Chapter 6: Linking to theory

Figure 25: Sylvie (aged 4 years, 10 months): "They’re family frogs."

Sylvie is making a book of drawings of frogs and tadpoles. She started with tadpoles hatching and growing bigger. Now she is drawing speckled frogs. 
"Here’s the mummy frog...and the little baby frog with his little tiny legs. He used to be a tadpole and he growed into a frog - a little tiny frog.
And here is the daddy frog."
Sylvie carefully adds some letter-like symbols at the top of the page.
I ask her: "And what does this writing say?
Sylvie replies: "'I love my family'. And here is the sister one. The mum and dad frog have lots of kids and they love them so much. They look after their babies and they eat some flies for dinner.
They’re family frogs and they love each other; they be family and they love their two brothers and sisters and babies."

Sylvie is constructing a concept about frog families. At this stage she is basing her concept on what she knows about human families. She has yet to understand frogs from a scientific concept (Vygotsky, 1962). Her drawings (and 'writing') help her to explain her ideas.
Introduction

In this chapter, I analyse the drawing events described in the previous chapter primarily from a Vygotskian perspective, looking for evidence of children constructing knowledge in collaboration with others and using drawing as a mediator of learning. I understand drawing to be a cultural artefact that enables children to externalise their thoughts and make visible their learning. The analysis draws on the social constructionist theoretical constructs (outlined in chapter 4a) that:

- children are active participants in the construction of their own knowledge,
- development occurs in social and historical context,
- learning can lead development,
- language plays an essential role in development of thought and higher mental functions,
- spontaneous and scientific concepts develop in tandem in a dialectical relationship.

(Bodrova & Leong, 1996; Berk & Winsler, 1995; Vygotsky, 1962; Wink & Putney, 2002)

My analysis further draws on more contemporary theorists who have extended Vygotsky's work. I describe the occurrence of negotiated meanings that the children developed, based on the theory of intersubjectivity developed by Wertsch (1985, cited in Wink & Putney, 2002, pp. 128-129). The concept of intertextuality developed by Broome and colleagues (Bloome, 1989; Bloome &
Bailey, 1992; Bloome & Egan-Robertson, 1993; all cited in Wink & Putney, 2002, pp.133) is employed in relation to the children sharing knowledge and ideas. The idea of *consequential progressions*, conceptualised by Duran and Szymanski (1996, cited in Wink & Putney, 2002, p. 136), is used to describe some of the children's ideas which were built on and continued into future discourses.

My analysis draws on other theorists in the area of children's drawing development to link observations from my data to more specific theories concerning learning and meaning making. I use the constructs of intentionality (Cox, 2005), repertoires (Wolf, 1997; Wolf & Perry, 1988) and strategies (Kindler, 1999; Kindler & Darras, 1997) to analyse the differences evident in the children's drawings. I also analyse the context in which the children produced their drawings, including their gestures, dialogue and movements with reference to the theories of Wright (2003, 2007, 2010), Kindler (1999) and Kress (1997) concerning the multi-modal expression involved in children's graphic productions. I link the children's pictorial productions to Arnheim's (1969, 1974) theories on "*forms of equivalence*" and representation of reality. Much of my analysis reflects the work of Brooks (2002, 2003b, 2005, 2009b) in the area of children using drawing as a mediator for ideas and learning.

I shall explore my findings in the light of my research questions for this study, which 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
The analysis will be informed by further sub-questions:

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, gesture)?

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?

**Ideas, knowledge and understanding expressed through drawing**

**Research question 1: In what ways do children use drawing to express their ideas, knowledge and understanding of the natural world?**

During the study sessions that I had with the children, drawing was an integral part of the learning processes that were occurring. Drawing was just one of the elements of the process of connecting with nature which also involved dialogue, discovery, thinking, action, learning, research, cognitive and affective development. Drawing allowed children to explore their new understandings and experiences. Drawing sustained their interest and acted as a mediator between their experiences and ideas or thoughts.

The most remarkable finding from my data was the variety of ways that children used drawing in the course of the study. Different children drew in different
genres and styles, as was to be expected, but some children employed different ways to draw at various times and for various reasons. It was clearly evident that children had different intentions and employed various drawing strategies. Within my focus group the children used drawing to express movement (wriggleness of worms), realism (Emperor Gum moth), imaginative or fanciful ideas (snowman eggs), record scientific data (magnifying glass, light and fire), narrative (storm) and communicate information (froglet tail).

**Intentions and strategies**

**Sub-question 1.1: What are the different intentions and strategies that children use in their drawings?**

The developmental theory that drawing 'progresses' in a linear fashion towards pictorial realism and is tied to cognitive functioning has had many critics since it first surfaced. Studies of the differing strategies and intentions children use in their graphic productions (Cox, 2005; Kindler, 1999; Wolf, 1997; Wolf & Perry, 1988) have contributed to an alternate view of drawing as meaning making, through which "children purposefully bring shape and order to their experience, and, in so doing, their drawing activity is actively defining reality, rather than passively reflecting a 'given' reality" (Cox, 2005, p. 124).

Wolf (1997; Wolf & Perry, 1988) has suggested that children learn different ways to represent the world and their ideas, but rather than each being superseded by a more 'developed' drawing style, these systems are retained as an array of drawing strategies (Wolf, 1997, p. 192). As each new form appears, older renditions do not disappear but may evolve as distinct drawing systems, each
with its own set of rules and "each characterized by different rules about the kinds of information to be recorded and the most powerful or satisfying ways to make those records" (Wolf & Perry, 1988, pp. 19-20). From as early as twelve months old, children develop repertoires of graphic production which, if encouraged, develop into differing skills of realistic drawing, map-making, diagrams, cartoons, and other aspects of adult visual literacy, each with its own rules of production, information content and appropriate application (Wolf & Perry, 1988; Wolf, 1997). Kindler (1999) also discusses children’s different repertoires in drawing:

Various pictorial repertoires are guided by different purposes, require different skills and abilities and engage different cognitive processes...

Some repertoires benefit from imagination and require creative invention, while others depend on learning rules, norms, and conventions. Some can be fostered and developed through encouragement and gentle scaffolding, while others require direct and focused instruction. Some have roots in curiosity, and come about through active discovery and construction by a child, while others require cultural models that need to be socially transmitted, understood, and internalized (p. 345).

In a study of her nine year old son’s graphic productions, Kindler (1999) analyzed his drawings with regard to the intention of his communication. She showed how each differed in style and content according to the information it needed to convey.

The following section examines some of the children's drawings, analysing their intentions and the drawing strategies that they have used. In the first two
examples, I compare two drawings from each of two children (Dwayne and Sylvie) where they have employed different drawing strategies because their intentions in each case were different. The last two examples explore graphic play and graphic communication.

**Gestural representation versus graphic information**

Wolf and Perry’s (1988) ideas were borne out when I compared several sets of drawings from the same children. When Dwayne drew the wriggling worms (figure 10, p. 110) using vigorous circular scribbling motions, complete with sound effects and body movements, his intention was to depict extreme movement, so he chose to use a drawing strategy that would incorporate motion. He did not draw the body of the worm, he drew its movement over time. In a similar vein, Wolf and Perry (1988, p. 20) describe a child drawing a looping line across the page to illustrate the movement of a car driving along, ending in a tangle of lines and crash noises and accompanied by the utterances "Car going, going, going - CRASH!". In his later production of the snowman with his eggs, Dwayne used a realistic drawing system to depict the snowman with well-formed body and arms, facial features, hair and fingers. In this drawing the snowman was not active as the wriggling worms had been, but Dwayne, as creator and narrator, told a story about the snowman and his eggs.

**Narrative versus documentation**

Similarly, I was able to observe how Sylvie used different drawing systems (figures 14 - 20, pp. 120-124). In her visual and spoken narrative about the storm, her two initial drawings were fairly detailed but subsequent ones became
very sketchy and were made very quickly, utilising a shorthand way of visually reminding her about the events of the storm. A later drawing from observation of the Emperor Gum moth (figure 22, p. 127) was executed carefully in a detailed and realistic manner, taking a lot longer to produce and was obviously of value to her as a product, because she asked me if I could reproduce it for her. Wolf and Perry (1988, p. 28) note that:

(D)rawings made from direct observation show that children as young as five, who typically make relatively spare drawings from memory, can also create highly detailed renditions, concerned with idiosyncratic volumes, textures, and proportions.

I compared her drawing of the moth (figure 22) with that of a cow done from memory as part of the storm sequence (figure 20) and found a similar result to that of Wolf and Perry (1988). Likewise, Cox (2005, p. 121) maintains that children use more visually realistic ways of drawing when it is appropriate to their purpose and more 'economical' modes as in Sylvie’s sketchy drawings of the storm narrative.

As Sylvie drew the pictures of the lightning and rain, she started to tell me the story of what had happened. Her initial drawings were fairly detailed and drawn at a steady pace, but as the story unfolded and became more complex, her rate of drawing quickened, becoming spare in detail and connected intimately with the verbal narrative. At times it seemed as if the act of drawing was leading the verbal story, which suddenly changed direction as the act of drawing stimulated another memory (cow in the garden, figure 19) and led her thoughts to another sub-narrative. At this point the drawing was leading the narrative; there was a
connection between the process of drawing, stimulation of memories, and thoughts processing the memories of the storm. This produced a stream of ideas expressed in words and drawing to form a cohesive narrative about the storm. Ideas and speech were driving the pace of the drawing so that apart from the first drawing the subsequent ones were very quickly and roughly produced with little detail. In contrast, her drawing of the Emperor Gum moth was completed slowly with many references back to the moth and little verbalisation as she drew, apart from describing what she was drawing.

