IN SEARCH OF UNDERSTANDING CHILDREN’S ENGAGEMENT WITH NATURE AND THEIR LEARNING EXPERIENCES IN ONE URBAN KINDERGARTEN CLASSROOM

by

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A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy
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Abstract
Considering the context of large city schools, this study explores what variables in a kindergarten classroom may impact the process of children’s engagement with nature. In particular I examine the central role of children and teacher in co-constructing their own unique understanding, knowledge, and attitude towards the natural world. In this study, I examine nature-child’s connection considering the complexity of nature beyond a pre-packaged concept (Louv, 2007) and avoiding a linear identification of a cause and effect relationship between children’s learning experiences and nature, (Kellert, 2005).

This qualitative case study is based on extensive classroom observations, in which 20 kindergarten children and their teacher participate. The children’s direct, indirect, and vicarious experiences with nature are documented using digital photography, video-audio recording, and collection of artifacts. I interview the classroom teacher two times and invite the parents to fill up a questionnaire about their children’s experiences with nature outside the school time. I use the techniques and procedure of the grounded theory to analyze the data.

A comparative analysis of the five learning episodes demonstrates four major factors that when all woven together encourage and sustain the children’s engagement with nature. These factors are: investigating children’s meaningful and autotelic questions, encountering and experiencing nature in familiar contexts, developing emotional bonding, and having sufficient time. The findings show the crucial role of the classroom teacher in creating five main conditions
to engage the children in the process of each inquiry. She offers the children many opportunities
to use their prior skills and knowledge, take responsibility of their own learning, and experiment
with learning as a process. She often responds positively to the children’s learning endeavours
and communicates her high confidence and expectations for them.

This study makes an important contribution to the field of early childhood education and
environmental education by demonstrating the possibilities and challenges in actively and
holistically engaging children with nature in school settings. The findings shed light on our
understanding of children and teacher’s sense of ownership and motivation as two driving forces
of learning.
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Dedication

To my agentive partners: The children and the teacher who searched for nature in their city classroom, kept me engagement, and shared their joy of learning with me. My understanding of learning, nature, and the power of children is different because of you.
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Then to the lip of this poor earthen Urn

I lean’d, the Secret of my life to learn:

And Lip to lip it murmur’d – “while you live,

Drink! – for, once dead, you never shall return.”

Khayyam, Persian poet
Prologue

What is nature?

We often talk about and use the word nature in a casual way in our everyday language. But, if we try to define what nature really is, we will find that it is not easy. Our definitions depend on how we individually think about nature as well as how our society and culture shape the way we talk about, view, and culturally represent nature.
Is nature a wild field of dandelions?
Or boosted flowers in a pot?
Is there any dualism between nature, humanity, and society?

Can humans be a part of nature in our definitions?

How has the dominance of technology blurred the line between what is ‘natural’ and ‘man-made’?

Is it helpful to have an inclusive definition of what nature is?

Or an exclusive definition of what nature is not?
Defining what nature is in a big city is even more challenging often creating hot discussions because nature is not free of our influences.

Is a ‘cut-and-paste’ garden nature? How about dressed-up pet animals? Or fake ‘falls’ in shopping malls?

Or are the nature trails which pass through our roads natural?

What about raccoons and squirrels that live with us in the city?
How could any of our definitions include the children’s experiences with nature in large city schools?
In which,
Nature can yet be a rich sensory world with open-ended materials and free spaces
Full of wonder and joy inviting children to touch, to listen, to smell, to see, and to relax.
In one approach nature can be considered as "properties and processes that are indeed independent in the sense that they are not humanly created but only humanly managed" (Soper, 1995, p. 154).
At the center of this study is a construct of nature which includes nearby and familiar natural landscapes of large cities, where 55% of the world population lives at the moment and where by 2040 about 70% of men, women, and children will start their mornings.
In this study, nature is a ‘green’ web of objects, events and elements, animals and plants interconnected through complex bionetworks, survival processes, and socio-cultural correlations. In an anthropocentric perspective, ‘naturalness’ becomes a matter of degrees. Natural things in general are those that have been less substantially processed and changed by human intervention. So, we may say a tree branch is more natural than a wood chair, and a wood chair is more natural than a plastic chair.
Chapter one

The Context of Children’s Lives in a Metropolitan City: Recognizing a Concern for Alarm

Recent research by health and educational experts has warned us that children’s opportunities for direct contact with the natural world are diminishing (Alliance for Childhood, 2004; American Academy of Pediatrics, 2006; Kahn & Kellert, 2002; Louv, 2006). At home, children are spending longer hours in front of screens (Kaiser Family Foundation, 2006). Current national data indicate that only 10% of Canadian youth are meeting the guidelines for screen time of less than 2 hours per day and many get close to 6 hours per day. Data indicate 87% of children and youth are not meeting Canada’s physical activity guidelines of 90 minutes of physical activity per day (Active Healthy Kids Canada, 2009).

At school, demanding curriculum, high academic expectations, and standardized testing have placed limits on children’s outdoor free explorations. In one broad research of 450 children, ages 3-5, from 24 preschools in a metropolitan area of South Carolina, researchers found that children are largely indoors and sedentary at those preschools (Brown, Pfeiffer, McIver, Dowda, Addy, & Pate, 2009). 87% of researchers’ observations of children occurred inside and during this inside time, 94% of children’s total time was sedentary.

In the wider community, the dominance of what Louv (2006) called “the criminalization of natural play” (p. 27) and the fear factor have dramatically limited and restricted children’s experiences in parks, ravines, and even backyards. Commercialization of play and our urban lifestyle have left very limited time and place for children to immerse in and directly experience nature.

One may argue that our world is changing. Our children’s ways of living, learning, communicating, viewing, and playing have dramatically changed: our city children are one click
away from surfing the Web to learn about global warming; they can campaign to raise awareness about deforestation of Amazon rainforests in their school merely via texting their peers and teachers; they can watch the recent tsunami in Japan on their smart phones; they can play environmental video games to become aware of their daily footprint on the earth. A bombardment of information technology is connecting children to the natural world and challenging them to develop a sense of environmental awareness in a way that we could not even imagine a decade ago.

Connecting to and learning about nature through books and on screens are important; however, these vicarious and abstract experiences cannot replace the rich sensory experience of direct connections with nature (Kellert, 2005). If a child has never dug the earth to look for worms or chased the butterflies in a park, how will he or she develop a relationship with nature based on love and care? Some environmentalists suggest children first need to learn to love nature to be able to develop a strong sense of responsibility and motivation to protect it throughout their lives (Chawla, 2006). Ray and Laminack (2001) suggested children need to have many unstructured, self-initiated, and explorative contacts with nature to become the kinds of people who are respectful and supportive of the natural environment. Children need many direct experiences with nature to “lie on their backs in open fields, … get down on their knees at the edge of murky ponds, or stand out in rainstorms” (Rosenow, 2008, p. 1) to develop curiosity and ask questions about pond life, rain, or sky. I suggest that children also have rights to discover and connect to nature close to their daily life, to their home, to their schools, and to themselves.

Children’s disconnection from nature, or what Louv (2006) called “nature deficit disorder,” (p. 34) has serious human costs, including attention difficulties, learning disabilities, increasing rates of socio-emotional and physical illnesses, and a declining sense of responsibility
towards the earth (Fjørtoft, 2001; Moran, 2006; Nabhan & Trimble, 1994). Louv’s (2006) book, *The Last Child in the Woods* has created a growing international movement to develop ways to reconnect children to nature. This emergent movement and the associated research are helping teachers, administrators, parents, and the larger community to become more aware of the benefits experiences with nature give children. There is strong evidence that the time children spend in the natural world can improve their cognitive abilities, reduce symptoms of attention deficits, and decrease negative effects of stresses and depression among many other benefits (Faber & Taylor, 2001; Hilgers, Haynes & Olson, 2008; Kaplan, 1995; Sobel, 1993; Wells & Evans, 2003).

**The Focus of the Present Study**

Several research studies have addressed various aspects of children’s experiences in nature. Some of these studies have focused on the structured and goal-oriented experiences of children aiming to raise environmental awareness to foster a more sustainable life style (Barton, Koch, Contento, & Hagiwara, 2005; Brinn 1996; Potter 2007). Another body of research explored children’s free-choice and informal learning experiences with nature in settings such as museums or zoos (Brody, Tomkiewicz, & Graves 2002; Falk & Dierking 2002; Rounds 2004). Within this research on environmental knowledge, attitudes, and behaviors, research on young children’s learning experiences through engagement with familiar natural environments in their school setting is sparse.

In academia, research is often grounded in researchers’ desires to answer their professionally and personally relevant questions (Strauss & Corbin, 1998). Rooted in my teaching experiences and knowledge of kindergarten classrooms and with a goal of addressing the gap in literature, I became interested in understanding ways children encounter and engage
with nature in a school setting. What sense could they make of their experiences with nature? What could nature mean to children in large cities and what opportunities do they have to connect with nature? I was also seeking to learn more about the significant role of teachers and pedagogy in mediating children’s interaction with nature in schools.
Commenting on the fences around her Kindergarten playground, Rauz said, “I don’t like it. It’s ugly. Now, I make it beautiful!”

She looked around in the grass close to her school and picked some dandelions to tie to the fence. After a few failed attempts, she realized that she needed a dandelion with a long stem.
This research study was guided by one central question:

- How does the process of engagement with nature contribute to learning experiences in an urban kindergarten classroom for children ages 4 and 5?

The following sub-questions emerged as the research unfolded:

- Within the context of a mandated public kindergarten curriculum, what are the possibilities and challenges in actively and holistically engaging children with the natural world?
- What factors in a kindergarten classroom can facilitate and sustain children’s engagement with nature?
- What is the role of the classroom teacher in facilitating children’s learning experiences?

