). The centre is an early childhood service that caters for up to twenty children per day, from three years old to school age (4½ to 6 years), offering a preschool education programme three days per week for school terms, from 9am until 3pm. It is

'community based', which means that it is funded by the State Government of NSW, licensed (then) by the Department of Community Services, and managed by a parent committee. The children came from the local village and surrounding rural area, much of which is farmland supporting primarily beef cattle production on open grazing land. The climate is sub-tropical, which allows for outdoor activities all year round except for the middle of the day during summer.

Figure 2: Part of the outdoor area of the preschool.

At the time of the study, the preschool program was based on *The curriculum framework: The practice of relationships* (Stonehouse, 2001), a NSW state-wide document that supported emergent curriculum and child centred learning in early childhood services. The program was developed from children's interests and featured in-depth learning in certain topics chosen by the teacher based on what children were most likely to engage with. The program allowed for free play in several sessions of 1 to 1½ hours during the day, giving children choices of activity in both indoor and outdoor areas. My research study sessions slotted into this framework as an optional activity for the children during the morning

block of free play, on one day of the week.

The staff of the centre comprised a teacher-director who is four-year university trained in early childhood education, and two untrained assistants. One of the assistants had worked at this preschool for twenty years; the other had been recently recruited to support the special needs program for children with disabilities. The staff were interviewed about the children's engagement with my nature study program and occasionally joined in the investigations and conversations, but generally were not involved in the study while I was present.

Significance and potential contribution of the study

Why is it needed?

This study is needed because it addresses a gap in the literature and research in early childhood education. It draws together two aspects of young children's experience: their engagement with nature, and how they process their experiences and make their learning visible through drawing. There is an increasing amount of research on children's drawing processes, and some studies address how children at primary school and beyond draw their understandings of nature (Alerby, 2000; Kalvaitis & Monhardt, 2012). For children aged under five years, I was not able to locate any research connecting children's experiences of nature with drawing. If, as Brooks (2005, 2009a, 2009b) suggests, drawing is an important learning tool that mediates between children's experiences and conceptual learning, then research into how children use drawing to learn is essential to further early childhood pedagogy.

What will it contribute?

My study will contribute to both the burgeoning field of connecting children to nature and to the research on children's drawing. At present there has been little research conducted and published in Australia on young children engaging with the natural environment. As mentioned previously, (p. 5), early childhood educators are just beginning to take children into 'bush' environments with the purpose of forging connections with nature (Elliott & Chancellor, 2012). Despite the proliferation of research on children's drawing, few people are analysing children's graphic productions from a Vygotskian perspective. Brooks (2002, 2005, 2009a, 2009b) and Sunday (2012) draw on Vygotsky's (1962) theories, in particular his theories of thought and language to develop concepts of drawing functioning as a mediator between experience and thought in the way that language does. My work builds on Brooks' research and writing, but with the added dimension of studying how drawing can assist children in learning about nature. This is further discussed in chapter 6.

My methodology of visual ethnography will hopefully encourage others researching in the early childhood field to use video recording as a very sensitive and receptive tool for documenting young children's experiences and their learning. As technology has improved and become more affordable, video recorders have become a part of everyday documentation with young children (DEEWR, 2010; Lubawy, 2006; Walters, 2006) and their use in qualitative research, particularly in the social sciences, is expanding (Heath, Hindmarsh, & Luff, 2010).

Thesis Overview

This ethnographic study documents children engaged in exploring the natural environment and then processing their discoveries to make meaning from their observations. The literature review for this study is divided into two parts to explore the twin aspects of this study: children's relationship with nature, and the historical and current thinking about children's drawing. I wanted to give children a voice through my study because my research was conducted *with* children, not as a study *of* children. Consequently, I have included large sections of transcribed dialogue, in the expectation that it will assist the reader in understanding the context in which learning was taking place.

In analysing my data collected over ten weeks, I decided to focus on the drawings of a few 'key informants' (O'Reilly, 2009) as a way of directing the reader's attention to essential differences in the way children draw. Basing my analysis on the works of Arnheim (1969; 1974), Kindler (1999), Wolf and Perry (1988), and Wright (2003; 2010) I explore repertoires, graphic equivalences and multi-modal expression. The children's drawings form an essential part of the data, and a selection of these have been included. Each chapter is introduced with an illustration from the study data of either a child's drawing or a photo of children engaged in exploration. The accompanying text below relates to the pictured event, but also reflects the content of the chapter. Reproductions of other drawings appear in the data analysis section (chapter 5) where their genesis is described.

Summary of chapters

Chapter 1 introduces the study, its aims and questions, and gives some background to the context, rationale and significance of the study. It includes an overview of each chapter of the study and an explanation of key terms.

Chapter 2 explores the relationship children have with nature. In the developed world today, children have less experience of the natural world than any previous generation (Louv, 2005). I examine a number of factors which give rise to this change: environmental changes such as increased urbanisation of the expanding population; bigger houses and smaller gardens; less access to natural environments due to traffic; and the retreat of wild spaces. Social factors also play an important part: parents' perceptions of risk, engagement with electronic media, changing lifestyles and recreation pursuits. The benefits of children engaging with nature are explored, looking at aspects of physical and psychological health, play and development, and cultivating future environmentalists. Current developments in environmental education in the early childhood sector are described.

Chapter 3 explores historical and current thinking about children's drawing. The study of children's drawings has in the past focused on stage developmental theories derived from Piaget or development of the aesthetic sense. More recently, stage theories have been criticized and researchers have turned to studying how children make meaning through graphic and other visual forms of representation (Anning & Ring, 2004; Brooks, 2002; Cox, 2005; Wright, 2003).

In *Chapter 4a,* I outline my epistemology and the theoretical framework that I use to analyse the data from the study. My analysis draws heavily on Vygotsky's (1962; 1997) theories of learning and social constructionism. I outline Vygotsky's theories and demonstrate how they relate to my study by using an example of a previous drawing event. I set out the aim for this study and the research questions.

Chapter 4b sets out my methodology. Firstly, I justify my choice of visual ethnography as the methodology for this research study. I then describe the context and participants in the study. My methods of working with the children and how data were collected are explained. I address the ethical questions that arose from implementing the study.

In *Chapter 5*, I describe a number of significant drawing events and transcribe the children's dialogue that occurred during the interactions. The children's drawings that were produced from the described events are also reproduced. This chapter focuses on descriptive and narrative documentation of events as they occurred.

In *Chapter 6*, my research questions guide an exploration of my findings, establishing links between the data described in the previous chapter and the learning theories of Vygotsky and social constructionism. Evidence is noted of children constructing knowledge in collaboration with others and using drawing as a mediator of learning, a cultural artefact that enables children to externalise

their thoughts and make visible their learning. Links are made to the work of other theorists in the field of children's drawing development.

In *Chapter 7*, I look at what and how the children learned. I outline implications from my research for early childhood educators. I reflect on what I learned as a researcher and educator, the strengths of my research and how I could have improved it. Finally, I suggest some directions for future research in the early childhood field in the directions of both environmental education and drawing for meaning making.

The final section contains references and appendices: ethics approval, consent forms, children's assent forms and participant information sheet.

Definitions of Key Terms

To assist the reader with having clear ideas about key concepts referred to in the study, the following terms in alphabetical order are defined:

Belonging, being and becoming: The early years learning framework for Australia (EYLF) is the national learning framework developed for all Australian early childhood services from birth to school age. It became mandatory in 2012.

Drawing, for the purposes of this study, refers to predominantly linear graphic productions made by children using a limited range of media, namely graphite pencils, ballpoint pens, fine tipped felt pens and artist-grade coloured pencils. The reasons for these choices are elaborated on in the text. Drawing was not

encouraged as a means to achieve an aesthetically pleasing product, but as a way to make thoughts visible, to facilitate meaning making.

Early childhood: in the Australian context, this construct most often refers to the years between birth and school age. For the purposes of this study, the age group I worked with was aged three to five years. Occasionally, I refer to *early childhood* to mean from birth to school age.

Early childhood education in Australia refers to the pedagogy of early education and care services that cater for children from birth to school age. Children start school between the ages of 4½ and 6 years, depending on the state in which they attend and parental preference.

Early childhood educator refers to a staff member who has primary contact with children in early childhood services. They may be unqualified (although, as of 2014, all staff must, at minimum, hold or be working towards a Certificate III in Children's Services) or be qualified up to four-year university trained.

Education for sustainability (EfS) incorporates action for sustainability, acting *for* nature, not *in* nature (Davis, 2010; Davis & Elliott, 2003) - embedding the practices of an EfS orientation into daily life and routines of early childhood centres (Littledyke & McCrea, 2009).

Environmental education is education about the natural environment. This term is now often being superseded by the term 'Education for Sustainability'.

Nature can be defined in many different ways (Elliott, 2010, p. 4) ranging from pristine wilderness, "remote, untouched, uncontrolled" to meaning "things not man-made", although even this distinction is blurring. As I was not able to access 'wilderness' with the children involved in the research, the outdoor environment of the preschool represented 'nature' for the purposes of this study; that is, natural elements in an environment planned and planted by humans. The outdoor environment consisted of planted trees, lawn, gardens, rocks, sandpit, native birds, small lizards, insects and other small invertebrates. The children observed invertebrates in the preschool garden, which represented indigenous, 'native' life forms.

Preschool in the Australian state of New South Wales generally refers to an early childhood educational service that provides six hours of education per day for children from three years to school age. Generally, these services operate on a term basis with breaks aligned to the primary school calendar.

Concluding Comments

This introduction and overview of the thesis has outlined my interest in the topic, the context in which the research took place and the problem to be addressed. It identifies the gaps in research and literature. From this gap, the main aim is stated, and the research questions that informed the study. The following chapters discuss in detail the literature relating to children in nature, and the theories of children's drawing, both past and present.