**Graphic play**

Many of the children’s drawings combined details observed from their study of creatures with imaginative constructions. One drawing in the focus group played with ideas of eggs and reproduction in a novel way - Dwayne’s drawing of the snowman and his eggs (figure 12). Researchers such as Cox (2005), Hopperstad (2008), and Wright (2007) have shown that children play with ideas in their drawings, trying out their ideas in playful and humorous ways. In her observations of nursery children involved in the processes of drawing, Cox (2005, p. 121) mentions jokes that children made with their drawings and reflects on the power that children have to create "new realities" as they draw:

...(C)hildren can recognise the power of representation and the power of drawing to represent, and on the other hand, that they, themselves, can be in control of this. The children explore the process through playing with possibilities, not only through representing their idiosyncratic ideas but also in subverting 'reality' and, in effect, creating new realities (Cox, 2005, p. 121).
I interpreted Dwayne’s snowman with eggs as a humorous play of ideas, as he admitted that snowmen do “not really” have eggs. Dwayne has a very active and creative imagination and a well-developed sense of humour. As this drawing appeared with no antecedents that I had observed, I concluded that it was all his own idea. It was interesting to me that the ensuing discussion was not about eggs and reproduction but about life/death and brought up some interesting ideas (see discussion chapter 5, pp. 114 - 116). Children at this age have very fluid boundaries between observation and imagination and are not bound by the rules of different genres as older children and adults are. Hence their drawings happily incorporate a mix of observation and fiction, or their interpretation of the real world with creations of their imagination (Katz, 1998, p. 35). Sunday (2012, p. 5) describes this ability:

...(C)haracteristics of play, like characteristics of drawing, situate it as a space of transformation. Play, including graphic play, provides opportunity to mentally manipulate and organize experiences, thoughts and actions for the purposes of internalization and connection with others. Playing provides children with opportunities to select, appropriate, and integrate (sometimes) disparate ideas in a mixture of realities of both fact and fiction for their own purposes of creating meaning and sense of their world.

In this example, we can clearly see Dwayne playing with ideas in a humorous and fanciful way, combining reality and imagination in his own creation.

**Graphic communication**

Drawing can communicate ideas to others and is one of the basic reasons for all graphic production in our society. Children can use drawing to supplement their
verbal communication or extend beyond language when their emerging speech reaches its limits.

Shea already had knowledge about the metamorphic process that his tadpoles were undergoing but he felt an urgent need to communicate it to everyone at preschool because it was something that he was so excited about. His drawing (figure 13) enabled him to show others the idea that he wanted to communicate, to aid his verbal communication, to give greater impact to his words and verbally expressed thought. His ingenious way of demonstrating the process of the metamorphosis of the frog's body combined drawing (and erasing) as well as speech, with drawing being the main way of conveying the idea, and speech used to modify the explanation about the froglet's tail: "It doesn't fall off - it gets sucked back into its body."

Children at this age are still developing speech and although Shea has quite well developed language, he has several articulation problems with certain sounds, which often means that he is not understood by others, particularly adults. On several occasions I could not decipher what Shea was saying to me and needed other children to translate his speech. For Shea, who is so full of knowledge, ideas and excitement about the natural world, drawing affords him a way to communicate this to others; drawing acts as a mediator of ideas in the social context. The children in this study, aged between three and five years, do not yet have fluency with text, and some not even with language, so drawing offers them a viable mediating role for communication, meaning making and problem solving (Brooks, 2005, p. 82).
Sub-question 1.2: How is drawing interrelated with other forms of expression in children's communication (physical, verbal, gestural)?

Multi-modal expression

As the theory of children's art development has moved away from linear development of pictorial realism, and has focused more on meaning-making, theorists and researchers have also begun to study children's visual productions as processes that occur in a social context. Previous researchers such as Kellogg (1969) studied thousands of children's early graphic productions to find similarities across developmental stages and make connections with cognitive development. However, these drawings were studied totally without regard for the way in which the children produced them. More recently, children engaged in the process of drawing have been studied to include their verbalisation, gestures, body movements and social interactions (Coates & Coates, 2006; Cox, 2005; Kindler, 1999; Kress, 1997; Wright, 2007, 2010). In a study of his own children engaged in meaning-making, Kress (1997) observed that many different media were used in the making of representational symbols including drawings; construction from paper, cardboard and found materials; and arrangements of physical objects to represent contexts in their play (for example, a 'car' constructed from wire-mesh drawers, pillows, a tool box and other assorted items). Kress argued that "children act multi-modally, both in the things they use, the objects they make, and in the engagement of their bodies; there is no separation of body and mind" (Kress, 1997, p. 97).
Much of Wright’s (2003, 2007, 2010) work has been focused on the multi-modality of children’s creative work incorporating graphic, narrative and embodied signs (Wright 2010, p. 6). She sees the integration of these modes of expression as a powerful tool for children to use in understanding their world:

It is the integration of three modes in consort - graphic, narrative and embodied - that makes visual narrative a powerful source for children’s learning, representational thought and creativity. Body and mind intersect as children discover, through exploration and play, the distinctive features of meaning-making that take place within these modes. (Wright, 2010, p. 20).

Kindler (1999) has also explored the interplay of visual, kinaesthetic and vocal expression in creating meaningful communication. She concludes that:

"creating a picture" may require talking, making sounds, and moving around; that an interpretation of an image produced by a child will often be incomplete or sometimes misguided if it is based solely on examination of pictorial evidence; and that assessment and evaluation of a student's work may require taking into account more than just the graphic image (p. 346).

This resonates well with my findings that the children's drawings were often not able to be understood without the verbal and gestural context that I was able to capture with the video camera. In particular, Dwayne and Shea’s drawings (figures 10 and 11) of the ‘wriggliness’ of worms would have been totally misrepresented without their engaging dialogue and expressive body movements.
Similarly, Sylvie's visually expressive narrative about the storm incorporated verbal and gestural expressions as well. Sylvie vocalised the sound of the thunder with a loud 'boom'; she drew the lightning flash, holding the pencil tightly and pressing down very heavily to emphasise the power of the lightning. She gestured "out there" to show that the rain was "just on the road". In the discussion about "Dad driving Mum's car into the shed" (figure 17) she drew a line from the drawing about Mum's car to the edge of the page and immediately started drawing on the left hand page as she told about Dad going inside to get Mum's car keys (figure 18). Her line indicates Dad going inside to where the action continues on the other page, representing 'inside' and Dad looking for the keys. Drawing and story have become one, with the drawn line making the story visible as it unfolds.

**Drawing as a learning tool**

**Question 2. In what ways does drawing function as a learning tool in children's construction of knowledge about the natural world?**

**Drawing as a mediator**

Vygotsky (1962) theorised that language functions as a mediator between thought and speech. Language is a culturally produced artefact that enables us to put our thoughts into words and communicate them to others. It also works in reverse - it allows us to make meaning in a shared context through speech and internalise constructed understandings as ideas or abstract thoughts. Vygotsky (1986, p. 88) proposed a visual way of representing this - in his Venn diagram of
thought and speech, the intersecting area represents verbal thought, that is, when abstract thoughts are put into words to create meaning.

Language itself is an abstract concept requiring us to use words as symbols to represent our experience of reality (Vygotsky 1962). Thus, as children learn language they must start to make generalisations about their world, and attach a name or word to real things in order to communicate with others. However, language has a serious limitation - ideas or things can only be represented by words in a linear and rather cumbersome way, usually requiring a number of words strung together to represent a single idea and requiring time to elapse before the whole idea can be completed. In contrast, a picture can be apprehended as a whole thought instantaneously (Brooks, 2003, pp. 7-8). For children who are still learning language, their limited speech must cause frustration when they want to express ideas that are more complex than they have words for. Hence using visual means to convey thoughts is a powerful tool for young children in the construction of meaning. Brooks (2009b, pp.11-12) draws the analogy between Vygotsky's idea of verbal thought and the intersection of the visual and thought, labelling it 'visual thought'. Like language, visual artefacts can act as mediators between perception and thought to create meaning. Vygotsky (1962, cited in Brooks, 2006, p. 53) acknowledged that there were more mediators than just language - he also included signs, symbols, algebraic systems, and graphic productions. If he had lived longer to continue his research, he may have developed further theories about mediators other than language.
Hence, drawing can act as a mediator in the social context to express thoughts, communicate to others and make ideas visible in an external, concrete form. This provides the opportunity to record, revise, review and rework ideas in a way that is accessible to young preliterate children as writing is not (Brooks, 2003). Drawing can be used to document observations (figure 22: Sylvie's moth), ideas (figure 12: Dwayne's snowman eggs) and learning (figure 6: Sophie's leaves). It gives children the opportunity to consider their thoughts in an external, enduring form that allows for further reflection and deeper thinking (figure 24: Cody's drawing of Katie looking at the fire).

**Intercontextuality and consequential progressions**

The way in which I organised the nature study sessions allowed children to make their own discoveries whilst exploring the preschool outdoor environment. In setting up the drawing table we made a physical space in which both children and adults could interact, discuss, and develop a social context for constructing knowledge. How we, as adults, construct the physical and social environment for children to learn in gives direction to how they learn (Brooks, 2009). In the pedagogy of the Reggio Emilia early childhood centres, environment is considered as "the third educator" (Gandini, 1998, p. 177) as discussed previously in chapter 4. For children to actively participate in constructing knowledge, they need to create a shared physical and social space or context for dialogue, sharing ideas, and developing meaning. Wink and Putney (2002) describe this as intercontextuality - a space created in the social context where people interact and meaning is negotiated through shared understandings (p. 128). Intercontextuality also involves "referencing and using other contexts for
learning as an example of how to learn in a new context” (Wink & Putney, 2002, p. 135). Children involved in the research brought knowledge to the nature study group from other contexts, forging connections with their own understandings from their home lives and prior experiences to make sense of current learning at preschool. The understandings that people bring to the learning context have been termed 'funds of knowledge' (Moll, 2000; Wink & Putney, 2002, p. 93).

When Dwayne and Shea were drawing worms together, drawing occurred as a shared event in the social context. An intercontextual space existed where gesture, drawing, dialogue and idea formation all existed together in the social context. I was also a part of this context, prompting discussion and suggesting that the worms tied themselves in knots, an idea that the boys adopted and extended on (Dwayne later saying that that’s how worms sleep).