Drawing on the literature on the complexity of defining nature (Soper, 1995) and the various ways that children experience nature (Kellert, 2005), I was cautious about ensuring that my research questions did not lead me to a simplistic identification of a cause and effect relationship between children and nature. The literature review demonstrates many of the ‘positive’ effects of learning about, spending time, and interacting with nature for both children and adults. However, I was aware that this is often not a linear cause and effect relationship, as some of the more quantitative research aims to show. The interaction, relationship, struggle, and interdependency between human beings and nature, especially in a classroom setting, require more attention to the qualitative aspects of the phenomenon. To better understand the phenomenon of children’s engagement with nature, in a context which is both particular and general, I suggest it is essential to conduct a qualitative research project that views the whole child and his or her competencies and rights to grow in and with nature. In this regard, the value
of the natural world goes beyond being a display for only aesthetic purpose in a classroom setting. Nature and its contribution to life during and beyond childhood appear more complex and important than can be demonstrated in standardized means of measuring learning outcomes. I decided to conduct a case study to examine when and how free and less structured time with nature can contribute to children’s learning experiences in an urban kindergarten classroom.

**The Roots of the Study**

I do not separate who I am as the researcher from the research study that I planned to conduct (Stake, 2010). My professional and personal experiences influenced the questions that I asked, where I chose to look, what and how I collected my data, and how I interpreted them. In the following sections, I reflect on some of the professional and personal roots of the present study.

**Professional roots.**

Dropping off my daughter at 8:30 am in school, where she would spend six hours inside a classroom everyday, and going to work at my computer for over eight hours a day five days a week, I wonder what possibilities we have to connect with nature in our day to day city life. What do long hours of indoor life and work mean to me, to my daughter, to us, and to our shared physical and emotional health? How may this lifestyle impact our work, our thoughts, and our relationships?

Reflecting back on hours and weeks that I was often trapped indoors with 24 children ages 2.5 to 5 in a daycare setting, I remember not enjoying winter in Canada at all. The challenge of dressing 24 young children to go outside on cold days, the icy condition of the playground, the families’ concerns about taking their children outdoors when it was cold, the number of children who were not feeling well enough to be outside, and the reluctant teachers were often
challenging any attempt to go out. With a lack of an indoor gym, children themselves felt restless, inattentive, and even bored being in a small classroom for 7 to 11 hours a day. They were also challenged by a constant requirement of *no running* and *no jumping* in order to not to hurt themselves or their peers. The children missed many days of school because of sickness; parents were complaining of having to take many days off from work to take care of their sick children. My colleagues and I were suffering from flu, stress, and fatigue. We were all counting down the days to spring when we would be able to be outside again to picnic, play, build, and relax.

I ask myself how we can overcome some of the above challenges to improve the life and learning experiences of our young children in schools.

My memories and reflections remind me of another challenge that I faced as a teacher of young children. I remember teaching infants, toddlers, and preschoolers in classroom environments that were, at times, physically, emotionally, culturally, and socially ill-equipped to respond to children’s ways and rights of engaging with nature: for example, they only had few small windows to allow in natural light or fresh air; they disregarded the learning benefits of children’s play at the water or sand table; they designated the left-over time for children’s outdoor experiences; and they were loaded by mono-color plastic toys and materials and had poor natural texturescape (Vecchi, 1998).

I noticed children in these classrooms were usually less engaged in activities, inattentive, stressed out, restless, and at times bored. Non-constructive conflicts between teachers and children or among children were not unusual. Kuo and Sullivan (2001) suggested that crowding, high temperatures, and noise are linked to aggression and violence in human. Instead, as soon as my students stepped out of the classroom breathing in fresh air, feeling sun on their skin, dancing
on the grass, and playing in the water, they became energetic, happy, engaged, and cooperative. After these experiences, they appeared to be more focused, less stressed, and calmer back inside the classroom. Recent research in ecopsychology affirms my observation of the positive effects of spending time in nature on children’s physical and emotional health (Duncan, 1998; Roszak, 1992).

Researching the many opportunities of connecting children to the natural world, I learned about a few programs which have made this a priority. For example, in Forest Kindergartens, children start their day outdoors in a green area in any weather condition. They spend the whole day exploring and investigating nature, eating food, and singing and dancing in the woods (O’Brien, 2009). Another example is the infant-toddler centers and preschools of Reggio Emilia, Italy, where nature is invited inside classrooms where healthy green plants, natural light, natural materials, and caring for animals are at the center of their daily program (Edwards, Gandini, & Forman, 1998).

There are creative ways to take children outdoors to nature or to bring nature inside. Freezing winters, rainy days, lack of resources, and living in large cities should not necessitate “indoorization” of our children. So, what are the possibilities for not losing our natural connection with nature but to support and enrich it in our schools and classrooms? What could be the possible impact on children in schools? What are some of the challenges? After all, do direct experiences with nature really matter anymore?

Personal roots.

My childhood and adulthood.

My parents are from a small dry city surrounded by sand and semi-desert landscapes in northeast Iran. My memory of their home town is filled by summer days that we spent in Zomay,
a small village where in late afternoons, my mom, my cousins, and I walked for hours on gravel paths which connected villages to each other. I loved the silence in the desert and the power in the sky. I remember sleeping for many nights under a sky sparkling with millions of stars decorating the Milky Way. I chilled seeing the sky brightening before the sunrise while I sat at the edge of a never-ending desert.

I grew up sharing a city with 12 million people in Tehran, Iran. I fought my way to school and work among millions of cars and people everyday while thinking I belonged to that desert panorama where the silence was listening to the stream of my thoughts and the wind was blowing my worries away. Today, the desire to be immersed in that solitude of sands and the overwhelming demands of life in megacities are here with me.

My deep sense of belonging to ‘nature’, something wiser and more powerful than me, and the happiness that I am still able to find in smelling a soft maple leaf in Canada motivate me to continue searching for pieces of nature in places where I live. I search for a connection to help me to give meaning to my day to day life, to cope with the negative stresses of work, to overcome my frustrations over heavy traffic, and to laugh at my weaknesses in fighting with a tiny flu virus. It is a search and a cultural connection and knowledge which I share with my family and we constantly reconstruct.

My childhood positive memories and experiences in nature, which continue into adulthood, play a significant role in shaping and informing my understanding, attitude, and relationship with nature. I learned about nature not just with my brain and physical body but experienced it with my heart, mind, and spirit. If these ways of knowing nature are vital, how can we make sure that the generations after us, my children and our children, still enjoy many positive experiences with nature?
Holding a flower and a bag Rauz is carefully observing a snail that we found on our way to a trail.

*My daughter experiencing nature in a megacity.*

The lights, sounds, and scents of big cities often hide the pieces of nature otherwise so close to us. My daughter, Rauz, and I often sit close to a green bush searching for bugs. If we find one, we stay quiet for a few seconds hoping to hear the sound of him crawling up a stick (image 3). She loves our adventurous explorations in nature where we are open to unexpected encounters.
Image 4. Rauz enjoys challenging her balance skills walking on rocks by a small lake close to our city.

Since Rauz started crawling, I rarely stop her. I often stay close to her allowing her to test her abilities and explore her environment. By taking risks, she has learned a lot about her body and has developed a strong confidence in her physical abilities (image 4); this has developed her kinesthetic intelligence as well (Gardner, 1999). Being a physically active child, however, has
not been a challenge in moments of sitting and quietness for her. Observing her at carpet time in a preschool classroom, I was often surprised by how at 2.5 years she was able to keep her body in control for about half an hour to conform to the rules of sitting at the circle time. Could so many opportunities for outdoor play and exploration and a physically active life style better prepare her for the demand of long hours of sitting on the carpet and at the table under the current pedagogy in public schools?

For Rauz, the benefits of being outdoors are not limited to those mentioned above. Generally, she is a very healthy child who rarely misses school due to illness. Connecting to nature and experiencing peaceful moments in the natural environment have helped her to be physically and psychologically healthy and apparently happy. Together, we are committed to construct a happy relationship with and develop a sense of belonging to nature in the big city where we live. Research also suggests that children and adults who spend longer hours outdoors are physically and emotionally healthier (Bell, Hamilton, Montarzino, Rothnie, Travlou, & Alves, 2008; Charles, Louv, Bodner, & Guns, 2008; Kaplan, 1995; Lewis, 1996; Wells, & Evans, 2003). Reflecting on my own experience and the current research, I agree with Godbey (2009) that “The major determinants of health may have little to do with the health care system” (p. 5). Social, cultural, and environmental aspects of health and well-being need to be considered and studied as well.

Is this a simple picture?

A colleague of mine raised an important question, “How about the children who physically or psychologically do not enjoy rolling down the muddy grass hills or touching slimy slugs? What about the children who have terrifying memories of and experiences with nature? Do all children really love to be in nature?” That’s an important question to consider. The silence
of, the closeness with, the immersion into something unknown can be an overwhelming feeling and experience for some children. I remember a personal experience when,

Early one morning, I took Rauz, who was three, and Aki, who was six, out for a walk on side streets close to the country cottage that we rented for a weekend. Aki is my very close friend’s daughter. While we were walking quietly hand in hand enjoying the beauty of the neighborhood, I turned to Rauz and Aki and said, “Hush! Listen, what do you hear?” Being familiar to our listening walk, Rauz stopped and focused to listen. To my surprise, Aki looked alarmed and unsafe and quickly told me uncomfortably, “I want to go back home. It’s very quiet here.” Did I scare her? Did she think something bad was going to happen? I tried to explain, “Aki, listen to the birds singing in the morning.” She repeated, “I want to go back.” Although Aki knew me very well and always trusted me, my attempt to get her comfort and trust back failed and we went back to the cottage. I assumed Aki would have enjoyed quiet time and solitude in nature, but I was wrong. She either associated the quiet atmosphere of nature with something unknown and so unsafe or she was not sure how to interpret my signal.