Chapter 2: Children and nature

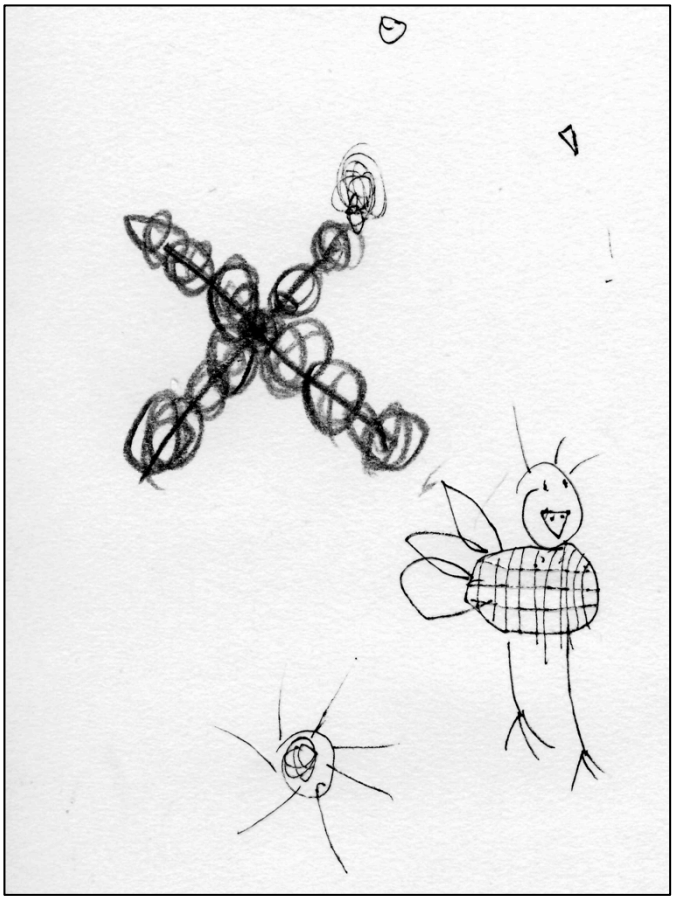

Figure 3: Katie (aged 4 years, 10 months): "That's how nature works."

At my study preschool, I am conversing with several children as they are engaged in drawing. Katie, a thoughtful, intelligent child, is drawing a spider on a dewy web. She is telling me excitedly about something interesting that happened at home the previous night.

I ask: How come there was a frog on your window last night?

Katie replies: Because that's how nature works. They just go wherever they want to go. It was catching some moths to eat.

She is constructing a concept of 'nature' as a system, wherein creatures are free and unrestricted, where it is even possible for frogs to sit on windows.

Introduction

Children in the developed world today have less experience of the natural world than any previous generation. In this chapter, I examine the literature pertaining to factors which give rise to this transformation: environmental changes such as increased urbanisation of the expanding population; bigger houses and smaller gardens; less access to natural environments due to traffic; and the retreat of wild spaces. Social factors also play an important part: parents' perceptions of risk, engagement with electronic media, changing lifestyles and recreational pursuits. The benefits of children engaging with nature are explored, looking at aspects of physical and psychological health, play and development, and cultivating future environmentalists. Current developments in environmental education in the early childhood sector are described.

Connecting with nature

Over fifty years ago, Rachel Carson (1956;1998) encouraged adults to plant and nurture the seeds of wonder about the natural world in children from their earliest years. Carson was concerned that children lost their initial curiosity and excitement about the natural world; she lamented that children's "clear-eyed vision, that true instinct for what is beautiful and awe inspiring, is dimmed and even lost before we reach adulthood" (1998, p. 54). In the several generations of children growing up since Carson wrote her seminal work, children in many developed counties have become less connected with the natural world and have fewer opportunities to engage with it (Elliott & Davis, 2008; Louv, 2005; O'Brien, 2009; Rivkin, 1997; Wilson, 2008). In the same period, many countries in the

world have seen unparalleled development with world population more than doubling from 3 to 7 billion people (U.S. Census Bureau, 2011) causing the destruction of much natural habitat and extinction of numerous species. Many are now asking: how do we halt this seemingly unstoppable decline in the natural environment and teach our children to become stewards of the earth, not exploiters as their parents' generation has been? What future is there for not only humans, but many fellow species, on a planet that is running out of fresh water, fertile land and natural resources? What are today's children missing by not spending their childhood exploring the natural environment? This chapter explores the current state of children's relationship with nature, predominantly in the developed countries of Australia, North America and Europe.

Some concerns

Many adults in the developed world are concerned that children are growing up today without the opportunity or inclination to play freely in natural spaces whether backyard, vacant block, park or undeveloped natural environments. In his United States based exploration of children's experiences of nature, Louv (2005) found that children currently spend much less unstructured time outdoors in 'natural' surroundings than their parents or grandparents did. He considers that children now know more about the theories of environmental science but have little first hand knowledge of natural flora and fauna in the spaces that they inhabit (Louv, 2005, p. 2). Changes in the Australian urban landscapes and lifestyles have likewise reduced the access and time that children play outside anywhere, with a sharp decrease spent in natural surroundings (Cleland, Timperio, Salmon, Baur, & Crawford, 2010; Dowell, Gray, & Malone,

2011; Elliott & Davis, 2008; Malone, 2007; Veitch, Bagley, Ball, & Salmon, 2006; Veitch, Salmon, & Ball, 2010; Veitch et al., 2011; Wen, Kite, Merom, & Rissel, 2009). Causal factors for the decline in children's access to the natural environment arise both from changes in social behavior and transformation of the built environment of urban landscapes, which will be explored further.

Another area of concern is the relationship between children's health and development, and their access to natural environments. Health professionals across the developed world are greatly concerned by the growing epidemic of childhood obesity, which is linked to later chronic diseases. Studies suggest that access to inviting natural environments can stimulate play and physical activity, thus contributing to a more active lifestyle and reduced obesity (Dowell et al., 2011; Dyment & Bell, 2007; Nedovic & Morrisey, 2013; Veitch et al., 2011). Psychological health and sense of well-being can also be affected by the natural environment (Grinde & Patil, 2009; Louv, 2005; Wells & Evans, 2003).

As Flannery (2005, 2010) reports, our planet is starting to experience the effects of climate change due to increased levels of carbon dioxide in the atmosphere, resulting largely from uncontrolled use of fossil fuels over the last 150 years and the destruction of a large percentage of the world's forests. Development and population growth have greatly reduced areas of natural wilderness and created pollution that has caused the extinction of vast numbers of species and threatens many more. To halt this abuse of the environment will take many committed adults who care for the state of the natural world and are prepared to work for its salvation. To encourage the development of such 'stewards', it is vital to forge

connections with nature in early childhood, teaching children to enjoy, respect and look after the natural environment (Chawla & Cushing 2007; Chawla 2009).

Finding the 'natural environment'

There are many definitions of 'natural environment' ranging from pristine wilderness to cultivated parks and gardens. Elliott (2010, p. 46-47) explores a number of definitions of nature, ranging from untouched and uncontrolled wilderness, to 'nature' as the ecosystems of the planet that connect all living things. For the purposes of this study, as access to pristine wilderness was not feasible with my study group, I have considered the outdoor playspace of the preschool in which I collected my data to provide some of the essential ingredients of a 'natural environment' such as: wild populations of invertebrates, indigenous lizards and birds, plants (mostly cultivated), experience of weather and natural materials - soil, water, rain, wind, sun. My inclination, as an early childhood teacher, was to provide experiences to young children in their immediate, known environment (home and preschool) to start the process of engagement with nature. I believe that early experiences in familiar places can form the foundation for an appreciation of nature, which children can build upon as they become older and more able to access and explore truly wild environments.

Why children are not experiencing nature

The reasons put forward for children's current lack of experience of nature are numerous. They include changes to our environments, both built and natural, as well as differences in demographics, social behaviour and psychological

perceptions of outdoor spaces.

Urbanisation of the population

In Australia, the population has increased in predominantly urban areas, making the natural environment less accessible to children than it was a few generations ago. According to the Australian Bureau of Statistics in the early 1900s, almost half of the Australian population lived in communities of less than 3,000 people (Hugo, 2001, table C4.42), whereas in 2009, 89% of the population lived in urban areas (UNICEF, 2011). To house increasing population levels, urban areas have expanded onto land which several generations ago was bush or farmland. Consequently, today less of the population live in rural areas, and larger urban areas mean that more people live further from undeveloped land than in previous generations. Similarly, in the USA, Louv (2005) comments that as urban living expands, wild landscapes retreat and there is less undeveloped land accessible to children close to their homes.

Shrinking backyards

In Australia over the past twenty years, suburban houses have increased in size whilst at the same time house blocks have decreased in area, with a consequence that there is less open outdoor space for children in their own home environments (Elliott & Davis 2008, p.3; Little & Wyver, 2008, p. 34; Malone, 2007, p. 516). Malone (2007, p. 516) describes this problem of urban Australian children:

> Most of these suburban middle class children will grow up in homes in new master planned estates, or what Hawley (2003) terms

> McMansionland. McMansionland is packed with large houses on small blocks of land; they have little or no front yard, high fences, a remote control garage and look more like fortresses or holiday resorts than the leafy houses depicted in earlier urban developments. McMansions, unlike earlier versions of the Australian suburban home, have no space for cricket in the backyard; landscaped patio and designer BBQs replace the clothesline and veggie garden. These estates negate the opportunity for children to interact with children or adults in their neighbourhood streets and their design discourages children's outside play.

Backyards which once provided a safe yet stimulating play environment for children have become not only smaller, but have also been 'tamed' by paving, swimming pools, and ornamental gardens. Children's opportunities to build their own play structures, climb trees, dig in the dirt and catch bugs have been severely curtailed. From their earliest years and their most immediately accessible environment, children are prevented from interacting with nature.

Increased traffic

For previous generations of urban children in the Western world, the immediate neighbourhood was accessible as a play environment. This is no longer the case in most communities, where the volume of motor traffic in the majority of urban areas makes play in the streets and open areas unsafe. I recall, as a child in the 1960s, playing football in the middle of the road outside our house in suburban Melbourne, with players keeping an alert ear for the odd approaching car, to give us enough time to get off the road. Now, the volume and speed of motor vehicles prohibits any close proximity to roads while parents are reluctant to allow

children to cross roads to access parks and other play areas. Studies show that parents' fear of the danger of traffic leads them to restrict their children's independent movement outside home (Veitch et al., 2006; Veitch et al., 2011).

Electronic media

What we now find is that adults and children alike spend much of their leisure time indoors. Electronic media has become the pastime of choice for a significant percentage of the population of all age groups. The proliferation of television, computers and electronic games encourages children to spend more time indoors in activities primarily engaged with electronic media (Louv, 2005, p. 47). An Australian study of preschoolers shows that between a quarter and a third spend more than two hours per day engaged with electronic media (Okely, Trost, Steele, Cliff, & Mickle, 2009). As adults spend less time outdoors engaged in gardening, building, home maintenance and outdoor hobbies, so their children are also not involved in these activities. The increased size of modern houses provides space for people to be engaged indoors with computers, television and electronic games. Some houses even have a specifically designed 'entertainment centre' in which to engage with electronic media. Thus, changed recreational pursuits are reflected in house design, and decreased garden space limits outdoor activities.