As Dwayne and Shea worked together at the drawing table (chapter 5, pp. 110-113), they created an interpersonal space in which to explore the wriggling worms using drawing, gesture and dialogue. Their similar drawings and free exchange of ideas, both verbal and visual, illustrate how closely they worked together to explore the 'wriggliness' of the worms. I observed Katie a week later drawing in a very similar fashion and calling her picture a 'squirmy wormy', saying 'it's tied itself all in a knot'. Dwayne and Shea's ideas had become part of the ongoing dialogue and knowledge construction amongst the children, termed consequential progressions by Duran and Szymanski (1996, cited in Wink & Putney, 2002, p. 136). As people discuss ideas and make meaning together, they build on their past interactions with each other. Their current talk will become
part of future negotiations and will be built on by themselves or their peers in later interactions. In classrooms, the meanings and dialogues that students share become a part of the consequential progressions of future meaning making.

Children brought different ideas and knowledge that were shared [intertextuality (Bloome, 1989; Bloome & Egan-Robertson, 1993; Bloome & Bailey, 1992, cited in Wink & Putney, 2002, pp.133)] in the space and time of the nature study sessions through dialogues and drawing that occurred [intercontextuality (Floianni, 1993, 1997, cited in Wink & Putney, 2002, p. 134)]. This resulted in shared meanings being constructed, which then continued and were built upon in future discussions and negotiations [consequential progressions (Duran & Szymanski, 1996, cited in Wink & Putney, 2002, p. 136)]. Several ideas surfaced and were discussed or appeared in graphic form amongst the children at different times during the study period. Alive or dead and parents and babies were ideas that were explored on a number of occasions among different individuals or groups of children.

Negotiating meaning

In the intercontextual space created within our nature study sessions, the children often engaged with each other in discussions and drawing events during which they negotiated meaning. One such event arose from Dwayne's drawing of the snowman eggs and the ensuing discussion about whether snowmen were alive. Shea contributed his idea of how snowmen can 'die' which made Dwayne change his mind about whether they were alive. At this stage, the boys have no scientific concept of what death entails, so they are referring to their spontaneous concepts which they have developed through their observations,
perceptions and culturally transmitted knowledge. Their ideas of death are still fluid and together they negotiated what it means for snowmen to 'die'.

Another example of negotiating meaning occurred during the discussion about worms (see chapter 5, pp. 106-109). A space of intersubjectivity (Wertsch, 1985, cited in Wink & Putney, 2002, p. 129) existed in which Dwayne contributed his observations, Shea contributed previous knowledge, Katie contributed ideas (worm is alive because it's moving/ worms have babies) and I drew out the children's ideas and asked questions. The group was considering my question: Do worms have eyes? Dwayne said: We don't see it has eyes but it does. Shea was more knowledgeable and contributed: They just feel their way through the dirt. Dwayne seemed to be combining spontaneous and scientific concepts here - he could not see the worm's eyes (spontaneous concept) but his knowledge of animals in general (scientific concept) informed him that they have eyes (at his stage of development he may not have experienced or learned about any creatures that do not have eyes). In contrast, Shea had more scientific knowledge than Dwayne, and explained how they move around without sight. In this discussion, the meaning of 'eyes' had been negotiated to mean 'sense organs to allow them to find their way around'.

Spontaneous and scientific concepts work in a reciprocal relationship to expand learning and development (Vygotsky, 1962; Wink & Putney, 2002, p. 95). Scientific concepts are abstract, and lead to generalisations about the world. They organise the way children think, taking in and refining their spontaneous concepts derived from experience and perceptions. As children develop and
engage in formal learning, their spontaneous concepts expand into abstract, scientific concepts which can then be operated on mentally. In the above example, Dwayne's spontaneous concept of 'no eyes' met Shea's scientific concept of 'special sense organ' (a concept that was not observable) and together new meaning was constructed in the social space.

**Sub-question 2.1: What learning is visible in these children's drawings?**

**Visual thinking**

Drawings serve to externalise thought and, unlike language, remain as tangible 'artefacts', enabling children to refer back to them, to revise their ideas, or to examine ideas in more detail. Cody drew the experience with the magnifying glass creating fire by focusing the sun's light (figure 24). He documented the observation that the magnifying glass, the sunlight and the fire were in a relationship that he did not fully understand, although he believed (correctly) that the sunlight was needed to cause the fire to start. The process of his drawing enabled him to give form to his emerging idea of the relationship between the sun, the magnifier and the fire. Once the drawing was complete he was able to make some deductions, for example, that the sunlight 'made the fire' and that both the sun and the magnifying glass were needed to make fire, although he was unable to explain what role the magnifying glass had in this process. Having his thought externalised in the tangible, visible form of the drawing seemed to enable Cody to refer to it and think about the relationships between the elements. He could also refer to it as he explained the experience to me, using it as a diagram to point to the different elements as he explained their relationship. The drawing kept his thought 'in front of him' as he explained it to me.
Development of concepts

As drawing functions as a mediator for thought ('visual thought'), we are able to discern children engaging with ideas and developing concepts in and through their drawings. In his classic work, *Thought and language* (1962), Vygotsky theorised about his research into the way children develop concepts. Young children organise their perceptions of the world into 'complexes' where elements are linked by an observable association (Vygotsky, 1962, pp. 61-66). They do not begin to form true concepts as abstract ideas until they are around the age of puberty as discussed previously (chapter 4a, p. 73) (Vygotsky, 1962, p. 58).

![Figure 26: (l) The silkworm family](image1)
![Figure 26: (r) The stinky bug family](image2)

A spontaneous concept that emerged in a number of children's discussions and drawing events was the idea that the creatures studied by the children existed as family groups (Figure 10: Dwayne's drawing of the dad, mum and baby worms,
p. 110; Figure 25: Sylvie’s drawings of frog families, p. 137; figure 26 above of the stinky bug family and the silkworm family, drawn by children outside of my focus group). The children’s spontaneous concepts of the relationships within family are based on what they observe in their own families and what they learn from their culture, which is based on relative size and the nurturing function of parents (the traditional story of *The Three Bears* for instance). The children developed their spontaneous concepts from their experiences and observations that size denotes familial relationships: dad biggest, mum slightly smaller, babies very small. As adults, our scientific concept of family is based on reproduction and genetic relationships.

At this age preschool children do not have the scientific concept of parents and offspring that adults have, where parents are related genetically to their offspring but may be different shapes (as in caterpillar babies and moth parents, or tadpole babies and frog parents), may not be around to nurture their offspring and may not be in the same size ratios as human parents and babies. Drawing these ‘families’ of different creatures (I collected examples of children’s drawings of frogs, worms, stinky bugs, turtles and silkworms which included mums, dads, and children or babies) enables the children to impose some order on their observations of the natural world. Why else would there be different sizes of the same kinds of animals?

I had a long discussion with Sylvie about tadpoles and frogs, while we observed tadpoles swimming in the classroom tank. Even though she could repeat the information that tadpoles hatched out of eggs and matured into frogs, she
maintained that larger tadpoles were 'mums and dads', and they looked after the smaller 'baby' tadpoles; similarly the larger frogs were parents that looked after "the little tiny frogs". At this stage in her learning, Sylvie does not yet have a scientific concept of what 'family' constitutes in relation to frogs - her spontaneous concept has developed from her association of large and small frogs and tadpoles. However, she does have the beginning of a concept about human families, in which larger fathers and mothers love and care for their smaller children and babies. Sylvie expressed her ideas of the frog families in the drawing at the beginning of this chapter with descriptions of the relationships between them which reflect her understanding of human families.

**Learning from observation**

In my earlier study (Heckrath, 2006) of children observing the development of silkworms (of which Sophie's drawings of leaves in figure 6, p. 62, were a part), I documented Sophie's drawing development over several months towards a representational style that incorporated many features she observed in the lifecycle of silkworms/silkmoths. I wrongly assumed that I would observe a similar development in the current study. Kolbe (2005, p. 88) cautions that children need time and practice to learn how to draw "what they see" and this process necessarily involves memory, feeling and imagination as well as observation. Many children in my study did observe features of the creatures we studied and incorporated them into their drawings, but not to the extent that I expected. Sylvie's drawing of the Emperor Gum moth (figure 22) was an outstanding example of a drawing done where a child observed a subject and drew what she was learning about the moth from observing it. The process of
drawing served to focus Sylvie's attention to the different parts of the moth, allowing her to discover details that she might not have known about before. Her drawing was careful and she continually referred back to the moth, sometimes using a magnifying glass, before adding details to her drawing. She mentioned the 'hairy stuff', antennae and patterns on the wings as she drew them. Other children's drawings often included realistic details, even when drawing from memory or imagination.

**Representation of reality**

Drawing is always a symbolic representation of reality; even the most realistic rendering of a scene or object is still a two dimensional abstraction of the real thing. Arnheim (1969, 1974) theorised that all art is representational of reality and all artistic form is essentially abstract:

> ...(T)he transition from perception to representation is not a simple process of duplication; it requires the invention of representational concepts that mediate between perceptual concepts derived from our direct experience with the world and its representation in a particular medium. Thus, representational concepts are not automatically given in the perceptual experience but are conceptions of forms deemed adequate to represent the perceived structure of the object within the constraints of its medium (Golomb, 2002, p. 17).

When children are starting to draw, they invent 'forms of equivalence' (Arnheim, 1974) which are highly abstract forms that stand for the real object being represented. As children's skill and experience develop, the abstract forms include more details that impart greater information about the subject:
Artistic thinking begins with the creation of highly abstract and simplified forms that the novice can conceive and give form to, and only later does the artist strive for a more complex representation. With increasing development comes a desire for greater complexity and the ambition as well as the skill to depict the multiple aspects and meanings of an object (Arnheim, 1969, 1974, as cited in Golomb, 2002, p. 17).

In Sylvie’s drawings we can see that she uses forms of different complexity - in the moth drawing (figure 22), compared to her ‘cow’ drawing (figure 19), she attains a higher degree of complexity, incorporating multiple aspects of the moth that she is observing and learning about as she draws.