This experience encouraged me to question my assumption that all children would enjoy a moment of solitude in nature. I noticed Aki, as young as six, has already started constructing and defining her understanding of and relationship with nature. It is an understanding that can influence the kind of connection she may seek to create with nature as an adult.
The Role of Urban Schools

Schools play a very important role in supporting and encouraging children’s connection with nature. Today, many young children spend more waking hours in schools than at home and with their families. In Ontario, children Grades 1 to 6 spend 6 hours in school while they may spend another 4 to 5 hours in a before/after school program every weekday. With Ontario’s new plan to implement full day kindergarten which has started in 2010 and will end by 2014, our classrooms must ensure healthy connection and engagement with nature for the estimated 250,000 kindergarteners ages 4 and 5 who will also spend minimum of 6 hours a day in school.

In the beginning of the 21st century, our socio-cultural, environmental, political, economic, and health complexities have demanded that educators explore ways to improve the reciprocal relationship between individuals and the natural world. Our schools need to compensate for children’s limited connection with nature and lay the foundation for their lifelong learning, wellbeing, and health.

The Structure of the Thesis

This study is represented in ten chapters. Following the introduction of the study in chapter one, chapter two discusses the complexity of any definition for what nature is and presents the current research on how children may experience nature and what the possible benefits are for them. Chapter three examines learning as a complex process and gives an overview of The Conceptual Model of Learning as a framework that informed this study’s focus on children’s learning experiences in and about nature. This chapter continues by discussing the significance of children and teacher’s sense of ownership and motivation as two driving forces of learning. This chapter presents an overview of literature on inquiry-based learning as one approach to support and include children’s interests and questions in a learning situation. While
the literature review and the definitions are not exhaustive or conclusive, they provide a starting point for further discussion throughout this dissertation. The literature review informed this study’s approach to nature as a socio-cultural construct, viewing it beyond ‘wilderness,’ and suggested that learning in and about nature in school settings needs to be examined as a complex process in which children and teacher play a central role in developing and investigating their own questions.

Chapter four outlines the research methodology and design that I used in this study. This study is based on extensive classroom observations over five months, in which 20 kindergarten children and the classroom teacher participated as the agentive partners. The classroom teacher was interviewed two times, while ongoing conversation with the teacher and the children were also at the heart of the data collection process. To better understand some of the children’s experiences with nature outside school time, a questionnaire was also filled out by families. Photographs, videos, samples of the children’s artifacts and my reflective journaling were other sources of data for this study.

Chapters five through eight discuss the research findings with each chapter starting with a narrative describing one learning episode followed by data analysis. I use Comic Sans MS font for the narratives. Chapter five provides insights into the significance of the active roles of children and teacher in co-constructing a learning experience and argues that learning is more meaningful, engaging, and authentic when learners have the agency to create their own questions and seek answers for them. In contrast, when learners are denied an active role, they often feel less enthusiastic, motivated, and challenged to participate in a learning experience.

Chapter six examines how the process of direct experience with nature through an open window can engage children and offer them many opportunities for scientific and socio-
emotional learning experiences. The findings also suggest that when the teacher pays attention to the children’s lack of engagement and changes the classroom environment to invite their interests and questions, the children also respond positively by becoming more involved and generating questions.

Chapter seven further builds on the findings of chapter six and examines what happens when the process of the children’s learning experiences with nature is not linear and pre-determined. The chapter explores how the children’s cognitive conflicts can lead to social bonding among them and how the classroom teacher can facilitate and guide the process of the children’s learning rather than overriding it.

Chapter eight expands on the findings of the previous three chapters by extensively examining the extended inquiry about hatching chicken eggs in the classroom. The chapter considers the role of the classroom teacher in pre-planning but not scripting the inquiry to prepare the children for the process of hatching. Findings illustrate the teacher’s strategies in inviting children’s questions and interests throughout the inquiry. This chapter also highlights the value of collaborative learning to include other classes and the office of the principal in creating meaningful and engaging learning experiences for the children in the context of a long-term and demanding inquiry. Chapter eight suggests that learning occurs at the intersection of arts, play, social-emotional relationships, and cognitive endeavors.

Finally, in chapters nine and ten, I summarize and discuss the findings addressing three research questions. In chapter nine, I address my first research question and suggest that the findings indicate the children’s learning experiences are fully situated within the expectations and recommendations of the Early Learning – Kindergarten program published by the Ontario
Ministry of Education (2010). My goal is to encourage teachers to consider the possibilities of inquiry-based learning in nature in the context of a mandated curriculum.

Finally, in chapter ten, I address the other two research questions and suggest that four major factors, when all woven together, encourage and sustain the children’s engagement with nature: investigating children’s meaningful and autotelic questions, encountering and experiencing nature in familiar contexts, developing emotional bonding, and having sufficient time. The classroom teacher also plays an essential role by creating the conditions of learning and facilitating the children’s inquiries. This chapter concludes with the implications of this study for theory and practice suggests possibilities for further research.
Chapter Two
Nature and Children

Introduction

A review of literature establishes the complexity of the concept of nature. The effect of human beings on nature and the dominance of technology in our modern life have blurred the line between what is created by nature and what is man-made. We used to think robots are man-made and mice are not; however, that which we consider natural or free of human influence is presently diminishing; examples include genetically engineered plants and animals and nanomachines (Louv, 2006).

This chapter is organized into three main sections in which I review the relevant literature on the construct of nature, the various ways in which children may experience nature, and the benefits for young children of experiencing nature. The literature review in the first section focuses on the human – nature interrelatedness and the socio-cultural construct of nature. In the second section, I draw from Kellert’s (2005) model as the framework for examining the children’s experiences with nature. The last section reviews the literature on the physiological and psychological as well as learning benefits of experiencing nature for young children.

Nature in our Everyday Language: Anthropocentric and Biocentric Approaches

We often talk about nature in a casual way and frequently use the word nature in our everyday language, rarely realizing it is not easy to define this complex and multilayered concept. Challenging the discourse around defining nature and acknowledging this complexity, Soper (1995) argued that any definition of nature depends on "how it is thought about, talked about, and culturally represented" (p. 21). The dominant definitions of nature can be examined against two main approaches: anthropocentric and biocentric. Kahn and Kellert (2002) argued,
Anthropocentric reasoning is based on how effects to the environment affect human beings, including appeals to human welfare, personal interests, and aesthetic. Biocentric reasoning is based on how the natural environment has moral standing that is at least partly independent of its value as a human commodity, including appeals that nature has rights or has intrinsic value. (p. xi-xii)

In an anthropocentric approach, people’s interests and wellbeing are situated at the center of human – nature interaction and inter-relatedness. For example, nature is valued, respected, and protected because it has the potential to satisfy our mental, physical, and spiritual needs and desires. Bonnett (2007) questioned the instrumental idea of sustainable development which he argued reflects our “highly anthropocentric and economic motives” to consider nature “essentially as a resource, an object to be intellectually possessed and physically manipulated and exploited in whatever ways are perceived to suit (someone’s version of) human needs and wants” (p. 710). In contrast, a biocentric approach attempts not to commodify nature as merely our possession but as something that has its own rights and values. The line between these two approaches is not always clear-cut; rather, a definition of nature often sits somewhere on a continuum between these two approaches.

The Inter-relationship between Human and Nature: We Need Nature and Nature Needs Us

The United Nation World Charter for Nature (1982) emphasized the interrelatedness and the nurturing values of nature for humans and underlined, “Civilization is rooted in nature, which has shaped human cultures and influenced all artistic and scientific achievement; living in harmony with nature gives man the best opportunities for the development of his creativity, and for rest and recreation.” In this statement, nature is considered as the main source and the origin of civilization and human achievement throughout history. This statement also puts nature in a
strong position, claiming nature possesses the power to give human beings intellectual as well as psychological stimulation and maturation.

Dewey (1900/1963) opposed reducing nature “to a mass of meaningless details” (p. 141) and studying it only as an object to be observed. Instead, he argued the need for raising children’s awareness of the mutual interdependency between individuals and the natural world. With this approach, we can view nature as a complex "web of life" (Moran, 2006, p. 74) on which we depend for food, comfort, and existence.

Nature has also been represented as a rich sensory world with free spaces and open-ended materials by some environmentalists, architects, and educators (Day, 2007; Helm & Katz, 2011; Louv, 2006; Rainville, 2008). It is composed of “loose-parts” (Nicholson, 1971) offering children alternative choices for creative engagement, calming stimulation, and delightful imagination, which are considered to be the essence of ecological literacy (Moore & Wong, 1997; Orr, 1992). In this view, nature is identified as the source and stimulator of our creativity and imagination because of its engaging sensory qualities and indefinite features.

The above-mentioned approaches to nature are anthropocentric; that is, they situate the interaction between humans and nature and their inter-relatedness at the center and consider nature as a powerful source for humans’ physical, psychological, emotional, and aesthetic welfare. For this reason, our relationship with nature is valued and, in particular, children’s connection with nature needs to be promoted and supported.

Is Nature a Socio-Cultural Construct?

In one approach, nature can be viewed as a “green world” (Chawla, 2002, p. 200) of plants, objects (such as stones and rocks), events and elements (such as rain and wind), and animals (Kahn & Kellert, 2002, p. xiii). This view can be challenged because it limits nature to
its physical features ignoring its socio-cultural and political construct as well as the human impact on the natural world. At the beginning of the 21st century, this impact has been so extensive that some environmentalists have considered nature mainly as a “cultural product or construction” (Soper, 1995, p. 152). Recent work in critical human geography has also challenged the dualism of nature and society, highlighting the role of power relations in constructing the concept of nature and arguing that nature is socially constructed (Castree & Braun, 1998; Demeritt, 2002; Proctor, 1998).