The 'bubble-wrap generation'

As well as changes in recreation, there have been substantial transformations in adult perceptions of outdoor spaces. In recent years, parents have become more concerned with children's safety and are much less likely to allow their children

freedom to play unsupervised in their neighbourhood or nearby natural places. According to Louv, (2005, p.123), parents have a '(f)ear of traffic, of crime, of stranger-danger - and of nature itself'. Furedi (2001) has written extensively of parental paranoia about children's safety arising from media-generated perceptions about safety and risk, and is concerned about the resulting restrictions that impact on children's outdoor play. Malone (2007, p. 513) used the phrase 'bubble-wrap generation' to signify today's children, whose over-protective parents, because of 'the changing environment and climate of fear,' are 'restricting children's movements to such an extent these children will not have the social, psychological, cultural or environmental knowledge and skills to negotiate freely in the environment'.

This brings a further problem of teaching children how to manage risk. In earlier generations, children had ample opportunities to engage in open-ended, challenging activities in outdoor environments in which they learned how to gauge risk, and could engage in an activity at their own level of skill (Champion, 2008, p. 96). This taught many valuable lessons in taking on greater challenges and gradually expanding each child's level of competency. In our current climate of regulation, hazard reduction and concern for safety at all costs, children are not being challenged sufficiently to learn how to cope with risk (Little & Wyver, 2008; Vesperman & Kinsella, 2012). This is further examined in the section on complexity of play.

Nature itself is seen as hazardous, particularly in Australia with the possibility of encounters with poisonous snakes and spiders. As adults spend less time in the

outdoor environment, they have less experiential knowledge about flora and fauna and are more likely to be concerned that their children will come to harm in some way. Their concerns about safety include problems with bacteria in the dirt, being bitten by insects and other animals, contracting diseases and allergies, risking injury from falls, drowning and getting lost. Of course, a small percentage of children are affected by these hazards, but limiting their exposure to the risks means that children miss out on the many significant benefits of experiencing outdoor natural playspaces. It must also be remembered that indoor environments can also pose safety and health risks (Louv, 2005, p. 130).

Why experiencing nature is important for children's health and development

Carson's concerns back in the 1950s reflected sadness that children would miss out on the wonders and beauty of the natural world, but are there deeper and more profound reasons for introducing children to nature? Is experiencing the natural world fundamental to our health and perhaps even survival? Many studies have investigated different aspects of human relationships to the natural world, emphasizing the importance of access to natural environments for both adults and children. In their fact sheet on *Children's health and nature*, the National Environmental Education Foundation Program (NEEF) cite many research studies which have found positive correlations between health and access to natural environments (NEEF, 2011).

Psychological health

Children's healthy physical and mental development is of paramount concern for parents and early childhood professionals. Experiencing play in natural surroundings whether gardens, parks or wild places is an important factor in children's psychological health. Partridge (1984, as quoted in Elliott & Davis, 2008, p. 10) suggests that humans have neurological and psychological need for the natural surroundings in which we originally evolved. The concept of *biophilia,* developed by American biologist and environmental theorist E. O. Wilson (1984), ascertains that humans seek connections with nature, 'determined by a deep biological need, which stems from the fact that we have co-existed in close relationship with the natural world for so much of our evolutionary history' (Wilson, 1984, as quoted in Chiras, 2005, p. 44). Many studies of children and adults confirm that psychological wellbeing increases with contact with the natural world (Elliott & Davis, 2008, pp. 8-10; Maller, Henderson-Wilson, & Townsend, 2009; Townsend, Maller, St Leger, & Brown, 2003). Spending time in contact with the natural environment has been found to have beneficial effects on health and sense of well-being, aiding in stress reduction, improving attention, aiding mental restoration, speeding up the healing process and increasing longevity (Grinde & Patil, 2009; Louv, 2005; Wells & Evans, 2003). Wells (2000) found that increasing the natural elements in children's home environments had a "profound effect' (p. 790) on their cognitive functioning. Kuo (2001, cited in Maller et al., 2009) found that "green" surroundings had positive effects on children's and adults' abilities to pay attention and even enhanced attention functioning in children with attention deficit disorder (ADD).

Environment, physical activity and obesity

There is growing concern about childhood obesity, particularly in the US and Australia. A study by Salmon, Telford and Crawford (cited by Hoban, 2005, p. 8) found that 25% of Australian children are overweight or obese, and suggests that having inviting outdoor natural playspaces is one way to engage children in more physical activity. In a study of Victorian children, Liebert (2011, p. 257) found that there had been a slight decrease between 1999 and 2007 in overweight preschool children, but that 15% of 3 to 5 year olds and 12% of 2 year olds remained obese or overweight. Health professionals are concerned at the links between reduced activity and sedentary lifestyle in children and the growing incidences of type 2 diabetes, asthma, hypertension and cardiovascular disease (NEEF, 2011). A recent study in Melbourne shows positive correlations between having access to attractive outdoor public spaces (for example, parks) in the neighbourhood and reduction in children's time spent in sedentary activities with electronic media (Veitch et al., 2011).

Complexity of play and learning in natural playspaces

Play in natural playspaces gives significant 'opportunities for exploration, discovery and learning' (Elliott & Davis, 2008, p. 5). Studies (Herrington & Studtmann, 1998; Kirby, 1989; Kylin, 2003) cited by Elliott and Davis (2008, p. 6) indicate that play in a natural setting promotes more complex play, creativity and a broader focus for learning. Early childhood educators are in an ideal position to redress the disconnection with nature and introduce young children to meaningful experiences and engagement with the natural world, if only on a small scale in the immediate environment of the outdoor spaces of early learning

centres. However, as many communities and children's centres become more predominantly human constructed environments and encompass fewer natural elements, children are less likely to engage with nature in their outdoor play.

Natural play spaces provide open-ended complex learning opportunities for children in many different domains (Greenman, 1988; O'Brien, 2009; Rogers, 2008; Wilson, 2008, pp. 47-57). Cognitive learning is enhanced, stimulating children to order and categorize the many elements of a natural outdoor space, as they learn to make sense of the environment and the things in it. Senses are stimulated by colour, shape, sound, smells, and textures. Social learning develops through sharing, co-operating, communicating to others. Stimulating physical activities such as tree climbing, negotiating rocks and dense shrubbery, balancing, climbing, running, rolling provides endless opportunities for skill acquisition and graduated challenge (Greenman, 1988, p. 179-189; Little & Wyver, 2008, p. 35).

Learning to handle risk is an important learning opportunity that is currently being re-examined in early childhood pedagogy after decades of increasingly regulated services (Little & Wyver, 2008, p. 36). In the current climate of risk avoidance, over-regulation and litigation, the Australian early childhood sector has been pushed towards a curriculum that offers no challenges to children, in attempting to reduce all risks and possibilities of accidents occurring. However, there is a down side to excessive safety. Little and Wyver (2008) have made a critical analysis of literature on the inclusion of risk-taking in outdoor play for young children. They conclude that:

> [F]ailure to provide children with stimulating and challenging experiences through which they can engage in positive risk-taking exposes them to different risks that compromise their health and development. The ultimate aim for parents, teachers and other play providers should be to provide outdoor play environments where the risks of serious injury are reduced, but creativity, challenge and excitement are maintained. (Little & Wyver, 2008, p.39)

There are early signs that educators are beginning to turn away from excessive elimination of risks in outdoor playspaces. Instead, they are encouraging children to become responsible for assessing risk for themselves and learning to engage safely in challenging physical activities (Vesperman & Kinsella, 2012).

Cognitive learning

Learning about the environment from direct experience and constructing understanding about it must underlie children's further development of their 'ecological selves'. The Sengalese environmentalist Baba Dioum is frequently quoted as saying: "In the end, we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught" (Dioum, 1968, quoted in Maginnis, 2010, p. 2). He links the ideas of conservation, emotional attachment and cognitive understanding regarding attitudes to nature, making the point that teaching and understanding must form the basis for conservation of the environment.

Elliott (2010), a long time advocate for education for sustainability in the Australian early childhood sector, concludes that "(c)onnections with nature are

foundational to embracing EfS [Educaton for Sustainability] and, in early childhood education, there is a unique opportunity to create nature foundations" (p. 70). She maintains that cognitive learning about nature is important as a basis for understanding how the natural world works and can lead to "local and perhaps global understandings" which "provide a sound basis for making decisions from a sustainability frame of mind" (p. 69).

Childhood nature connections underpin adult environmentalism

Many studies show that children's healthy mental and physical development is enhanced by engagement in play with the natural world. Early connection to nature also affects the development of an 'ecological self' and may determine attitudes to the environment. Do these attitudes persist into adulthood? A number of studies have found correlations between positive adult attitudes to environmental sustainability and experiences of nature in childhood (Chawla, 2009; Chawla & Cushing, 2007; Hinds & Sparks, 2008, p. 115; Wells & Lekies, 2006). If we are to cultivate sustainable practices in our society, this is an important factor to consider. Certainly, most notable environmentalists acknowledge strong connections with nature in their childhoods as described by David Orr, a well-known American environmentalist, academic and writer, who is active in many areas of environmental studies, including environmental education and environmental design (Wikipedia accessed 6/2/2012). In an interview about the roots of his environmentalism, Orr states:

> I had no epiphany but I did spend a lot of time out-of-doors, playing in the woods, and hemlock groves in the Allegheny Mountains of Pennsylvania, and along the streams and rivers of the area. I later learned that there were

> names for what I'd experienced. E. O. Wilson calls it "biophilia," Albert Schweitzer called it "reverence," Rachel Carson called it "a sense of wonder." But by any name it is the sense of belonging in nature and particularly in one's place. I think everyone has that feeling to one degree or another. But it requires opportunity and the right circumstances to flourish, very much as described by Richard Louv's book, *Last child in the woods*. And it begins early in life in the experience of nature mediated by perceptive and caring adults to validate the child's fascination with bugs, animals, trees, rocks, plants, water, seasons, and landscapes (Richard, 2011).

Many other eminent environmentalists such as Sir David Attenborough (Tyrrel, 2010, p. 1) and E. O. Wilson (1994, p. 5) , report similar engagement with nature in childhood, leading to a lifelong fascination with the world of nature and often a strong commitment to its preservation.