Thus Shea and Dwayne represent worms by squiggly lines (not because that is all they are able to draw but because the movement of the worms is what they wish to give form to) whereas Sylvie represents the moth by a much more complex form that incorporates representations of many aspects of the real moth. In particular this relates to the development of the leaf drawings by Sophie as she learnt more about leaves from observation and included more complex details to represent her growing understanding of the structure of leaves. This series of drawings parallels the drawings of a tree that Kolbe (2005, p. 88) noted which developed from a formulaic version to one showing closely observed details and speculations about the underneath and inside of the tree.

**Sub-question 2.2: How has drawing supported this learning?**

The following section summarises the ways in which drawing has supported
children's learning with examples drawn from the data.

- Drawing focused children's observations and provided a means to document or record what they observed (for example: Sylvie's drawing of the Emperor Gum moth, figure 22).

- Drawing acted as a mediator to give form to thought. Drawing was a mediator between children's perceptions and their ideas and understanding (for example: Sophie's drawings of leaves, figure 6).

- Drawing acted as a focus and shared activity to enable sustained dialogues to take place. The process of drawing engaged the children and inspired discussion around the drawings that were being produced (for example: Shea and Dwayne drawing worms wriggling, figures 10 and 11).

- Drawing enabled the children to examine their own 'big ideas' by making thoughts visible and allowing children to examine them and make further deductions (for example: Cody drawing Katie making fire with magnifying glass, figure 24.)

- Drawing enabled the children to communicate ideas to others. Drawing gave children an additional communication method to complement speech (for example: Shea drawing the frog metamorphosis, figure 13).

- Drawing provided the children with a medium in which to play with ideas in an imaginative and humorous way, and allowing them to communicate their ideas and humour to others (for example: Dwayne and the "snowman eggs", figure 12).

- Drawing gave the children a medium in which to express strong emotions and deal with them by externalising them and communicating them to others (for example: Sylvie and the storm, figures 14 to 19).
• Drawing and language combined to produce narratives (for example: Sylvie and the storm, figures 14 to 19).

• Drawing helped the children to form concepts (for example: Sylvie's drawing of the frog family, figure 25).

• Drawing helped children to recall past events and to examine them as part of a narrative (for example: Sylvie and the storm, figures 14 to 19).

Sub-question 2.3: How has drawing helped children connect to nature?

The children drew every day of the study period as well as exploring their outdoor space, collecting specimens, observing the growth and development of captive silkworms and tadpoles. Some of these activities occurred as part of their normal preschool programme - the silkworms and tadpoles were provided by the director and not by me. What was different for the children was having a regular, focused time for research and the resource of an adult to facilitate learning. My role was:

• to stimulate discussion,

• record interactions and activities in the outdoors (children often asked to video or photograph their 'finds'),

• provide a space for drawing and discussion,

• provide materials and texts and

• make displays of their drawings, photographs, transcribed discussions and theoretical explanations of our activities.

Thus, the creation of an intercontextual space in which to develop meaning was an important factor in helping children to connect to nature.
As discussed above, drawing was only one aspect of the children's meaning-making. However, it played a significant part in some unique ways:

- As the children were unable to use written language to record their understandings and observations (although Sylvie did use her own form of writing to record what her frogs said in figure 25) drawing recorded a wealth of information, ideas and understandings that might otherwise have been lost.

- Drawing provided a means to focus children’s attention and engage them in discussion about and around the drawings. Without the activity of drawing, they may not have engaged for so long in dialogue or observation.

- Drawing focused their attention on the specimens they were studying, teaching the skills of visual recording of natural specimens, a time honoured tradition going back to cave paintings of Aboriginal people 40,000 years ago and Europeans of the Upper Paleolithic period in the Chauvet Cave in France of 30,000 years ago.

- Drawing acted as a mediator between the children’s perceptions of nature and internalisation of ideas and concepts about nature. Without the inclusion of drawing I believe that the children would not have been so involved in their study of nature and would not have learned so much.

Since the very dawn of art and thought, drawing from the natural world has been an important tool in learning about the environment. For children to make an affective and cognitive connection with the natural world, they have to be able to make meaning from it, for otherwise it would remain a threatening and complex
world 'out there'. By having the opportunity to explore nature and then process their findings in a way that is meaningful to them, children begin to learn that the natural world is interesting, has its own laws, is able to be understood, and is accessible to our human understanding. Once children learn to care about the natural world, they can then go on to learn to care for it (Davis, 2009; Elliott & Davis, 2008; Sobel, 1999).
Chapter 7: Learning journeys

Figure 27: Looking for water snails

Seven excited children explore a trickle of water flowing through an open stormwater drain just outside the preschool. Shea has found some small black molluscs which he identified as 'water snails' and collected them into a container. The children’s excited voices and focused attention are evidence of their interest.

AH: Shea, show us the water-snails and we’ll video them.
Child 1: I found a spider!
Shea: Oooh... I dropped my water snails - I'll have to get some more...
Child 2: Annie, come and look at this spider!
A: Which spider?
Child 2: That spider!
Child 3: Can I have it?
Child 4: Can I see it?
Child 1: No, it might be deadly.
AH: Don’t touch it, just look.
Child 1 picks the spider up on a small rock so all can see then drops it back onto the ground.
Child 5... Well, I want to pick some...
Child 6: I want to have a look at them too!
Child 4... I found some!!

The children are totally engaged in their exploration. This is how childhood used to be for many of us - exploring the natural world to find out what was out there. Now it seems we need to write it into curriculum documents to ensure that children learn in a formal setting what children always used to learn as a normal part of their everyday life.
Introduction

This chapter explores the learning journeys undertaken during the course of the study. I was not only a researcher-teacher, I was also a pupil, discovering a great deal about researching and children's learning during this study and analysis. The children embarked on different learning journeys: into the natural environment of their preschool, and the arena of their own cognitive development and associated drawing. In this final chapter, the children's and my own learning are explored. I discuss how the results of my research might be used by educators to inform early childhood education practice. I suggest how we might stimulate nature-based learning and incorporate drawing as a learning tool in the early childhood curriculum. I reflect on the strengths of the study and also how it might have been different. Finally, I suggest some directions for further research arising from my findings and reflections.

The children's learning journey

Peer learning

Throughout the study, children engaged with each other in conversations and shared observations of the wildlife they found. They discussed their ideas, with the more expert children contributing their greater understanding to the group construction of knowledge. Children developed knowledge quickly and passed it on to others. A sequence of video recordings showed Shea and Katie engrossed in a favourite nature book, Leaf litter (Tonkin, 2006) together, with Shea naming and explaining about many of the small creatures illustrated hiding in the leaf litter or under the ground. The following week I observed Katie, now the more
knowledgeable child, explaining the book to a third child. Other children shared drawing events, and learned from each other how to represent aspects of their nature study. Cody drew the sun and the magnifying glass after seeing Katie's representation; Shea and Dwayne drew almost identical depictions of worms wriggling. The children developed their own vocabulary about the creatures they were observing, for example, 'curly bugs' became a name they used for a species of isopoda, more commonly known as slaters or woodlice (CSIRO, n.d.).

**Field research**

Some of the children were already knowledgeable about how to find and collect bugs, but others had to learn this skill. By the end of the ten week study session, most children were enthusiastic hunters and collectors. The children learned the most likely places to find bugs and how to capture them without hurting them, increasing their skills in handling small creatures. We developed a culture of treating other life forms carefully and respectfully, and returning them to their habitat when we had finished observing them. From observing the bugs in their natural habitat the children learned about how they lived. They developed the ability to look closely at their finds and observe different aspects of their construction and behaviour. This experiential learning helped children form spontaneous concepts about the natural environment, which will become the basis for the formation of scientific concepts later in their development (Vygotsky, 1962).

From their observations, the children were stimulated to make representational drawings that incorporated features of their specimens that they wished to
record, thus inventing “forms of equivalence” (Arnheim, 1974). My recording of
Sylvie observing and drawing the Emperor Gum moth demonstrated the learning
that was occurring as she observed features of the moth of which she was
previously unaware. The video captured her intense scrutiny of the moth and her
detailed drawing, adding features as she noticed them.

**Thinking and concept formation**

Throughout the study, the children were developing ideas and concepts together
through dialogue, sharing ideas, co-operatively constructing knowledge, thinking
about their observations and developing hypotheses. As researcher-teacher, I
structured the time and space in which they could learn. I offered provocations,
questions that guided their thinking and assisted them to develop hypotheses
and concepts. The intercontextual space in which we worked together supported
the development of consequential progression of ideas (Wink & Putney, 2002) -
the learning that children were experiencing in regard to understanding
invertebrate animals, but also development of their thinking skills.

**EYLF outcomes**

If we are to incorporate nature study into our early learning programs, then we,
in Australia, need to be guided by the Early Years Learning Framework
curriculum (DEEWR, 2009). Outcome 2.4 states: "Children become socially
responsible and show respect for the environment" (p. 29). Incorporated in this
outcome is evidence that children: develop understanding of the
interconnectedness of all living things and the land; develop an awareness of
living things and the impact of human activity on environments; and increase
their knowledge of and respect for the natural environment (DEEWR, 2009, p.29). Our nature study incorporated all these aspects of respecting the environment. The children further developed their appreciation of other living things; in those ten weeks, they demonstrated that they were learning to respect the environment and were becoming aware of other life forms.

**Connecting to nature**

Over the course of the research study, children spent part of each session exploring the gardens and outdoor areas of the preschool, as well as observing specimens they had captured which were later released back to the outdoor area where they had been found. This was a small part of their week - they would also have spent time outdoors both at preschool and at home outside of the research study sessions. The videos of children engaged in playground explorations revealed evidence of their excitement and enthusiasm as they discovered worms, ants, ‘curly bugs’, slugs and water snails. Being able to observe real creatures up close in specimen containers was stimulating and engaging for the children, evidenced by their excited voices and the fact that they spontaneously collected and observed bugs throughout the study.