Soper argued (1995) that nature’s “properties and processes are indeed independent in the sense that they are not humanly created but only humanly managed” (p. 154). This definition also echoes Chawla’s (2002) viewpoint that nature “exist(s) independent of human creation, although they may be shaped into forms of human design” (p. 200). Bonnet (2007) distinguished between the quality of our experience of nature and nature as a concept (p. 712) suggesting “as with all other concepts, we can say that they are socially produced. However, within this socially mediated experience we encounter nature as precisely not socially produced” (p. 712). His view challenges the notion of nature as a socio-cultural product in a sense that our understandings and experiences of nature can be socially mediated but that nature, itself, is not determined by humans; it is not a social product.

However, in my point of view, from an anthropocentric perspective, naturalness is a matter of degrees. Natural objects in general are those things that have been less substantially processed and changed by human intervention. So, for example, a tree branch is more natural than a wood chair, and a wood chair is more natural than a plastic chair.

Informed by the above-mentioned literature, I view nature as a ‘green’ web of objects, events, elements, animals, and plants all interconnected through complex bionetworks, survival
processes, and socio-cultural correlations. To connect and develop an intimate relationship with nature, I adopt Bonnet’s (2007) suggestion that we need

a kind of knowing in which personal, moral, and aesthetic dimensions are embedded, i.e.,
a knowledge of things in which ‘fact’ and ‘value’ are not separated out because things are perceived in their life, wholeness, and inherent mystery. This suggests that we perhaps need to rehabilitate the notion of ‘knowledge by acquaintance’ into the curriculum, where the character of the acquaintanceship is akin to (but not identical with) the sense in which we may become acquainted with a person – a direct, intimate, tacit knowledge that affects and is capable of engaging all the senses. (p. 714)

**Experiencing Nature**

**Modes of experience.**

Sensory learning is often dominant during the early childhood development (Dietze, 2006; Katz & Chard, 2000). The practice and ongoing research in the preschools of Reggio Emilia, Italy show that the auditory, kinesthetic, tactile, and visual quality of the environment play a significant role in engaging children and enriching and sustaining their learning experiences (Edwards, Gandini, & Forman, 1998). Nature with its rich spaces such as ponds and bushes, its open-ended objects such as sand and twigs, and its surprising events found in rainbows and storms offers opportunities for a “sheer sensory experience” (Cobb, 1977, p. 29) to observe, listen, smell, play with, and manipulate.

Educators observed that children are attracted to and curious to investigate detailed information-rich sensory domains. For example, in their study of 20 students in Grades 4 and 5 in a three day residential environmental education program, James and Bixler (2008) found that students mainly used their senses to interact with the new natural environment. Sense of touch, seeing, and hearing provided the students with opportunities to build intimate and memorable relationships with natural objects and animals. In an interview at the end of the program, almost all the students remembered and valued seeing and touching live animals or hearing the sound of the stones that they enjoyed throwing in the water. The findings of this study illustrate children’s interests in exploring and investigating nature with all their senses and the significance of sensory experiences in helping them to know and connect with nature.

Sensory experiences are not the only way to experience nature in early childhood. Some environmentalists suggest children connect with nature at some deeper levels too. For example, Chawla (2002) viewed nature beyond its physical elements and brought the perspective of spirituality to the foreground, examining children’s special moments with nature that are filled with tenderness, love, responsive caretaking, and what she called “patterns of divinity.” Respecting and valuing these moment, Chawla invited researchers and educators to study how children may develop spiritual connections with nature.

Although in the modern urbanized life style, nature may seem irrelevant and even less visible, Kellert (2005) argued, “Nature continues to dominate the forms, patterns, and language of everyday life” (P. 3). He reminded us that the materials we choose to use, the designs and decorations of our spaces and clothes, and even our recreational choices are highly dominated by our connections to and interpretations of nature. We adore and pay a lot of money to own natural stones and metals, such as diamonds or gold. We decorate our offices with flowers, green leaves,
and even fake plants. We choose to spend our vacations by blue oceans. Considering the complexity of what nature is and the depth and breadth of human being’s modes of experience with nature, all of these choices form our daily encounters and interactions with nature, either directly, or more indirectly and symbolically.

**Kellert’s model and three modes of experience with nature: Direct, indirect, and symbolic.**

Kellert’s (2005) approach to recognizing and valuing as well as categorizing the different modes through which children may experience nature has informed this research study. His model was used as a framework to observe, collect, and analyze the data. He suggested children experience nature in three modes of direct, indirect, and vicarious or symbolic. In direct experience, children interact with “largely self-sustaining features and processes of the natural environment. These forms of direct contact include plants, animals, and habitats that function mostly independent of human input and control, although they may sometimes be affected by human activity” (p. 65). Children may directly experience nature in settings such as a meadow, a forest, a park, or even the backyards of their own homes. These settings offer children many opportunities to climb, catch things, touch and smell, and get messy while their contact is relatively spontaneous, unplanned, and self-initiated.

In contrast, children’s indirect experience with nature, “although involving actual contact, occurs in created and highly controlled environments that depend on ongoing human management and intervention” (Kellert, 2005, p. 65). Kellert suggested that this kind of experience may occur in places such as zoos, nature centers, and museums and is highly structured, planned, and organized. Indirect experience further includes children’s interaction with pets and plants at home or farms because these living things in some degrees depend on
human control for their survival. Although Kellert did not distinguish between children’s indirect experiences with animals or plants at home with their experiences in places such as zoos or nature centers, it seems that the home environment can offer children more opportunities for spontaneous, intimate, and child-initiated communication and interaction.

Finally, in vicarious or symbolic experience, children do not contact with actual features of nature but, rather, “with the image, representation, or metaphorical expression of nature” (Kellert, 2005, p. 66). Kellert argued that children’s symbolic interaction can be both evident and obscure because they often encounter a wide range of images and symbols of nature through their clothes, toys, stories, or on different technological devices. At a very young age, they may start playing with teddy bears, reading the story of the Three Little Pigs on a Leap Frog reading system, playing Mickey Mouse video games on a tablet computer, and watching National Geographic documentaries on television. Although this mode of experience may seem a modern phenomenon, Kellert believed it has its roots over along human history, where metaphorical representations of nature are often central in fables, myths, and totems.

In this study, I considered children’s experiences with nature on a continuum and examined both their direct encounters and interactions with the wilderness and their indirect and symbolic experiences with humanly-designed and structured natural environments in a school setting. I viewed nature beyond a packaged entity (Louv, 2006) and observed children’s interactions not only with animals and plants, but also with sunlight and fresh breeze, bird’s nests and seeds, pictures of nature, and books. I was interested in understanding how each element of nature offers children ‘ecstatic moments and places’ (Chawla, 1994) to touch, to listen, to smell, to see, and to be calmed by. This research study considered all three modes of experience while acknowledging each experience could have different effects on children’s physical,
psychological, cognitive, and affective learning experiences.

**The value of direct experience with familiar natural environment.**

The research and theoretical discussions promote the importance of direct experience with ordinary and nearby natural areas during childhood (Nabhan & Trimble, 1994; Pyle, 2002; Sobel, 1993). The familiarity of children with a natural setting plays an important role in stimulating their interest and desire to engage and build intimate and meaningful relationships with the environment. For example, in Waters and Maynard’s (2010) study of three classes of children ages four to seven and their teachers, in an inner city primary school in South Wales, researchers observed that the elements that took children’s attention were not very complex or unusual; rather, the children were mostly interested in exploring simple and regular aspects of the outdoor natural environment such as ants and wild tiny flowers. Other researchers also found that children are interested, curious, and care to learn more about spiders and bugs in their school yard than some distant endangered species or exotic animals with which they cannot make meaningful connections (Malone & Tranter, 2003).

In their study of a three day residential environmental program for primary school students, James and Bixler (2008) found that for students to become and remain attentive and interested in their natural environment, they needed frequent rich informal direct experiences with nature supported by engaging social interactions. In contrast, children tend to be offered isolated, occasional, and out of context opportunities to encounter nature, where they do not have the required time or a supportive context to develop deep relationships with an environment which is unfamiliar and new to them.

Although indirect and symbolic experiences potentially have some positive benefits for children, Kellert (2005) argued that these experiences do not adequately compensate for
diminishing direct encounters with nearby and familiar natural environments. He believed children’s direct and ongoing experience of accessible, healthy, and diverse nature is an essential and unique dimension of healthy maturation and development.

Children’s initial interest in and interaction with more familiar and nearby nature do not necessarily negate their future interest in and awareness of broader global issues. Kola-Olusanya (2005) suggested, “Familiarity also helps learners acquire the awareness, knowledge, and skills needed for this localized learning, which then becomes the basis for moving out into other systems, broader issues, and a more sophisticated comprehension of causes and consequences” (p. 66). Children need many meaningful experiences and sustained time to first develop love, care, and interest, and then become motivated to seek and construct broader environmental knowledge and awareness, and finally act on their knowledge and concerns (Pedretti & Soren, 2006).

Is there any cost?