Research supports the view that a critical prerequisite for a sustainable future is that children need to have a meaningful connection with the natural world to develop into adults who are concerned, educated and committed to conserving our environment (Chawla & Cushing 2007; Chiras, 2005; Hinds & Sparks, 2008; Louv, 2005; Samuelsson & Kaga, 2008). Chawla and Cushing (2007) researched studies of environmentalists, to determine the source of their interest and activism. Up to 80% of respondents identified significant experiences of nature or role models who influenced their interest. The report continues:

> These findings suggest that nature activities in childhood and youth, as well as examples of parents, teachers and other role models who show an

> interest in nature, are key 'entry-level variables' that predispose people to take an interest in nature themselves and later work for its protection. (Chawla, 2007, p. 440)

In advocating for more natural play spaces for children, Elliott and Davis (2008, p.10) argue that "(n)ature connections made in childhood are instrumental to the construction of values, development of an 'ecological self', and can be viewed as a lifelong resource".

Education for the future

Because of our present concerns with global warming, climate change and irreparable damage to the environment, we are faced with the task of educating our children to deal with a future of challenges and changed environmental conditions (Flannery, 2005; 2010). In our role as early childhood educators preparing children for their future as adults, we must address problems arising from changes to our natural environment and how to build sustainable lifestyles (Samuelsson & Kaga, 2008). Having an emotional connection with, and an intellectual understanding of the natural world and its processes is fundamental to the ability to make changes to the way we currently relate to the environment (Louv, 2005). In their report on the 2007 UNESCO international workshop on *The role of early childhood education for a sustainable society*, Samuelsson and Kaga (2008, p.12) noted 'a strong consensus that educating for sustainability should begin very early in life'. While the question of sustainability lies outside the scope of this study, I believe that making connections with the natural world in early childhood is fundamental to the development of a sustainable lifestyle and concern for the future of the environment (Elliott & Davis, 2008).

Consequently, my research focuses on the very early stages of learning about, and making connections to the natural world, which I believe underpin later attitudes and understandings of ecology and sustainability.

Environmental education in the Australian early childhood sector

Environmental education in the Australian school curricula has been present since the 1970s, although it has largely remained peripheral to mainstream subject areas due largely to political reasons for maintaining the status quo and not wanting to address the political nature of environmental education (Chapman, 2004). In the early childhood field, Elliott and Davis (2009) have explored *Education for Sustainability* and found the sector has been slow to engage with this important area of learning.

Environmental education has not been part of mainstream early childhood education in the past, despite the efforts of a small number of dedicated educationalists to encourage practitioners in the field to include it in their curricula and programming (Davis & Elliott 2003; Elliott, 2003). In 2003, the New South Wales Environmental Protection Agency (EPA) commissioned a national review of environmental education in the early childhood sector (Elliott, 2003). The report, *Patches of Green*, found that environmental education occurred in isolated occurrences like:

> [G]reen patches [which] were described as 'exemplary individuals, organisations and centres that shared a passion and commitment to the

> importance of early childhood environmental education' (NSW EPA, 2003:1). These green patches were localized, disconnected, had limited support, resources or research, and were rarely acknowledged within either the environmental education or the early childhood fields. (Elliott & Davis, 2009, p. 69)

The report looked at research publications in the field, and policy at state and federal levels to support environmental education, concluding that environmental education was dependent on a few passionate individuals, limited research papers, and inconsistent education policy, and hence was described as "an emerging paradigm" (Elliott, 2003, p. 36).

Early Years Learning Framework

Since the EPA's report, environmental education has become more widely accepted as part of the early childhood curriculum. In 2012, the national curriculum document, *Belonging, being and becoming: The early years learning framework* (DEEWR, 2009) commenced implementation in all early childhood centres across Australia. Environmental education has a place in this, as described in the EYLF, emphasizing play in natural environments:

> Outdoor learning spaces are a feature of Australian learning environments. They offer a vast array of possibilities not available indoors. Play spaces in natural environments include plants, trees, edible gardens, sand, rocks, mud, water and other elements from nature. These spaces invite open-ended interactions, spontaneity, risk-taking, exploration, discovery and connection with nature. They foster an appreciation of the natural environment, develop environmental

awareness and provide a platform for ongoing environmental education (DEEWR, 2009, p. 15).

Environmental education appears in the learning outcomes with guidance towards the implementation of developing cognitive and affective appreciation of our relationship to the natural environment, and promoting sustainable practices in everyday routines (Figure 4, p.40). Edwards and Cutter-Mackenzie

BELONGING, BEING & BECOMING:
The Early Years Learning Framework for Australia (EYLF)

LEARNING OUTCOMES FOR CHILDREN BIRTH TO 5 YEARS
Outcome 2:
Children are connected with and contribute to their world.
Children become socially responsible and show respect for the environment.

This is evident, for example, when children …

- *demonstrate an increasing knowledge of, and respect for natural and constructed environments*
- *explore, infer, predict and hypothesise in order to develop an increased understanding of the interdependence between land, people, plants and animals*
- *show growing appreciation and care for natural and constructed environments*
- *explore relationships with other living and non-living things and observe, notice and respond to change*
- *develop an awareness of the impact of human activity on environments and the interdependence of living things*

Educators promote this learning, for example, when they:

- *provide children with access to a range of natural materials in their environment*
- *model respect, care and appreciation for the natural environment*
- *find ways of enabling children to care for and learn from the land*
- *consider the nature of children's connectedness to the land and demonstrate respect for community protocols*
- *share information and provide children with access to resources about the environment and the impact of human activities on environments*
- *embed sustainability in daily routines and practices*

look for examples of interdependence in the environment and discuss the ways the life and health of living things are interconnected.

Figure 4: Environmental education outcomes in EYLF (DEEWR, 2009)

(2011, p.53) consider that the inclusion of environmental education in the EYLF reflects current policy making decisions that rate this as important in early childhood learning. As the EYLF is implemented across the early childhood care and education sector, environmental education should become embedded in pedagogical practice on a national level as a mainstream area of learning.

Forest Schools, Nature Kindergartens and 'Bush Kinders'

In Germany, Scandinavia, the United States, Britain and Canada, the development of 'forest schools' or 'nature' preschools and kindergartens has been growing over the last few decades, originating in the Danish early years programme (Maynard 2007; Warden, 2012a). In Germany, official recognition of these centres as day care by the government in 1993 facilitated subsidised daycare fees, leading to the growth of over 1000 forest kindergartens in that country today (Egle, 2012). Claire Warden opened her nature kindergarten 'Mindstretchers' in Scotland in 2006, followed by a second centre in 2008 (Warden, 2012a).

Children in these programs spend large amounts of time outdoors in all weather, exploring the environment and using natural elements to construct their play. Children develop knowledge, connectedness and a sense of agency through their play, as well as skills to cope with unregulated environments and inclement weather. They learn to accept challenges and extend their abilities in dealing with an environment that offers unlimited scope for open-ended play and development (Fjørtoft, 2001; Maynard, 2007; O'Brien, 2009; Warden, 2012a). O'Brien's (2009) evaluative study of children in seven Forest Schools in England

confirms that nature learning:

- Increases self esteem and self confidence
- Improves social skills
- Contributes to development of language and communication skills
- Improves motivation and encourages concentration
- Contributes to children's knowledge and understanding
- Improves physical motor skills.

This is an impressive list of outcomes that contributes to all facets of children's development. The Forest School movement appears to be gaining momentum and interest, as educators realize the potential that this kind of outdoor education has for developing children's skills and confidence, as well allowing them to make strong connections with the natural environment (Warden, 2012a).

Australian educators also are beginning to explore the potential of nature learning for young children. The first Australian 'bush kinder' opened in 2011 in the Melbourne suburb of Westgarth. Children are dropped off at nearby Darebin Parklands (2.5 km away) by their parents to spend one three-hour session per week in the parkland with their teachers. Since its inauguration, a number of other schools and early learning centres have taken the initiative to take children out into nature to learn. In their evaluative report of the Westgarth 'bush kinder', Elliott and Chancellor (2012) mention a further six "bush and beach kinder and school" programs emerging in Australia. Their evaluation of the Westgarth program includes positive effects on children's learning, group dynamics and

relationships, play, attitudes towards and knowledge of nature. They also mention positive effects on parents, teachers and the community.

Conclusion

As we approach an environmental crisis produced by human activity of a magnitude never before encountered in human history (Flannery, 2005, 2010), our future survival as a species depends on our relationship with the natural world. As early childhood educators, we have the opportunity to 'plant the seeds' of awareness and responsibility towards the natural world in the young children in our educational services. We must act now, in the belief that this will make a difference to the ability of future generations to handle climate change and adopt sustainable lifestyles (Elliott & Davis, 2008; Samuelsson & Kaga, 2008).

Chapter 3: Drawing as a learning tool

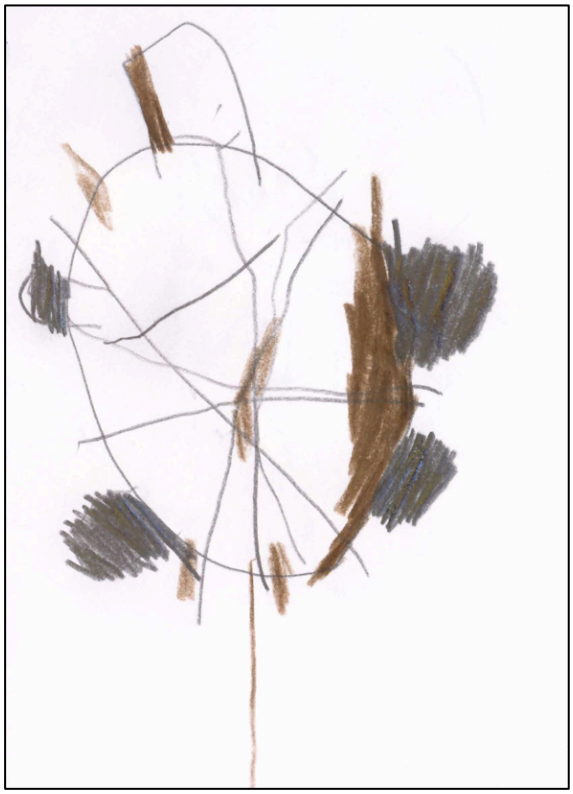

Figure 5: Dwayne (aged 4): "The turtle and the backswimmers"

Dwayne is drawing and telling a story as he goes. He draws a large round shape with criss-cross makings within it, four oval shapes extending from the sides for legs which he colours with lead pencil, and a roughly oval head at the top. A brown line is drawn from the lower end of the large shape extending to the bottom of the page. He explains: "The turtle is pooing..." Small brown patches are drawn on top of the turtle: "Those are the backswimmers. The turtle doesn't have any friends so the backswimmers come to be his friend. Backswimmers swim upside down. We caught some one day and some tadpoles." Dwayne's story and drawing intertwine to communicate an imaginative story about the turtle and also incorporates his first hand knowledge of 'backswimmers', [small water bugs of the family Notonectidae (Hadley n.d.)]. His drawing alone would not reveal the richness of his narrative, nor his experience and understanding of 'backswimmers'.