Children in my study group showed enthusiasm, curiosity, liking and positive reactions about the creatures they found or observed. One child was initially afraid of bugs, but by the end of the study was starting to show interest and was much more relaxed in handling small creatures. The children did not demonstrate understanding of the fragility of their finds and the effect of being handled; almost all the children wanted to touch and hold the creatures
discovered. That the creatures had a right and need to remain in their natural environment is an area for further teaching, to develop understanding of other life forms in their natural habitat and not as 'pets' for human beings. The mother who brought in the injured lorikeet encouraged the children to think about our impact on wild creatures (p.181). As children grow, they will hopefully change from their egocentric view and develop the ability to understand the needs and rights of other life forms, but it is essential to start teaching these concepts young. This is an important area for children's learning - to learn that we do not have 'dominion ... over all the earth and over every creeping thing' (Genesis 1:26, King James Bible) but that living things deserve respect and often protection from interference by humans.

However, a lifelong connection to nature cannot be sustained with a mere exposure of ten hour-long sessions - it must become a part of the mainstream curriculum, if not a significant part of each child’s home life, to make a meaningful contribution to children's attachment to nature. Having environmental awareness as part of the national EYLF is a start to ensuring that children have access to learning about the environment. A new direction in early childhood learning involves immersion in the natural environment, and is being addressed in 'nature kindergartens' and 'bush preschools' as described earlier in chapter 2 (p. 41).

**Drawing as a learning tool**

The results that Brooks (2002) described in her studies arise from the learning culture that she developed in her class. She had taught the same children for six
months and had used drawing as a regular part of classroom learning. It takes
time for children to learn how to use drawing and to develop the cognitive and
manual skills needed to feel comfortable with drawing as a method of
expression. Children need to be given regular opportunities to practice their
skills in drawing, and to link it to verbal communication and expression of ideas,
as encouraged by Steele (2011), an art educator and Professor Emeritus at
University of British Colombia, who has campaigned for over twenty years to
courage the development of drawing in young children. He states that:

    The relationship between words and drawings is highly symbiotic and
    should be nurtured throughout the school years as whole language. A
daily practice of drawing aids literacy because it stimulates conversations
with adult caregivers on serious themes. This relationship, with its rich
possibilities, is not possible when one or the other is neglected as drawing
is neglected in the home practice and school curriculum (Steele, 2011,
p.15).

In contrast to Brooks’ (2002) research participants, my study group did not have
the same background supportive of developing drawing skills and using drawing
as a meaning-making tool. If this group had had more exposure to drawing
development as part of the curriculum, these children may have shown very
different results. Children need to learn to use drawing as a learning tool over a
longer period of time than this study allowed - drawing ought to be embedded in
the curriculum as a learning tool that is used every day (Steele, 2011). Drawing
stimulates thinking skills - in the process of drawing, children ponder, question,
hypothesize, reflect, develop ideas and concepts. This is what makes it such a
powerful tool for young children - to be able to mediate their thoughts in a visible way that allows reflection and revision.

**Learning journeys for early childhood educators**

**Connecting children to nature**

There is a movement building in many developed countries of reconnecting children with nature. Richard Louv's (2005) book, *Last child in the woods*, is just one publication of many that are signaling a growing concern that children are disconnecting from the natural world. In an effort to redress this decline, he has, with concerned others, started the *Children & Nature Network* to encourage and support grassroots groups "to connect all children, their families and communities to nature through innovative ideas, evidence-based resources and tools, broad-based collaboration and support of grassroots leadership" (Children & Nature Network, 2013). This network is gathering momentum in the USA and is starting to have links with groups in other countries including Australia, for example, the Western Australia Naturalists Club (Children & Nature Network, 2013). Another action group is the *Nature Action Collaborative for Children* that developed out of the *World Forum on Early Care and Education* in 2005 with the aim of reconnecting children to the joys of nature and to shield them from "frightening environmental concerns before they are developmentally ready to understand them" (Nature Action Collaborative for Children, 2013).

Since the early nineteen nineties, Australian groups have formed to promote environmental education and/or education for sustainability. These include the
Australian Association for Environmental Education (AAEE) which has a Special Interest Group, established in 2003, of early childhood professionals promoting education for sustainability. AAEE has state chapters across Australian states and territories. Other State organisations promoting this work are The NSW Early Childhood Environmental Education Network (ECEEN), the Environmental Education in Early Childhood (EEEC) group in Victoria, and the Queensland Early Childhood Sustainability Network (QECSN).

Over the past decades, early childhood centres have faced increasingly stringent regulations and safety standards, as well as the perceived threat of litigation arising from children’s accidental injuries. Consequently, the majority of them have followed the trend to install 'no risk' environments and outdoor play areas, stocked with low maintenance, standardised, safety approved equipment and surfacing materials (Elliott & Davis, 2008; Little & Wyver, 2008, p. 35). Many early childhood centres have become devoid of any remnants of the natural environment in their playspaces. Thankfully, changing pedagogy and practices, with support from the EYLF, are now moving towards inclusion of more natural materials and environments. Many early childhood services in Australia are currently improving their outdoor spaces towards a more natural environment (Elliott, 2008) and realising the potential and need for learning about nature. Evidence of this trend is reflected in current research, publications and websites (Elliott, 2008; Kinsella, 2007; ) as well as in early childhood suppliers’ catalogues (Educational Experience, 2013), many of which now advertise natural products (such as building sets made from slices of branches with bark intact) and
equipment for exploring the natural environment, observing nature and gardening.

There is a movement back to gardening and food production sweeping across all sections of Australian society and indeed the developed world, and this is again reflected in early childhood education as well as schools (Biological Farmers of Australia, 2009; McCrea, 2008; Slow Food Perth, 2010; Sustainable Schools NSW, n.d.). In Australia, this change brings with it an interest in 'bush tucker' (Indigenous wild foods), with many individuals and organisations planting gardens containing these food species (Moreton Bay Community Gardens, n.d.). One such initiative is *Food with latitude*, a collaborative project led by Slow Food Perth to build children’s awareness of food production and Indigenous food culture (Slow Food Perth, 2010).

Another radical incentive in early childhood education is the forest schools and kindergarten movement in UK and Europe, and the 'bush kinders' in Australia as described in chapter 2. Although only a few programs have commenced here, educators are looking to examples overseas with a view to implementing similar programs locally with an Australian focus.

**Environmental education in the EYLF**

The Early Years Learning Framework (DEEWR, 2009) is giving Australian early childhood educators the impetus to ensure that young children make connections with the natural environment. It has now become part of mainstream early childhood curriculum, an outcome that Elliott and colleagues
have worked towards for decades (Davis & Elliott, 2003; Elliott, 2006; Elliott & Davis 2009). Having inclusion in the EYLF is a starting point for us, as early childhood educators, to ensure that environmental education is implemented as part of mainstream learning in Australia. By increasing cognitive learning and supporting curiosity, investigation and stimulating that "sense of wonder" (Carson, 1956), we can help children build a foundation for further learning about and connecting to nature. We can support children's learning about sustainability, nurturing their 'ecological selves' to develop lifestyle practices that will help to protect and preserve the natural environment.

**Drawing to learn**

Drawing needs to emerge from the aesthetic of pictorial representation to be used as a mediator for thought as discussed in chapter 6, page 150. Contemporary research and pedagogy reconceptualise drawing as functioning as another language (Katz, 1998; Steele, 2011) or as a mediator between verbal language (in young children), or written language (in literate children) and thought (Vygotsky, 1962; Brooks, 2002). This places it squarely in the domain of early childhood education as an important tool for learning. Brooks (2002), Warden (2012a), Project Approach educators (Katz & Chard, 2000) and educators in the Reggio Emilia centres both in Italy and in countries that have adopted a Reggio Emilia based approach to early childhood education (Fraser, 2000; Katz, 1998; Milliken, 2003; Vecchi, 1998) have used drawing extensively for meaning making in their everyday practice. Their research and writings add valuable knowledge to this field. Kress (1997) maintains that drawing is an important step to literacy as it functions as a symbolic system, allowing children
to express meaning. Drawing encourages thought, expression of ideas and symbolic representation. It allows children to record and document their meaning making, and can be used to review, revise and revisit earlier representations. It makes their thinking visible to others, in particular teachers who have a window into the child's thinking. For children to develop the use of drawing as a learning tool, it needs to become embedded in the curriculum and practised every day as an integral part of children's thinking and learning (Steele, 2011).

In this study, children used drawing as a way to make meaning from their observations and ideas about their explorations in nature. Their hands-on experience and sensory learning was fundamental to their development of spontaneous concepts. Following up their concrete learning with dialogue and drawing aided the formation of higher level thinking and scientific concepts (Vygotsky, 1962). The combination of "shared sustained conversations" (Siraj-Blatchford, 2009; Siraj-Blatchford & Sylva, 2004) and drawing is being used in a number of approaches to pedagogy. Warden (2012b) has developed 'talking and thinking floorbooks' in which children's conversations, drawings, photos, teachers' reflections and planning ideas are recorded. These books document children's learning and stimulate thinking about children's experiences, often in the outdoors in Warden's nature kindergartens in Scotland. The educators of the centres of Reggio Emilia have used drawing to a great extent as a meaning-making tool to enable children to make their ideas visible (Katz, 1998). As their pedagogical philosophy and methods have disseminated across continents, others have used their approach to make drawing a central part of children's
learning. Other teaching strategies such as the Project Approach developed by Katz and Chard (2000) have also included drawing as an important tool for children’s meaning making.

The Australian Early Years Learning Framework has as one of its outcomes: "Children express ideas and make meaning using a range of media" (DEEWR, 2009, Outcome 5). It elaborates further and gives examples of the way in which this might be evident:

...for example, when children:

- use the creative arts such as drawing, painting, sculpture, drama, dance, movement, music and storytelling to express ideas and make meaning
- experiment with ways of expressing ideas and meaning using a range of media
- begin to use images and approximations of letters and words to convey meaning (DEEWR, 2009, p.42).

This specifically mentions drawing as a means of making meaning and expressing ideas. This is our mandate as early childhood educators to support children’s drawing development and make it an essential tool in their learning process.

**My learning journey**

I was the researcher-teacher engaged in this study but I was a learner as well. In this, my first attempt at post-graduate research, I needed to negotiate a steep learning curve. As the study unfolded, I modified my original ideas about methods and methodology for research, and concepts and preconceptions about
children's behaviour and learning. While constructing knowledge with the children about nature, I was constructing my own knowledge about research and children’s learning.