Wilson (1997) suggested the theory of biophilia saying that children have an innate affinity with nature; however, Kellert (2005) argued that biophilia is “a ‘weak’ genetic tendency whose full and functional development depends on sufficient experience, learning, and cultural support” (p. 4). Children’s interaction with nature may not necessarily be filled with senses of love and care. In their curious exploration, children may step on plants to kill them, squish worms in their hands, and even hurt their pets. Learning, including ethical and moral learning, for children is grounded in involvement, interaction, and experience. They need plenty of time and a supportive context to construct environmentally safe, ethical, and moral choices, rather than developing damaging, destructive, and dominant desires.
Encouraging and supporting children’s direct experience with nature has some costs and requires constantly making moral and ethical decisions and choices. Pyle (2002) challenged and reminded us, “For special places to work their magic on kids, they need to be able to do some clamber and damage. They need to be free to climb trees, muck about, catch things, and get wet – above all leave the trail” (p. 319). There is not any easy answer as to what kind of direct experience adults should allow and encourage as children may harm trees or animals in their free exploration in nature. However, adults’ constantly imposed and strict supervisions and restrictive rules may discourage children’s desire to build a close connection with nature through multiple sensory child-initiated investigations. Louv (2006) argued against the dominance of many legal restrictions and liability fears which are framing children’s interaction with nature in many cities of the United States. Rather, he invited ongoing and extensive conversations regarding children’s safety, their rights to natural play, and the concerns about protecting the environment. These conversations can assist families, children, and the larger community, including schools, to explore and create ways to enjoy nature without being destructive.

**Benefits of Different Experiences with Nature for Children**

**Psychological and physiological benefits.**

An increasing number of studies have examined how children’s contact with nature can positively affect their mental, physical, and spiritual health (Active Healthy Kids Canada, 2009; Alliance for Childhood, 2004; Bell, Hamilton, Montarzino, Rothnie, Travlou, Alves, 2008; Duncan, 1998; Fjørtoft, 2004; Moore, 1997). Some of the findings show that nature can help children increase their resistance to negative stresses and depression (Day, 2007; Kahn & Kellert, 2002; Wells & Evans, 2003). Fjørtoft and Sageie’s (2000) study has shown children who play regularly in nature get sick less often and show more advanced motor skills. Moreover, the
natural world offers children a chance for solitude and a range of mental and sensory stimulation which is essential to their emotional health, including a general feeling of well-being (Charles, Louv, Bodner, & Guns, 2008; Lewis, 1996; Nabhan & Trimble, 1994). The impact often gets stronger when children can directly experience nature, especially on their own and in a less structured setting (Cobb, 1977; Carson, 1956).

A body of research examined the psychological and physiological benefits of nature on attentional functioning (attention restoration theory) and the reduction of stress and fatigue (Kaplan, 1995; Taylor & Kuo, 2009). Taylor’s (2001) study has shown the therapeutic influences of offering young children with Attention Deficit Hyperactivity Disorder (ADHD) time in nature, which often even replaced medications or behavioral therapies. In a survey with parents and guardians of children aged 7 to 12 with ADHD, Taylor, Kuo, and Sullivan (2001) found that when these children had opportunities to spend time in the natural environment after school or during weekends, their symptoms were highly relieved. They observed that children’s ability to concentrate, complete tasks, and follow directions improved dramatically after playing in natural settings; the relief effect was often stronger in the greener settings. Taylor (2001) argued that these benefits are not limited to children with ADHD and possibly all children can perform better at school and focus their bodies and minds if more breaks in a green environment and “something as simple as a view out the classroom window onto a green space” (Taylor, 2001, p. 32-33) are provided.

In another study, Katcher (2002), a child psychiatrist, discussed the special role that animals can play in therapeutic situations for children. In his work with children diagnosed with autism, developmental disorder, and attention-deficit hyperactivity disorder, he found such children were highly motivated and successful in learning the necessary skills and information to
take care of animals. While interacting with the animals, these children also demonstrated an
increase in their attention spans, behaving more cooperatively and less aggressively.

Research on children’s experiences in programs that offer many opportunities for regular
direct encounter and interaction with nature has also shown a wide range of psychological and
physiological benefits for children. For example, in Forests Kindergartens, which are established
first in Germany and then Scandinavia over 25 years ago, children start and spend most of the
day learning, playing, and eating in a forest or natural setting in almost all kinds of weather.
Research studies have shown the many benefits to children’s health and emotional well-being,
self-esteem and confidence, as well as their interests and perseverance to learn more about nature
(Borradaile, 2006; Murray & O’Brian, 2005). Fjørtoft and Sageie’s (2001) research on Swedish
outdoor preschools also showed that the children within these preschools were more focused and
their motor and balance skills were more developed which made them often feel more
comfortable being and playing in the natural environment. They also seemed to be less
frustrated, restless, and sick.

Learning benefits.

Affective and emotional learning benefits.

An overview of the research of educators, environmentalists, psychologists, and health
experts suggest a common agreement regarding the strong and unique effects that nature has
upon children’s emotional and affective development and learning (Carson, 1956; Chawla, 1994;
Day, 2007; Dewey, 1902/1963; Louv, 2006; Moore, 2008; Rosenow, 2008; Sobel, 1993; Steiner,
1996). Sebba (1991) interviewed 198 adults and studied their environmental preferences and
experiences of being outdoors as reflected in their recollections of their childhood. Her study
showed that 96.5% of adults mentioned that spending time outdoors played an important role in
their emotional maturation. In a seminal study of creative gifted people, Cobb (1977) found that, among those studied, childhood experiences in nature became the emotional basis for their later creative production. She explained that perhaps their many joyful and adventurous emotional experiences with nature stimulated and developed a strong sense of curiosity and wonder and many cognitive capabilities to observe, discover, and create.

Some other scholars also discussed the essential value of affective development and emotional experiences in and with nature in motivating children to further seek information and knowledge (Kellert, 2005; Louv, 2006). Sebba (1991) suggested that the rich, diverse, and complex sources of stimulation in nature often encourage an emotional as well as cognitive response. For example, the sensory rich texture of a meadow, the diverse auditory quality of a stormy day, and the complex cycle of ‘life and death’ in nature can emotionally engage children’s feelings of like, dislike, admiration, or pity and, in return, encourage them to further explore and imagine. Carson (1956) believed,

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\text{For the child … it is not half so important to know as to feel. If facts are the seeds that later produce knowledge and wisdom, then the emotions and the impressions of the senses are the fertile soil in which the seeds must grow. (p. 100)}
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In this statement, she suggested children first receive and respond to the natural world emotionally which then later, motivates them to invest and engage cognitively.

Although emotional interest and affective involvement can be the initial stimulator of children’s curiosity and desire to learn, the relationship between emotional and cognitive responses is not always very straightforward. Children’s innate sense of curiosity may engage them with nature without any initial emotional bonding. However, developing an affective relationship can often create stronger desires and determination to seek deeper knowledge and
information (Iozzi, 1989). That is, cognitive and emotional engagement can be often intertwined and enhance each other.

Frequent experiences with the natural environment offer children opportunities to develop and enrich their emotions and feelings towards its living forms. For example, children often express emotional states, such as like, dislike, doubt, fear, wonder, sympathy, and so on. They may like or dislike dinosaurs, have fear of insects, wonder about rainbows, and show sympathy for dead flowers. Kellert (2005) suggested children can recognize many similarities between themselves and these living forms. Examples include moving, responding to changes, and essential needs as food, safety, and a living place. Awareness of these resemblances prompts children to extend their own feelings and responses to these living things. For example, children may talk about flowers feeling sad and spiders planning ‘to kill a bad guy.’

Animals, either in their natural environment or in homes, as pets, can stimulate strong emotional responses from children because they have even more visible resemblances to children and are highly responsive to and sometimes even willing to interact with children. Sobel (1996) suggested one of the best ways to develop empathy is to cultivate children's relationships with animals. She argued that young children innately are drawn to animals and especially baby animals. White (2004) reported on studies of the dreams of children younger than age six which show that about 80% of their dreams are about animals. In addition, Kellert (1983) highlighted that about 90% of the characters employed in language and math learning activities in children's preschool books are animals.

Myers and Saunders’ (2002) research on children’s interaction with animals also showed children’s high level of interest in taking responsibilities to care for animals and developing emotional bonding with animals in their care. Children’s emotional understanding and responses
are valuable ways to know and connect with nature. Although they may be different from adults’ way of receiving and responding to the natural environment, they can invite adults to approach nature with children’s wisdom and compassion (Chawla, 2002). Educators such as Sobel (1996) believe that developing an emotional and affective relationship should be at the heart of children’s interaction with nature during early childhood, because these experiences can shape their values and attitudes toward the world which eventually influence the kinds of relationship they would build with nature as adults (Wilson, 1996; White, 2004).

Nevertheless, I suggest that we need to be cautious and not over-generalize the emotional learning experiences that result from children’s caring for the natural world. The effect of children’s interaction with nature depends on the socio-cultural contexts of their upbringing as well as how adults assist and lead them to approach and conceptualize their relationships with animals (Wilson 1996). For example, do children view and treat the animals in their care as toys, objects, or human commodities? Or, do they see them as ‘friends’ or living organisms with their own rights and feelings? In a caring relationship children may develop a strong sense of responsibility and an understanding of their interconnected lives with the other living forms and nature as a whole. In contrast, in a relationship that commodifies nature, children may view and interact with animals as mainly subjects of their play and pleasure.

Furthermore, admiring and valuing the positive emotions that children may develop in nature should not lead to overlooking children’s less pleasant feelings, such as fear, anxiety, and even pain in nature. However, with the support from a caring adult and when such feelings are not overwhelming for children, they may have positive results. Kellert (2005) argued for the necessity of these feelings in children’s maturation and emotional development. For example, a feeling of fear can help a child to develop a sense of danger to be able to recognize and perhaps
cope with unsafe situations. When adults identify and explore these emotional responses and experiences with children they can help them to approach, interact with, and understand nature as a whole, rather than developing an artificial, simple, and even false image of it. Research on children’s less enjoyable feelings in nature and their short and long term effects are sparse. Research in this area can help us to learn about which children may have more challenging feelings, the role of adults in helping them to understand and cope with these feelings, and the possible positive and negative learning experiences, both in the short and long term.