Introduction

This chapter examines the main theorists and researchers of children's drawings, from early beginnings in the late nineteenth century up to the present.

The study of children's drawings has focused in the past on stage developmental theories or development of the aesthetic sense. More recently, stage theories have been criticized as being too restricted, and researchers have turned to studying how children make meaning through graphic and other forms of representation (Anning & Ring, 2004; Brooks, 2002; Cox, 2005; Wright, 2003, 2007, 2010).

Studying children's drawings: a historical perspective

Beginnings

The drawings of children received very little attention until the late nineteenth century according to Gardner (1980). Then, as scientific interest in the development of the mind grew, researchers turned their attention to the graphic productions of children "reflecting the new preoccupation with growth and education" (Gardner 1980, p. 10). Since then, many studies of children's drawings have searched for the significance of their graphicacy, and resulted in various theories of development and meaning-making.

Hurlock and Thomson (1934) cite a number of historical studies of children's drawings, beginning with Barnes in 1893, whose study of over 6,000 drawings of children aged 6 to 16 years led him to deduce that "[f]or the young child, drawing is a language, a means of expressing ideas, in which symbols and

conventional forms are used " (Hurlock & Thomson, 1934, p. 127). From the 1890s until 1930, many studies were published, which focused on: the developmental stages of children's drawing (Baldwin, 1900; Bühler, 1930; Burk, 1902; Luquet, 1927, 1929; Shinn, 1897; Waddle, 1918; all as cited in Hurlock & Thomson, 1934); the subjects of interest that children chose to draw (Maitland, 1895; McCarty, 1924; all as cited in Hurlock & Thomson, 1934); the artistic merit and content development of children's drawings (Herrick, 1894; Thorndike, 1913, all as cited in Hurlock & Thomson, 1934); and the relationship between children's intelligence and their drawings (Goodenough, 1926, as cited in Hurlock & Thomson, 1934). Goodenough postulated a relationship between intelligence and the concepts that children were able to express in drawings, and further developed this into a test for intelligence based on drawing (Hurlock & Thomson, 1934, p. 130). From the perspective of aesthetics, the art educator Cizek (1865-1946) started the Child Art Movement in Vienna in the late 19th century, encouraging children's artistic expression and valuing the freshness of their distinctive style (Golomb, 2002, p. 48).

Stage theory in the 20th century

The theory of children's drawing development that has been most influential in the twentieth century is based on the studies of Luquet (1927, as cited in Wolf, 1997) and Piaget (1956). In the burgeoning field of child psychology, drawing was considered a reflection of cognitive development and was described as a series of stages in a linear progression from random scribbling to mature depiction of visual realism. The social context of children's drawing was ignored, as was any intent on the child's part to communicate thoughts or meaning.

Luquet: modes of representation

In 1927, the French art historian and philosopher, Georges-Henri Luquet (1876-1965), published his influential work *Le Dessin Enfantin,* in which he proposed that children used different modes of representation, starting from involuntary drawing and progressing to intellectual realism and finally visual realism. Luquet considered that children actively chose the way in which they represented their subjects from a repertoire of modes and did not necessarily progress in a linear fashion towards visual realism. He hypothesied that "we might be faced with a completely different art, yet one able to produce equivalent effects by very different means" (Luquet, 1913, p.24, as quoted in Wolf, 1997, p.189). Wolf (1997) saw Luquet 's work leading towards a different view of art and development, indicating a "vision of growth pictured not so much as a ladder of ascending stages, but as the development of a repertoire of choices" (p. 189).

Piaget: drawing and intellect

Piaget (Piaget & Inhelder, 1956, cited in Golomb, 2002, pp. 10-12) extended Luquet's work, but conceptualised the development of children's drawing as a hierarchical series of stages. Children begin with the 'scribbling' stage in which they make random marks, eventually discovering a fortuitous likeness in their drawing marks, which are then repeated. The second stage of 'intellectual realism' evolves as children attempt to draw what they know about their subject, rather than producing a drawing that is visually correct. For instance, a child will draw a table with all four legs showing, sometimes at right angles to the surface, even though they cannot see all four at once (Matthews, 1999, p. 87). In the third stage of 'visual realism', children develop the capacity to draw what they see,

using a viewer centered perspective of their subject and incorporating foreshortening, perspective and occlusion (Wolf, 1997). Piaget considered drawing as a window into the child's cognitive development, developing independently of social context as the child's intellect matures, and not as a special domain of development that develops in a dialectical relationship with cognition (Piaget, 1956, cited in Brooks, 2009c).

Together, the theories developed by these two men became established in art education for most of the twentieth century, reducing, as Matthews (1999, p. 85) notes, to a generalized 'stage' theory, whereby the child progresses from an inferior 'intellectual realism' to a superior stage of 'visual realism'. This approach to children's drawing assumes that visual realism is the highest development that art aspires to, and that children's development is necessarily linear and hierarchical in direction.

Lowenfeld: artistic expression

An aesthetic approach to children's drawing development was taken by the prominent theorist and art educator, Victor Lowenfeld (1903 - 1960), who published his most influential work, *Creative and Mental Growth*, in 1947 (Alter-Muri, 2002). Lowenfeld, after many years of research and practice in art education, theorised that children's art developed through definite stages which he described and ascribed ages to as: scribbling (2-4 years); preschematic (4-7 years); schematic (7-9 years); gang age stage (10-12 years); pseudonaturalistic (12-14 years); and period of decision (14-17 years) (Alter-Muri, 2002). Lowenfeld was very much influenced by the Expressionist Art Movement, as well

as a number of other developmental and art theorists including Froebel, Cizek, Luquet and Sully (Alter-Muri, 2002, p. 173). He advocated for free artistic expression of the child, believing that psychological and emotional health were evidenced in their art (Alter-Muri, 2002). Lowenfeld's work was an important contribution to art education and developmental theory at the time, but has since been criticised for failure to recognise cultural and social influences on children's development (which is typical of the times), as well as growing dissatisfaction among theorists with hierarchical developmental theory (Alter-Muri, 2002, p. 177).

Drawing as meaning-making

Dissatisfaction with the concept that children's drawing develops from random scribbling to pictorial realism in step with a corresponding cognitive development has led to a range of research and writing that consider alternative ways of conceptualising children's drawing. Many contemporary thinkers are approaching the dilemma from a 'meaning-making' angle, exploring how children develop understanding through mark making and visual means. Drawing is being studied in the context of children's intentions and meaning-making (Anning & Ring, 2004; Cox, 2005); narrative and gesture are being included as part of the drawing process (Wright, 2003; 2007; 2010); the function of drawing in the learning process is being studied (Brooks, 2002; 2005); Matthews (1999, 2003) proposes that children generate expressive and representational modes which express meaning and emotion; Kindler and

Darras (1997) have postulated a new model for children's development of drawing. These studies and theories are considered more fully below.

Equivalences of form

To diverge from the idea that art is a replication of reality, it is helpful to investigate the ideas of Arnheim (1969, 1974) concerning the representational theory of drawing. Arnheim, a perceptual psychologist, postulated that reality cannot be replicated, but only represented by abstract forms. Children begin to represent reality by inventing highly abstract, simplified forms - "*equivalences of form"* (Arnheim, 1969, as cited in Golomb, 2002, p. 18) - to stand for objects that they wish to communicate about. As their skill develops, the complexity of their forms increases, as does their ability to represent more complex meaning in their drawings (Golomb, 2002, p. 17). This theory supports the idea that not only form but also events and movement can be represented by visual means, as in Dwayne and Shea's drawings of the worms wriggling (see chapter 5, section 1b).

Repertoires

Another theorist who criticised the 'age-and-stage' theory was Wolf (Wolf & Perry, 1988; Wolf, 1997) who postulated that children develop a repertoire of drawing skills, and learn to use them for different purposes:

> First, in the course of development, young children generate an entire array of visual symbol systems, some based on gesture, others on pattern, and several resting on rules that permit the representation of a three-dimensional world in two dimensions. Second, different from what stage theory would predict, these varied systems do not necessarily atrophy

> once more realistic drawing systems emerge. Given a social and functional niche, these multiple graphic languages can mature (Wolf, 1997, p. 192).

Wolf argued that, rather than developing in a linear fashion towards the endpoint of graphic realism, children develop different drawing systems as distinct graphic 'languages'. These systems, given support and recognition, continue to evolve and increase the child's repertoire of drawing systems that they can use for different purposes. Kindler (1999) found her son Antoni used a range of drawing repertoires, chosen according to function (see further discussion of this study on page 54). Children are not only learning how to draw in different ways, but they also learn to actively *select* different drawing systems for different purposes. In my study, this was very evident when the drawings of individual children were compared (see chapter 5 for comparisons of drawings: Sylvie's drawings of the storm versus the moth; Dwayne's drawings of the worms versus the snowman).

From his studies of hundreds of young children's drawings and including longitudinal studies of his own three children from infancy to teenage years, Matthews (1999, 2003) concluded that children make meaningful representations of reality right from infancy. Rather than seeing early stages of drawing as 'scribbling' and random actions, Matthews argued that children develop "dynamic systems (that) guide the child's search of the environment for certain forms and relationships" (1999, p. 155). Children develop a range of expressive modes, which includes kinaesthetic, linguistic and musical forms of expression as well as image making. This theory resonates with research from

others, notably Wright's multi-modality (2003, 2007, 2010) and Kindler's interplay of gesture, language and drawing repertoires (1999).