**Ownership and funds of knowledge**

My first lesson occurred during the pilot sessions, immediately prior to the formal study period. Over several weeks I brought in 'natural' items for the children to study and explore. These included flowers, plants, unusual seedpods, beetles and a collection of items found on a beach. I included items that were human-made (non-living) and things that were dead (once living but no longer) as stimuli to initiate conversations about living, dead and non-living things. This approach proved unpopular with the children, who much preferred finding their own specimens in the playground or observing the classroom populations of silkworms or tadpoles. This gave the children 'ownership' of the research and enabled them to investigate living things in their native habitats, allowing them to learn about the contexts in which their creatures lived. For learning to be meaningful to the children, they needed to be involved in the search for and collection of specimens.

Several children brought creatures from home thus linking preschool learning to their home environment and tapping into 'funds of knowledge' (Moll, Amanti, Neff & Gonzáles, 1992), which are defined as:

...the bodies of knowledge, including information, skills, and strategies, which underlie household functioning, development, and well-being.

These may incorporate information, ways of thinking and learning,

This concept develops the idea from Vygotsky that knowledge construction and development cannot be separated from their social and historical contexts (Bodrova & Leong, 1996, p. 9). The knowledge that exists within a family is internalised by the children as they learn and develop, and may then be introduced into other contexts such as school and preschool and shared with others (intertextuality). Whether this knowledge is acknowledged by others, particularly educators, can either give a child affirmation of his power as a learner or denial of this ability.

Shea came from a household where environmental knowledge was encouraged and held in high esteem. Shea’s mother was herself very interested in the environment, and encouraged her children's interest by providing them with opportunities to keep small creatures or set up places where they could be observed, for example, a water feature in the yard where they kept a rescued turtle and assorted aquatic invertebrates collected from their creek. Two relatives in the family were marine biologists and another was a surfer and keen bushman. This resonates with Hedges et al.’s (2011) study of children's funds of knowledge in New Zealand preschools, in which the authors acknowledge that the wider family and as well as other adults in children's lives contribute to their funds of knowledge. I learned about this background to Shea’s passion for small creatures through discussions and a more formal interview with his mother conducted at preschool. From my knowledge of Shea’s home environment, I was able to appreciate the importance that he attached to learning about the natural
world. I conceded that his knowledge was greater than mine on some topics.

The study was also supported by a staff member who brought in the Emperor Gum moth and the director who set up a tank of tadpoles for the children to observe their development over a period of time. Parents also contributed to the study; one mother brought in an injured rainbow lorikeet for the children to see. She talked to the children about it being scared and noted its sound of distress; she demonstrated how it became quiet when it was covered up as it was not scared anymore. She was taking it to WIRES, an organisation that cares for injured wildlife. The children responded respectfully to her cues to maintain quietness near the bird and refrain from touching it - an important lesson in regard for other living creatures.

**The importance of sustained, shared conversations and thinking**

Throughout the study, the children engaged in conversation with each other, myself and other adults present (staff and occasionally parents). Most of the time, these conversations were relevant to what we were observing or what the children were thinking about or drawing, and often led to forming new ideas or discovering new knowledge. The concept of *sustained, shared thinking* is emerging in early childhood pedagogy, developed from research by Siraj-Blatchford (2009). It is defined as individuals conversing and thinking together to solve problems, explore ideas or construct new understanding. Sustained, shared conversations were evident throughout my study, between the children and myself or each other, and were an integral part of the learning that was occurring.
My ability to support and encourage sustained, shared conversation improved over the course of the study but needed to develop further. In reviewing the video recordings, I discovered that I often dominated conversations, sometimes with a barrage of demanding questions, occasionally ignoring children’s dialogue and missing opportunities to follow up interesting avenues of thought.

Comparison of my questioning to that of preschool teachers researched by Siraj-Blatchford and Manni (2008) showed many similarities with the kind of closed questions that they found in their study of interactions between children and educators. For example, in the transcript of Cody describing the fire produced by the magnifying glass, my questions became increasingly closed but also more complicated as I struggled to lead Cody to make links between the magnifying glass, sun and fire. Under my questioning, Cody’s responses regressed to single words and finally the defeated confusion of ‘I don’t know’. Had I engaged him in conversation in a more supportive manner, I could have encouraged him to speculate and hypothesise about the phenomenon and thus enhance his thinking.

Littledyke and McCrea (2009, p. 46) suggest that questions can either stimulate thought and avenues to investigate, or can block children’s flow of ideas altogether. Similarly, Siraj-Blatchford and Manni (2008) stress the importance for educators to be aware of how their questioning shapes interactions and thus learning with children. Their study concludes:

...that observations of the pedagogical approaches of pre-school practitioners, including their questioning techniques, can reveal potential strengths and weaknesses of varied approaches, which may in turn be used to inform better practice (Siraj-Blatchford & Manni, 2008, p. 15).

Their study and the observations of my own questioning should serve as a
prompt to educators to reflect on their own techniques for engaging with children and to ensure more positive ways to support learning and encourage conversations.

Cadwell and Fyfe (1997) also advocate the importance of engaging children in meaningful dialogue to facilitate learning. They are educators and pedagogues who have been instrumental in establishing the Reggio Emilia approach in early childhood centres in the USA. They see that the role of the teacher is to "extend and deepen children's thinking" (p. 86), using open ended questions rather than 'fishing' for the right answers, and to stimulate discussion, giving every child a chance to participate and encourage "critical and creative thinking skills" (p. 85). Conversations with children are essential if we are to plan from children's interests, extend their thinking and document their learning.

In Australian early childhood pedagogy, the Early Years Learning Framework (DEEWR 2009, 2010) specifically supports "shared, sustained conversations and thinking" as it encourages educators to:

- Co-construct meaning with children – ensure there are sustained interactions and thinking experiences with all children in secure, respectful and reciprocal relationships.
- listen and respond to the children's voices (DEEWR, 2010, p. 12).

The importance of engaging children in sustained thinking and problem solving is further outlined in the curriculum document. Educators are expected to "...engage in sustained shared conversations with children to extend their thinking" (DEEWR, 2009, p. 15) and to "...use strategies such as modelling and
demonstrating, open questioning, speculating, explaining, engaging in shared
thinking and problem solving to extend children's thinking and learning"
(DEEWR, 2009, p. 15). Littledyke and McCrea (2009) also explore the value of
asking "meaningful, open-ended, speculative questions" (p. 46), posed by both
educators and children together, to open up avenues of collaborative discovery
and learning. Thus, educators working in the Australian early childhood field are
couraged to develop the skills of authentically engaging with children in
sustained conversations that extend learning and allow children to develop ideas
and share them with others.

On most occasions I actively listened to children's ideas, and discovered that
sometimes they had more knowledge about certain creatures than I had. I
conceded that they were 'experts', for example, about 'backswimmers', which are
aquatic insects of the Notonectidae family (Hadley, n.d., p. 1). Shea's explanation
of the tadpole's tail 'being sucked back into its body' made me realise I had never
really thought about what happened to tadpoles' tails, so this was a new idea for
me as well as for the other children. I believe it is important to acknowledge
children's ideas and knowledge, to develop a democratic context for learning in
which everyone's ideas and knowledge are respected. For young children this is
especially important as they are rarely treated as equals and even less often as
experts, and yet, as we have seen in this study, sometimes they do have expert
knowledge. The self-assurance that they gain from knowing that their knowledge
and thoughts are respected must surely inspire further learning and the
confidence to share their ideas with others.
Drawing plays an important role in shared, sustained conversations. Brooks (2005; 2006; 2009a) considers that drawing acts to focus children's thoughts and encourage sustained conversations. By representing the children's ideas, drawings allow conversations to take place over an extended time frame, particularly if verbal ideas are recorded with the drawing which can then be accessed later by the educator, and the conversation revisited and extended. In my study I found that drawing often acted as a focus for conversations (Dwayne and Shea drawing worms), was part of the evolving conversation (Sylvie and the storm) or was used to demonstrate ideas being expressed (Cody and the magnifying glass). I feel that drawing acted in a way to sustain the conversation, to keep the child focused on one train of thought as the drawing was produced and allowed the children to evaluate their ideas by making them visible.

The intercontextual space of constructed understandings encouraged sustained dialogue and led to the consequential progression of ideas (Wink & Putney, 2002). The EYLF specifically supports sustained, shared conversations (DEEWR, 2009, p. 15) as a way to extend children's thinking and learning. Drawing can play an important part in this to focus the children's thinking and make their ideas visible to others, to allow conversations to take place around their ideas. In my study, Dwayne's drawing of the snowman and his eggs (figure 12) stimulated and focused a 'sustained, shared conversation' about living and dying that would otherwise not have taken place. In another example, Cody developed his drawing of Katie with the magnifying glass (figure 24) after watching Katie draw hers (figure 23). Cody picked up on Katie's ideas and representation in order to examine her ideas for himself, thus leading to a consequential progression of
ideas. Had this study been pursued for longer, these drawings may have been revisited by Cody and Katie, or other children, to further develop their understandings and ideas.

**Environment as the third educator**

Developing an intercontextual learning space proved to be positive and productive in terms of both the physical and mental processes that occurred there. Our nature study table was used at every session with constant attendance of children, not always the same ones, involved in drawing, observing or engaging in conversation. As the children grew used to the routine of each study session, they were more comfortable with accessing their drawing books from the storage box, engaging with others in dialogue or bringing specimens to the table to be shared with others and studied. My choice and arrangement of the physical space was partly serendipitous and partly arose from my pedagogical philosophy that the environment contributes to how and what learning occurs. The large outdoor table on the veranda ensured numbers of children could work together, encouraging conversations and interactions. Our drawing activities and nature specimens were accessible and visible to children engaged at the table and also to other children passing by. Children were able to move freely between drawing, observing, exploring the playground or leaving the nature study activity altogether. I could also move easily between children working at the table and with others exploring in the gardens. Reflecting on how well this space functioned as a work area for both the children and myself, taught me a lot about the importance of the environment in both a physical and social sense.
This aspect has important ramifications for educators, as argued by the educators from Reggio Emilia (Gandini, 1998) who have termed the environment "the third educator" (p. 177). Physical space must be considered as part of the learning environment and process - will it support and enhance learning, or will it detract from it and make learning more difficult? A few questions to consider are: What messages does the environment give to the child? Does it allow children to make choices, be autonomous, have control over their own learning and resources, or does it restrict them to learning what we present to them as prepackaged ideas and curricula? I realised early in my study that children wanted control over their learning by finding their own bugs rather than studying the specimens I brought to the preschool. The children were free to join the study or leave at any time; they could investigate anything within the limits of the preschool and they had free access to their drawing books and materials. The research study included both child-initiated and educator initiated learning, which generally supported children’s thinking and development.