**Cognitive and educational learning benefits.**

Researchers have also studied different aspects of cognitive and academic benefits of connecting children with nature (Alliance for Childhood, 2004; Berman, Jonides, & Kaplan, 2008; Falk, 2005; Hilgers, Haynes, & Olson, 2008). The sensory-rich environment of nature promotes children’s cognitive development and engagement by improving their awareness, observational skills, reasoning, problem-solving, decision making, and critical thinking (Trancik & Evans, 1995; Wells, 2000). Children do not experience nature as merely a background, but rather as a strong stimulator with open-ended possibilities for creative exploration. The delightful stimulation in nature with varied plants, animals, and landscapes supports children’s imagination, fantasy, and curiosity, resulting in enhanced creativity and curiosity (Cobb, 1977; Moore, 1997).

The theory of loose parts, suggested by Nicholson (1971), proposes that “in any environment, both the degree of inventiveness and creativity, and the possibility of discovery, are directly proportional to the number and kind of variables in it” (p. 30). The loose and flexible parts in natural environments provide children with “a rich curriculum” (Carr, 2001, p. 540) from which they can choose to develop their ability to discover, observe, analyze, and comprehend facts and ideas. Perhaps no other environment can offer this rich and detailed informational
context to engage children in ongoing cognitive learning experiences. When experiencing nature, children need to distinguish creatures, natural features, and environmental processes, classify and categorize living and nonliving things, observe and interpret a wide range of processes, such as reproducing, surviving, and dying.) Through experiencing numerous familiar and unfamiliar events in nature, children can “progress from simple acts of identification and classification to more complex conceptualizations and predictions” (Kellert, 2005, p. 69).

Children’s interaction with nature fosters their innate curiosity and often helps them to perform better in schools too. Miller’s (2007) study illustrated how preschool and primary children developed skills in a number of academic disciplines derived from their frequent gardening experiences in their schools. The sense of wonder that children develop through firsthand investigation and exploration in nature can improve their learning in other areas as well (Rosenow, 2008; Taylor, 2001; Wilson 1997). In a survey of parents of first graders, Hilgers, Haynes, and Olson (2008) discovered that after three lessons of a garden-based curriculum, children’s awareness and interest in science and the natural environment increased. Volk and Cheak’s (2003) five-year study of the development of a place-based education in one Hawai’ian school showed when children explore critical ecological issues in their own community, they undertake more challenging tasks, collaborate more effectively, think more critically, and feel a sense of responsibility to take action on environmental matters.

Research demonstrates that the complexity and the rich variety of natural elements and their interactive properties invite more diverse, imaginative, and creative play (Fjørtoft, 2001; Moore & Wong, 1997; Taylor, Kuo, & Sullivan, 2001). Play in nature offers children more space and freedom to negotiate meaning, exercise real influence over their situations, and participate in democratic decision-making (Fjørtoft, 2004; Garrick, 2004; Lindahl, 2005). Studying the
Norwegian kindergarten contexts, Aasen, Grindheim, and Waters (2009) observed that nature offers not only a flexible landscape with different opportunities for play, but also “a flexible social space” (p. 10) for negotiating meaning and practicing participation in a democratic community. Their study showed that in nature, children had extended opportunities to explore and construct their individual and group identities which are vital learning experiences if we believe learning is a socio-cultural construction.

**Ethical/Moral learning benefits.**

Early childhood is a critical period in children’s moral learning, as their experiences highly influence their formation of values and attitudes and give fundamental direction to the kind of life they may choose to live (Sobel, 1996; Wilson, 1996). However, children need many opportunities to smell, hear, taste, and see the natural systems to understand and experience the complexity of this system both scientifically and emotionally, to feel connected to it, and to develop a sense of ethical responsibility toward nature. These interactions can transpire through activities such as gardening and caring for animals or observing birds and squirrels searching for food in a local park. Pyle (2002) suggested lack of interaction with rich ecosystems leads to lack of concern for their protection which leads to further lack of interactions. Development of a sense of awe and affection for nature is crucial in children’s learning in and about nature and consequently becoming caring responsible citizens (Palmer, 1997).

**Summary.**

Emotional, cognitive, aesthetic, and ethical learning experiences in nature are all closely related and one cannot be complete without the rest. School pedagogy may emphasize one over the others, but considering the whole child and her or his way of knowing, experiencing, and thinking about the world, these four experiences are often tightly interwoven.
Chapter Three

Conceptualizing Learning

Introduction

I believe no single model or theory of learning can identify and describe the mechanisms that contribute to learning; however, each model attempts to explain some aspects. To define learning in nature is even more challenging considering nature being omnipresent, complex, and full of rich resources.

Questions such as “what is learning?” and “how do children and adults learn?” are fundamental in any educational theory and pedagogy. Any attempt to define learning proves it is another familiar but challenging and multi-faceted concept to understand and then define. Recent research suggests that we constantly learn in many different ways, from various resources, and across time and place (Anderson, 1999; Bransford, Brown, & Cocking, 1999; Falk & Dierking, 2002). In particular, learning about and in nature may typically include learning facts, numbers, and concepts; however, it can also elicit changes in attitudes, values, and beliefs (McGregor, 2004; Orr, 1992; Russell, 2005; Sheppard, 2006). Furthermore, learning can also mean developing aesthetic understanding and appreciation of what one is studying (Edwards, Gandini, Forman, 1998). Aesthetics is one of important dimensions in learning and education, in particular, in topics deserving deeper understanding and evaluation. Vecchi (2010) suggested,

Perhaps first and foremost it [aesthetics] is a process of empathy, relating the Self to things and things to each other …. It is an attitude of care and attention for the things we do; a desire for meaning; it is curiosity and wonder; it is the opposite of indifference and carelessness, of conformity, of absence of participation and feeling. (p. 5)
These are some aspects of aesthetic dimensions which are undoubtedly more than these things. Aesthetics can nourish the process of constructing knowledge not merely based on accumulating information but by developing sensitive empathy and creating connections with things we investigate. For example, children can learn the names of different plants and study their physiological needs to grow. They may also go further and develop a positive caring attitude towards plants believing in their affective as well as aesthetic values for human beings. Learning about nature is not always intentional and children may learn some scientific facts or develop responsibilities towards nature as a result of an activity, interaction, and communication which is not primarily planned to teach them these facts or attitudes.

The complexity and multi-facetness of the concept and the phenomenon of learning has led many educators to focus their definitions on a few particular aspects at a time. Some research suggests that learners play an active role in interpreting and gaining knowledge about their world and focuses on the role of the learner in a learning situation (Bruner, 1960; Erikson, 1963; Piaget, 1962). Others emphasize learning is both individually and socially co-constructed and focus on the role of the socio-cultural context in a learning situation (Dewey, 1938/1963; Vygotsky, 1978).

In this chapter, I will draw on the Contextual Model of Learning (Falk & Dierking, 2000) as the framework to examine the complex and active role of learners in the complex socio-cultural context of schools, particularly Ontario schools. I also use the free-choice learning model (Falk & Dierking, 2002) to focus on the personal context or the role of the learner in a learning situation. These two models suggest learning is a contextual phenomenon, often derived from learner’s interests and choices, fueled from various sources, and happening everywhere and all the time.
Learning as a Process

Traditionally, learning experiences have been mostly viewed as isolated, distinct, separable, and singular events. With this view, to understand and assess learning, we may ask questions such as: What did the child learn from visiting a local farm, watching a documentary on climate change, and reading a book about polar bears? However, recent research on the brain and the cognitive process of learning, contextual learning, and learning in informal and free-choice situations strongly suggests that learning is a non-linear, continuous, dynamic, and never-ending process in which learners constantly develop, construct, co-construct, and deconstruct their experiences, understanding, and knowledge about the world (Anderson, 1999; Bransford, Brown, & Cocking, 1999; Falk & Dierking, 2002). With this view, the above questions are no longer the best questions that we can ask to examine and understand children’s learning experiences. Rather, a more accurate question could be how a particular lesson, visit, film, or book “contribute to what someone knows and understands about a topic” (Falk & Dierking, 2002, p. 42). This kind of question acknowledges learning is a process and is not constrained to a moment or place; rather, learners constantly construct and re-construct or redefine their knowledge about the world.

For Falk and Dierking (2002), learning is an ability to bring past experiences and knowledge into a new situation to make sense, construct a new understanding, and even to predict and control the future. They also argued, “Learning is a whole series of complex processes woven together, which in turn are intertwined with nearly all other parts of our being” (p. 35). Learning therefore is not a series of isolated processes or a product that we store in our brains; rather it is a dynamic lifelong process which is situated in and involves all aspects of our life.
Learning can also be examined as a process of making meaning in which learners constantly construct knowledge about the world by using different sources and senses over a period of time. Bartel (2002) used the website analogy suggesting,

As we encounter something new we establish a “place holder” construct (analogy — create a web page) and then begin to make it more complex by adding things to it (put more on the web page) and forming links to other existing constructs (hot button links to other web pages) (p. 11).

He suggested nine sources that are helping us to construct knowledge and add to the content of these “web pages”: kinesthetic/touch, limbic system/emotional, visual, olfactory, spatial, gustatory, cognitive/language, auditory, and gestural (p. 14). Considering these rich and various sources, we need to challenge learning in school when it is mainly based on linguistic and auditory while visual sources are more recently added. Senses of touch, smell, balance, taste, and emotional feelings are often overlooked while they can also play a significant role in helping children making each web page more complex adding to the depth of what they know about something.