"The hundred languages of children"

The role of drawing in children's learning has been radically re-examined within the early education philosophy and practice developed in the centres of Reggio Emilia (Edwards, Gandini, & Forman, 1998; Katz, 1998). These early childhood centres in the Reggio Emilia district of northern Italy, established in the post-war years, have developed an approach to learning that is influencing early childhood education all over the world. Their pedagogy arises from the concept of children as powerful co-constructors of their own learning, within the social context of their peers and adults. Children are empowered as meaning-makers, utilizing many different media to express and communicate their understandings in "the hundred languages of children", a term coined by the founder, Loris Malaguzzi (Edwards, Gandini & Forman, 1998, p.3). In the Reggio Emilia centres, drawing is considered a "graphic language" and is used by children to "record and represent their memories, ideas, predictions, hypotheses, observations, feelings…" (Katz, 1998, p. 28). Since the 1990s, educators in the USA, Australia and other countries have been developing pedagogical programs adapted from the Reggio Emilia approach in which drawing plays a significant role as one of the many ways that children express their understandings (Fraser, 2000; Fyfe, Cadwell & Phillips, 1998; Hendrick, 2004; Milliken, 2003).

Drawing as a learning tool: Social constructionist views

In her work and research with young children, Brooks (2002, 2005) drew on the

social constructionist theories of Vygotsky, who proposed that drawing could act as a mediator in the construction of knowledge in a similar way to language (Vygotsky, 1962). Brooks made the analogy between Vygotsky's idea of verbal thought (where abstract thoughts are put into words) and visual thought, where thoughts or ideas are perceived as images (Brooks, 2005). In her studies of preschool (age 3 to 5 years) and infants class (5 to 6 years old) children, Brooks examined how drawing operated as a "learning tool" to enable the children to make visible their ideas, thoughts and concepts. It gave them a way to document their thinking processes which allowed them to revisit and review previous work, discuss their ideas with others, revise earlier ideas and "explore and represent increasingly complex ideas" (Brooks, 2005, p. 80). These qualities of drawing as a learning tool support my research into young children's learning experiences of nature and are discussed within a Vygotskian framework in chapter 6.

Sunday (2012) further explored the role of drawing in a Vygotskian framework as a mediator in the formation of thoughts and the internalisation of egocentric speech, leading to the development of higher mental functions. Children draw in a interactive cognitive space, sharing ideas and thoughts, developing ideas, using graphicacy to facilitate dialogues. Drawing acts as a symbol system that facilitates the internalisation of egocentric speech to become inner speech and hence thought.

In contrast to earlier linear models of artistic development, Kindler and Darras (1997, p. 23) proposed a "map model", in which children's development of

pictorial representation was regarded as "a semiotic process that is affected by the sociocultural context in which it occurs and highlights links with other means of communication such as verbal and gestural language" (p.3). The authors acknowledged the importance of social context and interactions in children's artistic development, thus placing their theory within a Vygotskian framework of sociocultural development (Kindler & Darras, 1997, p. 20). According to their model, drawing developments occur in early childhood, but earlier modes do not disappear, being retained to be used when appropriate to the intent of the child. In a subsequent paper, Kindler (1999) explored some of the ways in which her nine year old son used gesture, language and various different kinds of drawing to express himself and communicate with others, choosing between different genres according to the intent of his communication. In some instances, verbal and gestural expressions were totally integrated parts of the drawing process, to the extent that the graphic end product was almost meaningless without them. Kindler cautions that "interpretation of an image produced by a child will often be incomplete or sometimes even misguided if it is based solely on examination of pictorial evidence" (p. 346). In my research, I found that children used a range of repertoires, and their drawing was embedded in the social learning context of the nature study group. Gesture and dialogue were almost always an important part of the drawing process.

Multi-modality

Wright (1997, 2007, 2010) has researched and written about children's creativity and multi-modal learning for well over a decade. In a research project involving children aged from four to eight years, Wright (2010) focused on

young children's creativity and their multimodal ways of making meaning and communicating with others. Her interest lay in recording the kinaesthetic and verbal expression that occurs simultaneously as young children draw, concluding that "(t)alk, drawing and movement are parallel and mutually *transformative* processes - they enrich and inform each other" (p. 170). By observing children as they create using integrated modes of expression - graphic, narrative and embodied - we, as educators, can get a glimpse into how they are thinking, feeling, imagining and representing their ideas. Wright (2010) concluded that "(m)eaning-making through visual narrative is a highly creative and 'fluid' process, where children become authors using multiple texts, combining graphic, verbal and embodied modes" (p. 23).

Context and conversations

Researching children's perspectives while engaged in drawing, Einarsdottir, Dockett and Perry (2009) concluded that spoken narratives accompanying the drawing process are integral parts of the communication and meaning making that children are undertaking. They researched drawing as a way for 4 to 6 year old children to express meaning and feelings about the transition from preschool to school, recording their narratives as they drew. The authors stressed that the children's narratives and drawings combine to convey meaning, and together provide access for others to understand their process of constructing meaning. Similarly, Coates and Coates (2006) found that young children, aged three to five years, drawing together in pairs, engaged in much discussion while creating their drawings. Talk was related to subject matter, story telling, social discourse and interaction with adults. Often the discussion influenced the direction and content

of the drawing. The authors conclude that much is to be gained by educators observing the production of drawings and listening to accompanying narratives to inform their assessment of children's capabilities.

In the UK, Anning and Ring (2004) studied the development of drawing and meaning-making in a small group of children (age range three to five years) over a period of three years from nursery (pre-school) through their reception year at school into the first year of formal schooling. They looked at what influenced the children's drawing behaviours and the role of significant others in their lives in influencing their drawings. They concluded that "(m)aking drawings gives young children opportunities to represent intricate personal narratives and use them to communicate with significant others in their lives" (p. 117). The authors showed how children's meaning in drawings is often ignored, particularly in school contexts, and drawing is commonly neglected as a form of symbolic representation or communication in favour of written expression. My method of data collection using video recording, allowed me to capture the conversations, gestures, movements and expressions that were contextual to the drawing process. Thus, the children's drawings were analysed in this wider context, allowing me as the researcher to gain greater understanding of the children's learning and thought processes that occurred as they drew.

Intentionality

Through her research in a UK nursery class with children (aged three to four years), Cox (2005) developed a case for the intentionality of children's drawing, focusing on drawing as a meaning-making process and providing an alternative

to the long held view of children's drawing as a series of developmental stages. She argued that children's drawings must be interpreted in the context in which they were produced, including the accompanying talk, the intentions or purposes, and other activities surrounding the process. Children use a repertoire of marks and symbols purposefully, in order to construct meaning and make sense of their experiences. Thus, children's drawings cannot be construed as deficit or undeveloped productions of pictorial reality, but must be considered as a way of making sense of the world and constructing meaning. Cox (2005, p. 122) considered that children's talk that accompanies their drawing is "an interplay of different ways of meaning-making"; drawing can be thought of as "a form of language, which carries meanings in ways which are semiotically specific to it".

An artist's observations

As a visiting artist to several child care centres in Sydney, Australia, Kolbe (2005) explored how young children (aged from two to five years) engaged in drawing for a range of purposes. Some of the drawing events were part of investigations of natural phenomena such as ants and flowers. She based her conclusions on direct observations of the children at work and recorded conversations of children with adults and peers as they drew. Her insightful interpretations of children making meaning through their visual representations bear out much of what other investigators have found (Cox, 2005; Wright, 2003, 2007, 2010). Her documentation focused on the processes involved in drawing:

- drawing is an extension of physical action,
- storytelling and drawing are interwoven and support each other as the narrative unfolds,

- children develop and employ different drawing strategies for different purposes in their meaning making,
- the intents and purposes of children's drawings determine how a drawing is made, not as an representation of reality (Kolbe, 2005).

In my study, I, too, made similar observations of the different strategies and intentions children employed in their drawings, which are discussed in chapter 6.

Children drawing nature

The method I employed in my study encouraged children to observe, draw, hypothesize and dialogue as ways to construct meaning (Brooks, 2005). Although many early childhood centres and primary schools are returning to 'nature study' in the tradition of the inspirational founder of the kindergarten movement, Friedrich Fröbel (1782-1852) (Wilson 2008), little has been researched about children's experiences of drawing from or about nature. Most environmental education or nature study programs seem to focus on observing local flora and fauna, or collecting items for 'nature tables' (Sykes, Greensmith, & Bullen, 2008), gardening (Bower, 2009; Hachey & Butler, 2009), sustainability (Davis, 2010; Kinsella, 2007) and nature based play as in the Forest Schools of the United Kingdom and Scandinavia (Warden, 2012a), and the recently emerging 'bush kinders' in Australia (Elliott & Chancellor, 2012). A development that is exceptional to this trend is occurring in the Scottish 'nature kindergartens' that Warden has established, where 'talking and thinking floorbooks' are used in conjunction with outdoor 'nature play' as a method of documenting learning, exploring ideas, consulting and planning experiences with the children (Warden,

2012a, 2012b). Drawing is a strong component of the documentation occurring, as is the dialogue that occurs between children and with adults.

In discussing the value of nature journals for adults, Leslie and Roth (2003) advocate learning to draw from nature as a source of many important skills. "Nature journaling, by helping learners become observant or immersed in, and reflective on, the world around them, sets the stage for life-long self-learning from primary sources" (Leslie & Roth, 2003, p.196). Nature journals were created collaboratively by adult facilitators and young children at a series of art and nature workshops, held in the Yarra Ranges Shire in Victoria, Australia. The workshops "... sought to connect art and environment to personal, meaningful experience and to develop and express a sense of place and wellbeing through art" (Burke, 2005, p. 11). The journals which recorded children's graphic work and personal insights during the workshops, made the children's learning visible, shared insights and informed future projects. The journals were:

> (n)ot so much a scientific record than a way of recording and expressing place through different lenses and world views, these nature journals created a 'seeing eye' that would allow people to slow down their viewing, spend time in the natural environment, and begin to see and listen to the world around them (Burke, 2005, p.11).

Although not specifically focused on children's meaning making, the journals functioned in a similar way to the children's drawing events in my study.

Gap in the literature

The literature reviewed covered many aspects of contemporary thought concerning children's drawing. There appears to be an increasing number of studies of young children engaging in drawing, but I was unable to locate any research that specifically studied young children's drawing of the natural world, although several studies looked at primary and secondary school children's interpretation of, or relationship to the natural environment (Alerby, 2000; Kalvaitis & Monhardt, 2012). Few researchers are interpreting children's drawing within a Vygotskian framework, the exceptions being Brooks (2002; 2005;2009b; 2009c), Kindler and Darras (1997), Sunday (2012) and the Reggio Emilia pedagogues (Edwards, Gandini & Forman, 1998).