**Technical aspects: Video recording positives and negatives**

As Heath et al. (2010, p. 55) point out, camcorders may record good quality visual images but the sound recording is poor. I experienced this often in my recording as the audio recorder picked up a lot of background sound that made the children’s voices difficult and sometimes impossible to hear. As I reviewed my recordings later away from the preschool, I realised too late that occasionally I had not recorded their dialogue sufficiently well to be able to transcribe it, and had also missed opportunities to make written notes of their conversations. To rectify this problem, Heath et al. (2010, p. 55) suggest using an external
microphone, preferably an omni-directional one, positioned near to the
participants, although this may prove a distraction when working with children
and may be difficult to use in outdoor settings or when moving around.

In her study of kindergarten to grade three children, Brooks (2002) enlisted the
help of a research assistant to record the children with a video camera as she
worked with them. I can appreciate how this would have made my data
collection much more effective, as I would have been freer to interact with the
children. Often I only started recording once an interesting conversation or
interaction had already begun, thus missing the opening sequence of the
interaction. A second person to record the children's interactions may have been
better placed to record conversations and drawing events from the start. As I
was usually involved with at least one child during the whole session, I probably
missed many interactions that took place outside my range of sight or hearing.
An independent recorder may have been able to capture these otherwise
unknown events.

Overall, despite the poor sound quality and the drawbacks mentioned above, my
video recordings gave me a wealth of data that allowed many levels of analysis.
Each time the sequences were reviewed I found new information that I had not
been aware of before, or I could review the video clips looking for different
aspects of the children's (or my) experiences. I was also able to record the
children and be engaged with them at the same time, which written recording
would not have enabled me to do. I could talk to one child and record the actions
of another. Often the children wanted me to video their finds from the garden or
zoom in on a creature in its habitat. In this way the children's voices were included in the research and, although I did not use their recordings in my analysis, this could be a potential avenue for further research, collaborating with children and inviting them to become co-researchers.

In this type of qualitative study, video recording offers immense potential. It enables the researcher(s) to record a wealth of information, which then allows analysis on many different levels and at different times. In particular, research into human behaviour and experience is greatly enhanced by video recording and supports a range of different analytic and methodological approaches to the study (Heath et al., 2010). In particular, research with young children can be greatly facilitated by the use of video documentation.

**Research journeys**

Every journey answers some questions but gives rise to new ones from knowledge gained. My learning journey served to open up new vistas of territory to explore, new directions for others or myself to head into. A few suggestions for future research are briefly touched on below.

It would be informative to run longitudinal studies of children connecting to nature, looking at the effects of engagement with the natural environment over a much longer stretch of time. Are there connections between early learning and the development of an 'ecological self' that is retained into adulthood such as Chawla (2009) investigated? I found that the children in my study had already started to form attitudes to nature and the environment, not always positive.
Rachel Carson (1956, 1998) began taking her great-nephew Roger out into the natural world at 20 months old to introduce him to the wonders of nature. Perhaps immersion in nature needs to start from an even younger age than the children in my study; this would be an interesting research avenue to pursue. Research may inform the pedagogy in our early childhood services of the need to incorporate nature play into the curriculum for even the youngest of babies. In most parts of the world, children are exposed to the natural environment right from birth and grow up feeling that they are part of the natural world.

My study addressed making affective and cognitive connections with nature that I believe are the foundations for later learning about sustainability. The rationale for my research is expressed in the words of David Sobel (1999) which open the introduction to this study, in which he urges that children first learn to "love the earth" before they are exposed to the environmental problems that need addressing. I strongly believe that children need to learn first about how interesting, interconnected and wonderful the natural world is before they learn how to look after it. Having an understanding of and affective connection to the natural world will give them a basis for learning about environmental sustainability. Once children have some basic understanding of the processes of nature, then follow up learning could be in the direction of environmental sustainability with action research to develop teaching methods and curricula that will launch young children towards a sustainable lifestyle in adulthood.

Although research into children’s drawing has increased in the past decade, there remains much that we still need to know about the connection between
drawing, language and thought. We need to research ways to encourage the use of drawing for children, not only in early learning, but throughout their primary schooling. Educators need to find ways to effectively teach/encourage/facilitate the development of drawing skills and to enable children to use drawing as a mediator for thought, as another language with which to explore and express meaning.

**And finally...**

All journeys must come to an end, or at least give rise to a period of rest and reflection to process what has been discovered before heading out on another quest. This has been a challenging and exciting journey for me into territory that I had not previously explored, that of research and higher scholarship.

For children, connecting with nature will give them lifelong interest, wonder and joy. It will give them an understanding of life itself and the place that we have in the complex environment that is our planet. It may assist them to comprehend the huge environmental changes that are occurring which will have a substantial impact on their future lives. It will hopefully awaken in them the need for all humans to live more sustainably to reduce the vast environmental impacts that we have had on our world over the last century. But it may also give them the reassurance that life is wonderful and that we are all children of nature.
References


http://www.worldforumfoundation.org/working-groups/nature/


Slow Food Perth (2010). Retrieved from


Appendices

Appendix 1: UNE HREC Ethics Approval

HUMAN RESEARCH ETHICS COMMITTEE

MEMORANDUM TO: De M Brookes, A/Prof N McCrea & Ms A Heckrath
School of Education

This is to advise you that the Human Research Ethics Committee has approved the following:

PROJECT TITLE: Drawn to Nature: Young children’s learning about nature through drawing.
APPROVAL No.: HE10/086
COMMENCEMENT DATE: 16/06/2010
APPROVAL VALID TO: 16/06/2011
COMMENTS: Nil. Conditions met in full.

The Human Research Ethics Committee may grant approval for up to a maximum of three years. For approval periods greater than 12 months, researchers are required to submit an application for renewal at each twelve-month period. All researchers are required to submit a Final Report at the completion of their project. The Progress/Final Report Form is available at the following web address: http://www.une.edu.au/research-services/researchdevelopmentintegrity/ethics/human-ethics/hrecforms.php

The NHMRC National Statement on Ethical Conduct in Research Involving Humans requires that researchers must report immediately to the Human Research Ethics Committee anything that might affect ethical acceptance of the protocol. This includes adverse reactions of participants, proposed changes in the protocol, and any other unforeseen events that might affect the continued ethical acceptability of the project.

In issuing this approval number, it is required that all data and consent forms are stored in a secure location for a minimum period of five years. These documents may be required for compliance audit processes during that time. If the location at which data and documentation are retained is changed within that five year period, the Research Ethics Officer should be advised of the new location.

Jo-Ann Sozou
Secretary

10/06/2010

The University of New England
Research Division
Armidale NSW 2351
Australia
Phone 02 6773 3449
Fax 02 6773 3543
jo-ann.sozou@une.edu.au
www.une.edu.au/research-services
Appendix 2: Letter to preschool management committee

The President,
Management Committee,
XXXXXXXXXXXXX Preschool
24th March, 2010

Dear Madam,

I am currently studying for my Master of Education with Honours (Early Childhood) at the University of New England. My research is focusing on young children learning about the natural environment and how drawing can be used as an important tool in their learning.

With your approval, I would very much like to undertake my research at XXXXXXXX Preschool, where I would propose to run a series of nature study sessions in terms 2 and 3 this year. All children will be invited to be involved in the nature study sessions, as they will be run as a normal part of the preschool program.

I will also be interviewing selected parents and the staff about the children's learning. All participation in the research study will be voluntary and written consent will be sought from adult participants and from parents on behalf of child participants.

I have included a Participant Information Sheet which gives more details about the project and how I aim to implement it. I am willing to answer any queries or concerns you may have about the research project and will be available at preschool on dates to be decided, prior to the commencement of the project.

Yours sincerely,

Annie Heckrath
Associate researcher
Contact details: telephone number
email
Appendix 3: Letter from preschool management committee

To Annie Heckrath,

The Pre-school Management Committee discussed your research project at our last committee meeting and have agreed that the proposed research project would make an excellent addition to the programming and activities provided to our children at Pre-school.

We believe the activities you have planned will allow our children to develop an appreciation for the world around them, give them a variety of new hands-on learning experiences and develop their fine motor skills and hand-eye co-ordination when completing their drawings.

We look forward to seeing their journals as your project progresses. These experiences will no doubt create excitement for the children and we look forward to listening to them talk about what they have learnt at pre-school with Miss Annie. Your earlier visit has already generated much enthusiasm. We wish you the best of luck with your research on behalf of the management committee of Pre-school.

Your Sincerely
Pre-school Management Committee.

Vice President.
Appendix 4: Introductory poster

I’d like to introduce myself...

I’m Annie Heckrath; I was the director at this preschool from 2005 to 2008. I am now the co-ordinator at YYYYYYYY Preschool and I also teach part-time in Child Studies at TAFE.

I am currently studying at the University of New England in Early Childhood Education and I would like to undertake a research project at this preschool. It would involve presenting a series of nature study sessions with the children on a weekly basis for about a term. The children would be involved in discovering, observing, discussing and drawing natural objects that they find in their environment at home or preschool.

I would of course seek permission from both the parents and the children before their involvement in the project. Some parents and the preschool staff would be interviewed about the children’s learning. The project will be more fully explained before consent is given. I hope you will support me in this project which will be of benefit to the children as they learn skills of observation, drawing and finding out about the natural environment.
Appendix 5: Letter to parents

Date......................