A rich content on each ‘web page’ adds to its complexity and depth; however, Bartel (2002) argued, “knowledge constructs are complex” (p. 12) because of the interconnection between these web pages or constructs which are continuously changing and influencing each other as we encounter new experiences in our life. For learning in school, this means that educators need to acknowledge the connections between different domains of knowledge as well as the interdependency between constructs. In developing an understanding about a phenomenon, ideas, or objects, children need to be able to use different sources and draw from
the rich body of human knowledge, including arts, socio-cultural studies, history, technology, math, and many more.

**Context of Learning**

Educators have long been emphasizing the importance of context arguing learning is always situated in socio-cultural, historical, physical, and political contexts (Bandura, 1989; Bernard & Armstrong, 1998; Bronfenbrenner, 1979; Ceci, 1996). For example, Vygotsky (1978) recognized the interrelationships between social and cultural contexts in which learning occurs arguing children’s learning experiences are mediated by social interactions and culture. For Vygotsky, knowledge is socially constructed and learning is a social process. His theory provides a framework to discuss the impact of socio-cultural contexts on what is learned, how, and why. However, the relationship between the context and the learner is reciprocal. Our learning experiences are not only shaped by our culture and social relationships, but we also co-construct cultural values and practices as well as social processes (Ogbu, 1995).

The role of context has been emphasized by others too. Illeris (2002) underlined the social process of learning arguing that learning is not a solitary activity but is strongly motivated and influenced by the learner’s learning context, including the historical, societal, and, even environmental conditions.

**The Contextual Model of Learning**

Drawing from constructivist, cognitive, as well as socio-cultural theories of learning, Falk and Dierking (2000) put forward the Contextual Model of Learning explaining three overlapping and interconnected contexts of personal, socio-cultural, and physical. They contended that learners bring a broad range of prior experience and motivations to a learning situation and that learning is “rarely an instantaneous event, but rather an unfolding, cumulative process” (p. 36).
This model attempts to describe rather than predict learning and can be considered more as a “large-scale framework with which to organize information on learning” (Falk & Storksdieck, 2005, p. 747). According to Falk and Storksdieck the detail of what directly or indirectly influence learning is countless, with many of them not being clear to us yet. In this complex picture of learning, the value of the Contextual Model of Learning is on providing the researcher with a framework to think about and study learning as a process while closely examining the continuous interactions between the individual and his or her physical and socio-cultural contexts. This model maintains that individual agency and environmental structures are in continuous dialogue and interactions.

**Personal context: The role of learner in the free-choice learning model.**

In the Contextual Model of Learning, the personal context refers to a learner’s characteristics, such as motivation, interests, attitude, learning styles preferences, and prior knowledge and experiences which highly influence what he or she chooses to learn and how. Falk and Dierking (2002) proposed the free-choice learning model in which learner is situated at the center of each learning situation and “learning begins with an individual” (p. 36) who is unique.

Although, Falk and Dierking (2002) developed the free-choice learning model to mainly describe informal learning in free-choice settings, such as zoos and museums, their model can be used in examining other learning situations, including learning in schools. Emphasizing on the role of learner, Falk and Dierking suggested free-choice learning is “self-directed, voluntary, and guided by individual needs and interests – [that is] learning that we will engage in throughout our lives” (p. 9). They proposed there are many different ways, places, and moments in which we learn, but in free-choice learning, learners choose what to learn and have a control over where,
when, and with whom to learn (p. 10). Learners’ needs and interests can stimulate their motivation to participate in a learning situation. Falk and Dierking argued that learners learn best when they experience flow and are able to bring in their prior experience and knowledge to the learning situation. This view of personal context is consistent with the constructivist theories that argue learners actively construct new ideas and concepts about the world based on their current or past experiences and knowledge (Bruner, 1960; Gardner, 1999).

In this study, I used the free-choice learning model as the conceptual framework to collect, organize, and analyze children’s free-choice learning experiences when they were fully involved and had extended time to connect and bring fantasies to their explorations in nature (Louv, 1990, p. 177). My focus was on two essential aspects of the learner’s role in a learning situation: learner’s sense of ownership and control as well as learner’s motivation.

Choice: Children’s sense of ownership and control over their learning.

Free-choice learning is “the learning we do when we want to learn; by definition it involves a strong measure of choice - choice over what, why, where, when, and how we will learn” (Falk & Dierking, 2002, p. 9). For many decades, the theories of major thinkers such as Bruner, Dewey, Malaguzzi, Steiner, Piaget, and Vygotsky have been encouraging educators to consider the significance of children having choice and playing an active role as meaning-makers, interpreting and constructing knowledge about their world. In their view, knowledge is not transferred but is constructed as a result of each learner’s interaction with his or her environment (Bruner, 1960; Dewey, 1938/1963; Malaguzzi, 1998; Piaget, 1962; Steiner, 1996; Vygotsky, 1975). So each individual learner’s choice and sense of control over what to learn, when and how, is important.
Helm and Katz (2011) also emphasized that autonomy and a sense of ownership are crucial in motivating children and enriching a learning situation. Children’s sense of control and choice over their learning can make them feel powerful and in charge of defining their roles and developing responsibilities (Dietze, 2006). With this sense of control comes a desire to get involved and to participate in the formation of the purposes and directions of learning processes (Dewey, 1938/1963). When they have control, children are more willing to explore and investigate and often choose what is meaningful and relevant to them, in particular, when they learn in and about nature (Burke, 2005; Fjørtoft, 2004; Payler, 2007; Waters & Maynard, 2010). They realize and exercise control over using materials and spaces, often in partnership with more expert adults and peers. This emphasis on the learner’s sense of control and ownership suggests an agentive role for children arguing they are the producers and the creators of their own learning experiences.

Having choice and control does not mean that children can choose not to learn or their learning does not need any facilitation from the more expert adult or peers. In his condition of learning model, Cambourne (1988) emphasized that children make decisions but also take responsibility of their own learning. The important role of the teacher is to offer them many opportunities for making those decisions while fostering their sense of responsibility. The recognition of children’s rights to have choice and control does not diminish the professional responsibility of teachers but is suggesting the learning experience needs to be negotiated and co-constructed by both children and teachers (Malaguzzi, 1998).

However, the dilemma is that learning is not always a matter of choice. It is not easy or straightforward to draw a line between free-choice learning, as Falk and Dierking defined it, and other ways of learning. We learn many things and for many reasons. For example, a child may
want to grow flowers and so the personal choice plays an essential role in learning how to plant. However, before being able to grow a flower, the child has to learn some specific rules and skills, which might not necessarily be voluntary and self-directed. In this case, the what of learning is chosen by the child while the how, the ways a learner has to learn, is compulsory. It seems that there is often a continuum in the measure of choice in a learning situation. This does not suggest to overlook the fact that when learners have a stronger choice over what, where, and how of learning, learning can be more meaningful, sustained, and deeper.

**Motivation.**

In addition to a sense of personal choice and control, a learner’s motivation plays a vital role in a learning experience. Children have a strong sense of curiosity about the world which motivates them to observe, touch, explore, investigate, and make meaning (Cameron & Bezaire, 2007; Rinaldi, 2006). To satisfy this strong innate sense of curiosity, learning can be intrinsically or extrinsically motivated (Paris, 1997; Renninger, Hidi, & Krapp, 1992). In extrinsically motivated learning, the anticipated benefits and rewards are external, such as good marks and teacher’s approval in schools. Learning is intrinsically motivated when the rewards are internal and the joy of the experience itself is the main driving force of learning. For example, a child can be intrinsically motivated to explore the life of dinosaurs for the sheer excitement of role playing ‘dinosaurs’ or discussing their amazing lives with friends.

Falk and Dierking (2002) suggested these two types of motivation are not mutually exclusive considering that learning is still socially and culturally situated. For example, to make a teacher happy, an extrinsic motivation, a child may work hard to learn the life cycle of a butterfly. However, the child may also experience joy and excitement in learning about this interesting topic, intrinsic motivations, which can make him or her continue learning even
without further extrinsic motivation. Learning is often motivated by a combination of both types of motivations.

To better understand the interaction between motivation and learning Csikszentmihalyi (1996), a well-known psychologist, studied and interviewed many creative people to learn how they lived and worked. He observed that these people exhibited a common set of behaviors and psychological feelings when highly engaged in demanding activities in which extrinsic rewards were not the leading motivators. What kept them engaged, rather, was an inherent quality to the experience, which Csikszentmihalyi (1975) called the flow experience. He described flow as,

the holistic sensation that people feel when they act with total involvement. In the flow state, action follows upon action according to an internal logic that seems to need no conscious intervention by the actor ... there is little distinction between self and environment (p. 36).

Highly focusing one’s attention and losing the sense of self and time, the person in flow does not need any external reward; the pleasure comes from the actual doing and the fact that the task is within one’s ability and control (Csikszentmihalyi, 1975). Flow activities share certain characteristics: they are full of opportunities for actions which are not boring or worrisome, have clear goals and appropriate rules, involve creative discovery and exploration, have unambiguous and immediate feedback, and are open-ended with uncertain outcomes (Csikszentmihalyi, 1975; 1996). A personal and internal sense of satisfaction and joy plays a positive role in immersing a learner in this “holistic reciprocal relationship with the phenomenon of focus” (Cameron & Bartel, 1999, p. 1) to think, explore, discover, create, and learn.

These characteristics of flow can apply to the definition of free-choice learning in which learners have the control to choose the challenge they wish and lead the direction of their own
learning (Falk & Dierking, 2002). *Flow* describes a special condition of learning which is self-fulfilling, engaging, and intrinsically motivated.

Children may experience flow when they are physically, emotionally, and cognitively involved and try an activity over and over again without feeling bored or exhausted or being aware of the passing of time. This state is often pleasurable and strengthened by a deep sense of intrinsic reward which comes from the joy of experience itself. This is probably the reason joy and play are the essential elements of any authentic learning process in the infant-toddler centers and preschools of Reggio Emilia in Italy, which are recognized as one of the world’s best programs for young children (Wingert & Kantrowitz, 1991). To them, learning becomes a value because of its power to bring about a synthesis between the individual and his or her context, in a warm relationship between those who learn and that which is being learned, a relationship filled with emotion, curiosity, and humor (Rinaldi, 2001, p. 43).