In my analysis of the children drawing and learning in my study, I draw on the work of many contemporary researchers and theorists. I use the ideas of intentionality (Cox, 2005), repertoires (Wolf & Perry, 1988; Wolf, 1997), equivalences of form (Arnheim, 1969, 1974) and multi-modality (Wright, 2007, 2010). I situate the children's learning in a Vygotskian framework with reference to Brooks (2002; 2003a; 2005; 2009c), Kindler and Darras (1997; Kindler, 1999) and the Reggio Emilia pedagogues (Edwards, Gandini, & Forman, 1998). I analyse the children's drawing process as a means of developing thought and higher mental functions. The importance of conversation and context is also considered in the analysis of my data. I have included the children's voices in my thesis so there are long transcripts of conversations that occurred in the drawing

and learning context.

Drawn to nature

By researching children's use of drawing as a tool for learning about the natural world, I hope to highlight the significance of this activity in supporting young children's understanding of and engagement with nature. I have a passionate belief that children need encouragement and opportunity to make an affective connection with nature in their early years. I wanted to support this emotional connection with cognitive learning in which drawing played a significant role as a way for children to make meaning from their experiences.

My study took into account previous research of meaning making, drawing in context, drawing repertoires, and drawing as learning tool. My approach was to design a method of working with children where the connection between their experience of nature and their explorations, discoveries, discussions, thoughts, dialogues and meaning making could be observed and documented with a view to discovering what role drawing played.

Chapter 4a: Theoretical framework

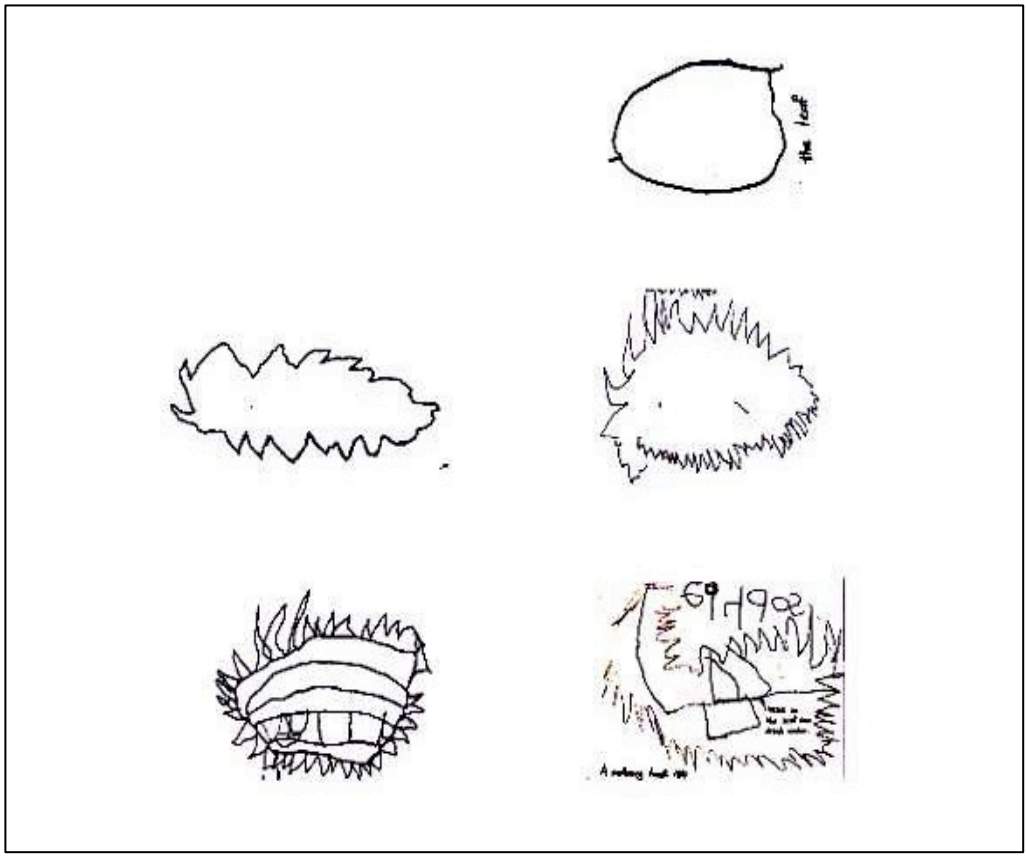

Figure 6: Sophie (aged 4 years, 9 months): Leaf drawings

"In these series of drawings Sophie had learned a great deal about leaves through her observation and drawings. She had started with a general idea of a leaf as having a roughly circular shape, progressed to observing and recording the serrated edge, and finally discovering the veins within the leaf. In her final drawing, she has automatically included the veins and refined her knowledge of the way they are arranged in the leaf. Being able to repeat her drawings and add more accurate details each time allowed Sophie to develop a greater understanding of how leaves function and gave insight into her thinking. Two weeks later, she had internalised the concept of leaves having veins and included them automatically in her drawing. This is an example of a child developing scientific thinking (Vygotsky, 1962) and starting to form concepts about leaves." (Heckrath, 2006)

Introduction

This chapter considers epistemological questions: the concept of the child and how children learn. Theories of learning and development are briefly discussed. My epistemological stance and my interests and background are described to position me as the researcher. The aim of the study and research questions arising from the literature review are stated. A theoretical framework with which to research the questions and analyse the data is proposed. An example of a child's drawing event is examined and analysed in the light of Vygotsky's theories of learning and development.

Epistemology

Concept of the child

How we view children and childhood is a construction of society influenced by economics, pedagogy, and social and political forces. Dalhberg, Moss and Pence (1999, pp. 44-49) describe a number of differing constructions: the child as knowledge, identity and culture reproducer; the child as an innocent; the child as nature; the child as labour market supply factor; the child as co-constructor of knowledge, identity and culture. The idea arising from Locke (1632-1704) of the child as *tabula rasa* (or blank slate) who needs to be filled with knowledge by teachers has been largely replaced in early childhood pedagogies by the concept of the child as co-constructor of knowledge where learning occurs in interactions with others (Dahlberg, Moss & Pence, 1999; Vygotsky, 1962; 1997). Many early childhood pedagogues and practitioners are basing their ideas of children on the socio-constructivist principles of Russian psychologist and educator Lev

Vygotsky who theorised that the child constructs knowledge in the social and historical context of their home and community (Berk & Winsler, 1995; Bodrova & Leong, 1996; DEEWR, 2009; Vygotsky 1997). The philosophy and practice of the centres of Reggio Emilia in Italy have become a strong influence on the early childhood profession in Europe, America and Australia. Their pedagogy arises from the concept of the child as "rich in potential, strong, powerful, competent and, most of all, connected to adults and other children" (Malaguzzi, 1993, p. 10).

My own pedagogy is based on the concept that children construct their own knowledge through social interactions with adults and peers, and through dialogic interactions with artifacts and materials in their environment. In this study, learning from personal interaction with the environment occurred as children explored, discovered and observed aspects of nature. Higher learning took place in the interpersonal social space of discussion, sharing and developing ideas. This built on the spontaneous concepts of experience and led to internalisation of ideas (Brooks, 2005; Vygotsky, 1962).

My study aimed at exploring how such learning occurred in a preschool context and focused specifically on the role that drawing played in children's learning through exploring and interacting with nature. My research questions were best suited to be studied qualitatively within a post-modernist, 'social constructionist' paradigm, within which it is considered that we all, including young children, have "responsibility for our own learning and meaning making" (Dahlberg et al., 1999, p.50). Children are considered powerful, resourceful co-constructors, with adults and peers, of their own knowledge within a social and historical context.

Theoretical framework

The theoretical framework that I have chosen within which to analyse my research findings is social constructionism, which originated in the work and theories of Vygotsky. Social constructionism has become an influential theory in pedagogy since Vygotsky's work was introduced to the West in the 1960s and further developed by many other researchers, psychologists and educators. Since the 1990s, the Vygotskian approach has been developed and become embedded in early childhood pedagogy (Berk & Winsler, 1995; Bodrova & Leong, 1996; Bredecamp, 1997; Edwards et al., 1998).

My study involved children using drawing as a mediator in their learning about nature. Drawing can be used in a similar way to language to externalise thought and to make a visible and concrete artefact in which thoughts and ideas can be viewed, reviewed, communicated and shared with others (this concept is discussed more fully in chapter 6). Throughout the study, the children's learning process also involved engaging in dialogue with peers and adults in the social context of the preschool. As the children observed and interacted with natural phenomena, they were developing spontaneous concepts from their experiences. Overall, I aimed to document children constructing meanings about the natural world. All aspects of my study could be encompassed within the framework of social constructionism.

What is social constructionism?

Social constructionism, based on the developmental learning theories of Vygotsky, proposes that children are active participants in the construction of

their own knowledge and understanding, and that learning occurs in a social, cultural and historical context. Knowledge is built collectively by individuals, who share their previous knowledge and expertise in order to construct and negotiate meaning (Wink & Putney, 2002, p. 12). Learning first occurs in the social context, that is, between participants on the *interpersonal* plane and is then internalised by the child (or learner) on the *intrapersonal* plane (Wink & Putney, 2002, p. xxi).

Vygotsky believed that learning is mediated by cultural and historical artefacts or tools, the primary one being language, but he also included drawing, visual images, maps, symbols, algebraic and number systems (Vygotsky, 1962, cited in Brooks, 2006, p. 53). Language plays a central role in thought development: "language, the primary cultural tool used by humans to mediate their activities, is instrumental in restructuring the mind and in forming higher-order, self-regulated thought processes" (Berk & Winsler, 1995, p. 5).

Who was Vygotsky?

In his unfortunately short life, Lev Vygotsky drew on a vast range of interests, reading and research to develop a new, unified psychology of learning and development for the Russian Marxist society emerging from turmoil of the 1914 revolution (Wink & Putney, 2002, p. 21). He was initially an educator, teaching literature, history, philosophy, psychology and pedagogy, before moving to the Psychological Institute in Moscow in 1924, where he researched and wrote predominantly about child development and learning, until his death in 1934. Vygotsky's theories were in direct opposition to the behaviourist tradition of

Pavlov and consequently, in the increasingly oppressive regime of Stalin, his works were repressed soon after his death and not released for twenty years (Wink & Putney, 2002). His research was carried on after his death by two colleagues, Luria (1902-1977) and Leont'ev (1904-1979) (Berk & Winsler, 1995) and later by a growing number of researchers around the world. In 1962, his major work *Thought and Language* (Vygotsky, 1962) was translated into English, but was not immediately accepted by Western educators, due to the great influence of Piaget and behaviourist perspectives on developmental psychology at the time (Berk & Winsler, 1995, p. 7).