Dear.............................................

I am currently studying for my Master of Education (Early Childhood) at the University of New England. My research is focusing on young children learning about the natural environment and how drawing can be used as an important tool in their learning.

My research will be undertaken with children at XXXXXX Preschool, where I will run a series of nature study sessions in terms 2, 3 and 4 this year. The management committee and director have approved my involvement, and my proposal has also been granted approval by the university’s Human Research Ethics Committee (Approval number: HE10/086).

All children will be invited to be involved in the nature study sessions, as they will be run as a normal part of the preschool program. If you are willing for your child's involvement to be documented for research purposes, please read the attached information sheet and sign the Parent Consent Form.

I will also be interviewing selected parents and the staff about the children's learning. If you are also willing to be interviewed, please sign the Adult Consent Form.

I am willing to answer any queries or concerns you may have about the research project. I will be available at preschool on the following dates prior to the commencement of the project: 28th June, 18th and 25th July.

Yours sincerely,

Annie Heckrath
Associate researcher
Contact details: telephone number
e-mail
Appendix 6: Participant Information Sheet for Adults

Drawn to Nature: Young children’s learning about nature through drawing

Dear Parents and Carers,

I would like to introduce myself – my name is Annie Heckrath and I am a postgraduate student at the University of New England. For those of you who don’t know me, I was the director of XXXXXX Preschool from 2005 to 2008. I have been the co-ordinator of YYYYYY Preschool since 2007 and I also teach part-time at TAFE in Children’s Services. Currently I am studying for my Masters degree in Early Childhood Education through the University of New England in Armidale. As part of my degree I need to undertake a research project in the early childhood field. I would very much like to carry out this research at XXXXXX Preschool, if you, as parents and carers, give consent for your children to be involved.

I have chosen to study how young children learn about the natural world, with a specific focus on drawing as a ‘learning tool’. Children can use drawing as a way to record and communicate their ideas, observations and understandings. Others can see from their drawings what they know and understand about their world. Their drawings can show how children’s learning and understanding changes and develops. My proposal is to work with the preschool children for about one hour every week on a regular day for about a term (10 visits), probably in term 2 or 3 this year. My ‘nature study’ sessions would be based around natural objects that the children or myself have found in our environment either at home or preschool. We may access the park next to the preschool to search for suitable subjects. I would encourage the children to observe closely the object in question, promote discussions, ask questions and look for answers. Part of our study session will be to draw the object.

I will provide all the children with small drawing journals or visual diaries (which they can keep), and good quality drawing tools which will be donated to the preschool after the study. I am planning to document the children’s work by photographs, videos, digital recording of discussions, scanning and printing out the children’s drawings. Children’s ‘stories’ about their drawings, their understandings and names for things will be written onto the individual drawings. Names will not be recorded on drawings. I will keep the children’s drawings with me for the duration of the project and then they will be returned to the children to keep. I will scan their drawings to keep a record for my research.

Children will not be identified by their names in this study. Any children whose parents do not give consent will not be officially observed and recorded, although they may be free to be involved in the sessions. Children will give their assent to be involved in each day’s session. I would run my ‘nature study’ session as an extra activity in the normal preschool program. Those children who do not want to be involved, will be free to participate in normal preschool activities. I will also conduct interviews with the teachers at preschool and some parents to ascertain the level of children’s learning, for which I will first seek their consent.

The final thesis will not contain any material in which children will be able to be identified. Any electronic data will be kept securely by me or deleted. After a period of five years, any data from the research project will be destroyed in keeping with the policies of the University. I will produce a version of my research report for the preschool community and a journal that is accessible by the children.

I hope that you will consent to your child being involved in this project. The children
will gain some skills in observation, drawing and increased understanding of the natural world. I feel certain this will be a positive experience for all the children involved. While teaching at XXXXXXX Preschool, I involved the children in a similar study of silkworms with surprisingly positive results in the children’s gains in understanding and development of drawing skills. I will make a few informal visits to XXXXXXX Preschool before I start my research to get to know the children and talk to any interested parents. I am happy to answer any questions regarding the project. Please fill in the attached consent form and return to preschool by / / 2010. If you do not give consent for your child to be involved in the project, the form still needs to be returned.

Many thanks for your interest,

Principal Researchers
Dr. Margaret Brooks University of New England Ph: 02 6773 2654
Email: mbrooks3@une.edu.au

A/Prof Nadine McCrea University of New England Ph: 02 6773 2039
Email: mccrea@une.edu.au

Associate Researcher
Annie Heckrath Phone number
Email:

This project has been approved by the Human Research Ethics Committee of the University of New England (Approval No: HE 10/086, Valid to 16/6/2011). Should you have any complaints concerning the manner in which the research is conducted, please contact the Research Ethics Officer at the following address: Research Services University of New England Armidale, NSW, 2351 Telephone: (02) 6773 3543 Email: Ethics@une.edu.au

Drawn to Nature: Young children’s learning about nature through drawing
MEdH-EC Research Project A. Heckrath University of New England Participant Information Letter v2:
22/3/10 Page 2/2
Appendix 7: Parent consent form

Parent Consent Form

*Drawn to Nature: Young children’s learning about nature through drawing*

I, [Parent/guardian]………………………………………………………………………………………… have read the information contained in the Parent Information Sheet concerning the above research project to be undertaken at Xxxxxx Preschool. I have had any queries satisfactorily answered.

By signing this consent form, I agree to allow my child

[Child’s name]…………………………………………………………………………………………………… to participate in the research study in the following ways:

**[Please cross out whatever does not apply]**

I consent / do not consent to the collection and use of information about my child

I consent / do not consent to my child being observed

I consent / do not consent to my child being videotaped

I consent / do not consent to my child being audio recorded

I consent / do not consent to my child’s drawings being reproduced

I consent / do not consent for my child to visit the parkland adjoining preschool in the company of Annie Heckrath and a staff member while engaged in nature study sessions with the associate researcher Annie Heckrath.

I understand that all information will be coded so that children are unable to be identified by anyone other than the research team. 

[ ] YES  [ ] NO

I understand that video and audio recordings are for research purposes only and will not be published. 

[ ] YES  [ ] NO

I understand that I may withdraw my consent at any time, provided that I communicate this to the researcher. If I choose to do this, all information about my child will be destroyed and not used in any manner. 

[ ] YES  [ ] NO
I understand that my child will be informed about the research project and will be able to give his/her assent to participate in each session. **YES NO**

I agree that research data from this study may be published, provided that my name or my child’s name is not used. **YES NO**

I understand that the nature study sessions will form an integral part of the normal preschool program and that all children will be free to participate or not. Only those children who give their assent and whose parents have given consent will be recorded and documented as part of the study. **YES NO**

............................ ............................ ............................ ............................
[Parent or guardian] [Date]

............................ ............................
[Investigator] [Date]

**Persons responsible for this project:**

**Investigator**
Annie Heckrath
Address
Email
Phone number

**Supervisors**
Dr Margaret Brooks  
University of New England  
Armidale NSW 2351  
mbrooks3@une.edu.au  
02 67732654

Associate Professor Nadine McCrea  
University of New England  
Armidale NSW 2351  
nmccrea@une.edu.au  
02 67732039

**Investigator coding system: Child number**

1 2 3 4 5 6 7 8 9 10

11 12 13 14 15 16 17 18 19 20
Appendix 8: Adult Consent Form (Parents or Staff)

Drawn to Nature: Young children’s learning about nature through drawing

I, [name]……………………………………………………………………………………………… ,

have read the information contained in the Information Sheet concerning the above research project to be undertaken at XXXXX Preschool. I have had any queries satisfactorily answered.
[I am the parent / guardian of] ..........................................................[child’s name]

By signing this consent form, I agree to participate in the research study in the following ways:
[Please cross out whatever does not apply]

I consent / do not consent  to the collection and use of information about my child/ XXXXX Preschool children for the purposes of this research study.

I consent / do not consent  to being interviewed about my child / XXXXX Preschool children

I consent / do not consent  to my interview being audio recorded

I understand that all information will be coded so that participants are unable to be identified by anyone other than the research team. YES NO

I understand that audio recordings are for research purposes only and will not be published. YES NO

I understand that I may withdraw my consent at any time, provided that I communicate this to the researcher. If I choose to do this, all information about me will be destroyed and not used in any manner. YES NO

I agree that research data from this study may be published, provided that my name is not used. YES NO

............................ ...............................
[Parent or guardian] [Staff member] [Date]

............................ ...............................
[Investigator] [Date]
Persons responsible for this project:

**Investigator**
Annie Heckrath

**Supervisors**
Dr Margaret Brooks  
University of New England  
Ardmale NSW 2351  
mbrooks3@une.edu.au  
02 67732654

Associate Professor Nadine McCrea  
University of New England  
Armidale NSW 2351  
mccrea@une.edu.au  
02 67732039

Investigator coding system: Child number 1 2 3 4 5 6 7 8 9 10

11 12 13 14 15 16 17 18 19 20

Staff Member 1 2 3 4 5 6 7 8 9 10  
Parent 1 2 3 4 5 6 7 8 9 10
Appendix 9: Children’s Assent Form  
(Verbal information and assent)

*Drawn to Nature: Young children’s learning about nature through drawing*

Child's name…………………………………………………

Hello, my name is Annie. I am going to come to your preschool to do some drawing with all the children. We’re going to find things in the garden and the park to draw, like leaves, flowers and bugs. Everyone will get a special book to do drawings in and I would like to take the books home with me so I can copy your drawings. I would like to video you doing your drawings and maybe record us talking about your drawings. When we’ve finished all our drawings, I’m going to write a book about the children’s drawings and all the things you’ve been learning about plants and insects. You will get to keep your drawing book when I’ve finished looking at the drawings.

Can I video you? YES NO
Can I take photos of you? YES NO
Can I copy your drawings? YES NO
Can I record your talking? YES NO

Signed…………………………………………......... Researcher Date   /   / 20

Signed…………………………………………......... Parent/guardian or Teacher  

Date   /   / 20

Heckrath, A. *Drawn to nature*. MEd(Hons) Thesis