Learning and development: Piaget versus Vygotsky

The two most influential child development theorists in the twentieth century were Jean Piaget (1896-1980) and Lev Vygotsky (1896-1934). Their theories both consider the child as actively constructing knowledge from concrete experiences but differ in the way they conceive the relationship between learning and development (Wink & Putney, 2002). Piaget based his theories on observations of children's experiential learning from their interaction with the physical environment, from which he deduced that children construct knowledge. Piaget, however, believed that development of thought and knowledge was influenced by the child's maturation process, determined by genetic inheritance. In other words, development leads learning. According to Vygotsky, the child, in a supported social context, learns first on the interpersonal level where concepts and ideas are processed between individuals, and then these are internalised by the child as knowledge. Development has taken place, led by learning (Wink & Putney, 2002).

Vygotsky's theories

Bodrova and Leong (1996, p. 8) have summarised four basic principles of Vygotsky's theories:

1. Children are active participants in the construction of their own knowledge.
2. Development cannot be separated from its social and historical context.
3. Learning and development are in a dialectical relationship each influencing the other - learning can lead development.
4. Language plays a central role in mental development.

These principles will be discussed and their relevance to my study demonstrated by way of an example event that occurred some years earlier than the current study (Figure 7, p. 73).

1. Children construct knowledge

According to Vygotsky, children are active participants in the construction of their own knowledge. He differed from other constructivists, such as Piaget, by including the social and historical contexts as mediators of learning. Children need, not only the physical exploration that Piaget assumed led to learning, but also socially mediated learning with peers and adults, as well as socially constructed artefacts such as language, books, number systems and other symbols. In her study of young children's drawing processes, Brooks (2002) built on Vygotsky's work and hypothesized that drawing can also function in this way as a mental tool for sharing meanings with others, thus making ideas visible in a way that the child can revisit, manipulate and refine.

2. Development cannot be separated from its social and historical context.

A child's learning is shaped according to his/her historical experience of the thought or concept under investigation. The social context influences how and what we think (Bodrova & Leong, 1996, p. 9). Cognition is first a shared process between people, wherein they negotiate meanings together before new learning is internalised:

> For Vygotsky, all mental processes exist first in a shared space, and then move to an individual plane. The social context is actually part of the developmental and learning process. Shared activity is the means that facilitates a child's internalisation of mental processes. (Bodrova & Leong, 1996, p.12)

Learning is influenced not only by the immediate social context, the people with whom the child is interacting at the moment, but also by wider influences of family, school, and the general cultural or social background, which includes language, number systems and other cultural artefacts (Bodrova & Leong, 1996, p.9). These ideas were further extended by Bronfenbrenner (1979) whose "ecological systems theory" described layers of influences on a child's life extending outward from the close relationships within family (microsystem) to broader and more distant effects of the individual's culture, society and government (macrosystem). Included in the model are the relations between contexts (mesosystem) and also links between the individual's context and other settings in which they do not have a direct role but which still influence the individual (exosystem). Rogoff (2003) extended Bronfenbrenner's (1979) ideas, emphasising the processes involved in human activity and development.

3. Learning can lead development.

Vygotsky (1962) identified what he termed *the zone of proximal development* (or *ZPD*), which is the space between what a child can do with support and what he/she can do independently. He reversed Piaget's hypothesis that children learn when they are developmentally ready. His theory proposed that learning leads development and is embedded in the social and cultural context, depending on support and co-operation of adults or more able peers to scaffold the child's learning (Vygotsky, 1962). Learning that occurs in a supported social context (*inter*psychological) is then internalised on the *intra*psychological plane (Wink & Putney, 2002, p.91).

4. Language plays a central role in mental development.

Vygotsky theorised that language in humans, as distinct from vocal communication in other animals, enabled us to develop thought and higher mental functions (Vygotsky, 1962). Language and thought develop in tandem, each influencing the other. As the child develops, language is used to construct thoughts, developing through the stage of egocentric speech to become inner speech in which thoughts are given form. Concurrently, as thoughts emerge, the child becomes more able to express them in external language (Vygotsky, 1962). Language is itself a generalisation of the external world - learning word meanings is about learning to generalise and form abstract concepts (Vygotsky, 1962). Language becomes a means to allow thinking to become "more abstract, flexible and independent from immediate stimuli" (Bodrova & Leong, 1996, p. 13). In Vygotsky's (1962) words:

> The relation between thought and word is a living process; thought is born through words. A word devoid of thought is a dead thing, and a thought unembodied in words remains a shadow (p. 153).

My study shows that drawing can function in a similar way to language by giving form to thought and dialectically allowing ideas and thoughts to develop within a visible, concrete medium.

Developing spontaneous and scientific concepts

Vygotsky (1962) further considered that children's experiences in the physical world allow them to develop spontaneous concepts about their environment which then come into contact with scientific concepts learned at school. Children progress through different stages of concept development, beginning with very early generalisations that occur in language development ('dog' is a generalisation of all the dogs that a child knows). In the preschool and school years, children develop 'complexes' which are generalisations based on attributes, but not yet abstract concepts. True concept formation only develops around puberty (Vygotsky, 1962). A child develops concepts from perceptions and experiences of his or her world, which Vygotsky termed "spontaneous concepts" (1962, p.84). These are largely unconscious in early childhood - the child is not aware of the concepts (s)he has acquired and is unable to define them or operate with them. "Scientific concepts" on the other hand are acquired through formal learning, starting from an abstract idea or generalisation and gradually working down to the level of the everyday (Vygotsky, 1962). Scientific concepts work from 'the top down', organising the spontaneous concepts into the more categorical ideas of the scientific concepts; for example, 'tree' is no

longer just one general tree but part of a whole genre of plants with its own specific category and attributes (Vygotsky, 1962). Spontaneous concepts work in harmony with scientific concepts, creating an experiential path for their subsequent development (Wink & Putney, 2002, p. 94). These two forms of concepts operate in a dialectical relationship with each other - scientific concepts give form and understanding to spontaneous concepts, and spontaneous concepts underpin the understanding of scientific concepts.

How Vygotsky's theories relate to my study

In order to inform the reader of how I used the above framework in my study, I shall demonstrate how a Vygotskian social constructionist approach can be used to analyse a drawing process that occurred in a previous study that I undertook for my Bachelor of Education, which is described earlier in the chapter. One of the children engaged in observing the silkworms made a series of drawings of leaves, which is described below.

Analysis of a drawing event

This analysis relates to the series of drawings in Figure 6, page 62. The first four drawings were executed in succession in one drawing episode; the last drawing was done several weeks later. My initial observations and analysis appear in italics; my current analysis using a Vygotskian framework appears in square brackets.

Figure 7: Analysis of Sophie's leaf drawings *(Heckrath, 2006).*

Sophie's leaf drawings

5th September, 2006: Sophie and I were both engaged in drawing the newly hatched silkworms on a mulberry leaf. She concentrated on her drawing but occasionally watched what I was doing too.

[In this social context, Sophie and I were sharing the process of observing and drawing. In our own ways we were making meaning of what we observed, using drawing as a mediator.]

Her first drawing of the leaf was a simple roundish shape drawn in felt pen with a small projection at one end probably representing the stalk. After watching me drawing she changed to using a lead pencil and redrew the leaf showing many large indentations around the edge.

[Sophie was influenced by the social context; that is, by my presence and the way in which I represented the silkworms, resulting in her modifying her drawing process.]

Then she turned the paper over and drew a very large leaf with many more indentations around the edge. She was still not satisfied with this representation and started again to one side of the large drawing.

[Sophie was reviewing her drawing to better represent what she was observing. There was interplay back and forth between her observations, her mental image of the leaf and her drawing.]

First she drew a roughly oval shape and added the leaf's serrations around the edge of the outline. Then she drew four vertical parallel lines from a point at the bottom of the leaf. Finally she added some horizontal lines between two of the vertical

lines. When I asked her what she had drawn, she pointed to the veins on the leaf she was observing.

[Sophie had observed the leaf veins but did not have any scientific concept to explain what they were.]

She did not know what they were called or what their function was. I told her and we discussed the way that the tree draws up water from the ground into its leaves through the veins.

[Social mediation occurred - with me as the more knowledgeable adult using a scientific concept to explain the veins' functions to Sophie.]

The same week the children did an experiment with flowers set into jars of different coloured dyes and observed the colour changes in the petals and leaves. This tied in well with Sophie's investigations of the mulberry leaf and she was able to tell me that the flowers were 'drinking' up the coloured water.

[Learning had become internalised on the intrapersonal plane. Sophie was starting to develop a scientific concept about plants' transpiration.]

19th September, 2006: Two weeks later Sophie was again observing the growing silkworms. She drew a mulberry leaf as a large shape with a serrated edge, a central vein running down the middle and lateral veins from the central one to the edges of the leaf. All this was executed without any prompting or encouragement from me. When asked, she explained that the lines within the leaf were 'veins so the leaf can drink water'.

[Sophie could now draw a leaf with veins and explain what they were, indicating that development had taken place.]

In these series of drawings Sophie had learned a great deal about leaves through her observation and drawings. She had started with a general idea of a leaf as

having a roughly circular shape, progressed to observing and recording the serrated edge, and finally discovering the veins within the leaf. In her final drawing, she had automatically included the veins and refined her knowledge of the way they are arranged in the leaf. Being able to repeat her drawings and add more accurate details each time allowed Sophie to develop a greater understanding of how leaves functioned and gave insight into her thinking. Two weeks later, she had internalised the concept of leaves having veins and included them automatically in her drawing. This is an example of a child developing scientific thinking and developing a concept of a leaf (Vygotsky, 1962). Sophie was then able to make the connection between the leaf 'drinking' and the cut flowers 'drinking' up the dyed water, thus demonstrating higher levels of thinking by being able to move from the more abstract concept back to the object (Vygotsky, 1962) (Heckrath, 2006).

According to my epistemological view of children's learning, and the subtle nature of my investigation, my choice of methodology and research methods were crucial to the outcomes of this study. The following chapter describes the choices I made and gives the rationale for my decisions.