The above-discussed research on learning strongly supports the crucial role of the learner affirming the key characteristics of a sense of choice and control, motivation, and flow experience in a successful learning situation. These constituents are tightly interdependent. When a learner feels in control, he or she is more motivated to get involved and participate in learning. When totally and deeply involved, learners may experience flow and become fully engaged. Engagement is as an essential condition of learning which may happen when learners believe in themselves as “potential doers” and learning is purposeful and meaningful and is not associated with pain or humiliation (Cambourne, 1988, p. 54). The possibility of engagement can increase if learning is facilitated by a person with whom children have bonded; somebody they admire, respect, and like (Cambourne, 1988, p. 53). Bartel (2002) suggested learners also need time and opportunity to use the skills and knowledge that they are acquiring while they are allowed to
“approximate the desired model” (p. 18). Absence of these conditions can restrain engagement and positive learning when learners see themselves as incapable and fear of humiliation and failure replace the joy of learning (Cameron & Bartel, 1999).

Yet, an important aspect of learning has been overlooked in the literature examined in this section. Learning is not always enjoyable, fun, and satisfying. While learners may not enjoy learning, a strong intrinsic or extrinsic motivation such as a personal determination or external forces may keep learners on task. Learning can still happen regardless of joy, control, positive feelings, and rewards. Perhaps more research is needed to examine these aspects of learning, especially in formal learning settings such as schools.

The literature reviewed helped me to recognize that any research on learning will remain incomplete, but offer a little bit of understanding of the puzzle of how human beings learn. Methodological limitations and constraints on studying children’s learning experiences often push the researchers to focus on one or two aspects of learning at a time. Researchers observe and study learning in a particular moment and place, which contradicts the dynamic lifelong approach to learning as was discussed in the Contextual Model of Learning in the preceding sections. Each research study takes and represents a picture of a never-ending process while trying to make sense of the whole process based on that one snapshot.

**Physical context.**

Falk and Dierking’s (2002) model also recognized the impact of the physical context proposing,

Learning is facilitated by appropriate physical contexts and by well thought-out and built designs – [such as] the outdoors or an immersive zoo for learning about animals, an art
museum or studio for learning about the visual arts, a historical site or reenactment for learning about history (p. 56).

The significance of the physical environment is also discussed and studied by other researchers, scholars, educators as well as urban designers (Day, 2007; Kellert, 2005). For example, Rinaldi (2006), a leading educator of the Reggio Emilia approach, suggested that learning is influenced and informed by the design and architecture of the physical environment. In this approach, physical properties, such as light, sound, texture, color, and contents can stimulate and enrich learning experiences (Giudici, Rinaldi, & Krechevsky, 2001). In their emphasis on the central role of the environment, Reggio educators proposed the idea of the “environment as the third teacher” which means, like a teacher in the room, the environment can be a facilitator and provider of rich learning experiences to children.

**The socio-cultural context: School-based learning and experience in and with nature.**

In the Contextual Model of Learning model, the socio-cultural context highlights that learning is a social activity. At one level, learning is individually motivated, but what an individual chooses to learn and why he or she engages in learning are influenced and shaped by social, cultural, political, and historical contexts in which the learning experience happens (Falk & Dierking, 2002). Learning does not occur in a vacuum; it is rather “a contextually driven effort to make meaning in order to survive and prosper within the world” (Falk and Storksdieck, 2005, p. 745). What an individual needs to learn to “survive and prosper” is highly influenced by the socio-cultural environments in which one lives and desires to become a full participant (Lave & Wenger, 1991).
**Dewey's theory: A bridge between learning, experience, and formal education with a focus on nature.**

Experience presents itself as the method, and the only method, for getting at nature, penetrating its secrets, and wherein nature empirically disclosed (by the use of empirical method in natural science) deepens, enriches, and directs the further development of experience (Dewey 1938/63, p. 2).

In the preceding sections, I reviewed the research exploring what learning is in general. However, in this study, I examined children’s learning in a public kindergarten classroom. I examine Dewey’s theory as a bridge between learning, experience, and formal education. The various aspects of educational theory and philosophy of Dewey have had a strong impact on my approach to learning and experience and my understanding of how nature can better inform and enrich children’s school-based learning experiences.

Suggesting an organic connection between education and personal experience Dewey (1938/1963) challenged progressive education to define experience. He asserted that experience and education are not the same thing saying not all experiences are equally and fully educative and some could even be “mis-educative.” For example, he argued that an experience of observing repeated cruelty toward animals may cause a general lack of sensitivity toward the wellbeing and safety of them or even promote a careless attitude toward other life forms. In addition, he strongly stated that disconnected, irrelevant, and disintegrated experiences in the formal setting of schools can mis-educate children to conclude that learning is meaningless, boring, unpleasant, and imposed. Learning can happen everywhere and anytime, but based on Dewey’s philosophy the quality of learning is not always the same. In particular, the *what* and *how* of learning about and in nature in schools need close examination. What facts and concepts
children learn and which ones are not included in the curriculum? What kinds of beliefs, attitudes, and aesthetic understanding about nature do they develop, and how?

Dewey (1938/1963) proposed the principle of the continuity of experience or experiential continuum arguing the quality of any experience has two aspects, “There is an immediate aspect of agreeableness or disagreeableness, and there is its influence upon later experiences” (p. 13). He continued, “Every experience is a moving force. Its value can be judged only on the grounds of what it moves toward and into” (p. 38). His statement is strong arguing that experience is not enough by itself; instead, the direction of learning, experience, and growth is even more important to be considered. His arguments suggest that growing and developing are not only physical and intellectual, but also moral. When examining learning in and through nature, an experience may make children more curious and create strong desires to further investigate, but the direction of their learning has to be considered too. In a moral approach to teaching and learning in nature, this direction is at the center. Recent theoretical discussions on teaching and learning about nature also emphasize the moral values that children may develop through daily direct and indirect interactions with nature in schools (Bondar, 2007; Iozzi, 1989; Jickling, 2001).

In Dewey’s theory, the concepts of situation and interaction are inseparable from experience. He (1938/1963) asserted that experience does not occur in a vacuum but is situated in socio-cultural contexts which are constantly shaping and influencing children’s experiences. He wrote,

Perhaps the greatest of all pedagogical fallacies is the notion that a person learns only the particular thing he is studying at the time. Collateral learning in the way of formation of
enduring attitudes, of likes and dislikes, may be and often is much more important than
the spelling lesson or lesson in geography or history that is learned (p. 48).

He helped educators to understand that apart from what children are directly taught in a lesson or
a learning situation, they may also develop specific attitudes towards learning in school which
will have a strong impact on them to decide what is valued and expected from them and if they
would like or dislike it.

Based on Dewey’s (1938/1963) argument, the dominant social and cultural values in
school settings influence the kinds of learning experience that children can have with nature.
Schools support and allow certain kinds of experiences, resources, and activities and discourage
and deny the other kinds. For example, a program that offers children opportunities to experience
nature as a whole with their body, mind, and spirit may help them to develop an understanding
of nature which is different from a program that mainly focuses on teaching children
disconnected and irrelevant facts through books and lessons.

This fact made me interested in looking beyond the scientific information that children
may gain about nature in schools. Dewey’s theory has also inspired me to consider children’s
learning in and about nature not as a product but as an experience. Therefore, I became interested
in examining learning experiences which influenced children’s choices of what facts and
numbers were important to learn, what beliefs and values were respected, and what kinds of
connections with nature were supported in their school and the larger community. These
experiences are particularly important considering their impact on children’s relationship with
nature outside of the school settings.
Does a pre-determined curriculum engage children in learning in schools?

I am so confident of the potentialities of education when it is treated as intelligently directed development of the possibilities inherent in ordinary experience. (Dewey, 1938/1963, p. 89)

Dewey (1938/1963) questioned the contents, value, and delivery methods of the traditional transmission model of teaching and learning arguing, “The traditional scheme (education) is, in essence, one of imposition from above and from outside. It imposes adult standard, subject-matter, and methods upon those who are only growing slowly toward maturity” (p. 10). Educational movements, instead, have encouraged educators to distance teaching away from the top-down approach and consider the crucial role of children and teachers in co-constructing a learning experience in schools. Helm and Katz (2011) criticized academic tasks in a top-down model saying these tasks are “typically carefully constructed, sequenced, and decontextualized small bit of information and discrete skills” (p. 3) and their highly pre-determined and linear structure often makes them irrelevant to the current interests and questions of the students and teachers.

When teaching and learning in school settings are encouraged to be relevant and meaningful to learners, the pre-determined and the top-down curriculum cannot provide the starting point. The starting point needs to be derived from the experiences, desires, and purposes that learners bring to school. The role of education is to build upon and expand these experiences for further learning. Would it then be enough to simply offer new experiences to children? How could teachers help children to connect these new experiences to their earlier experiences?

Dewey (1938/1963) distinguished “intelligent activity” (p. 84) from aimless random activity. He argued the former involves a careful selection of a variety of means and “demands keeping track
of ideas, activities, and observed consequences” (p. 87) to reach an intended and purposeful aim and idea. Inspired by Dewey’s philosophy, in the Reggio Emilia schools in Italy, teaching and learning are based on progettazione, or long term projects, in which children start with purposeful ideas and goals which are often grounded in their own experiences (Edwards, Gandini, Forman, 1998). Children then have many opportunities for close observation and exploration, to reconstruct their initial ideas and create new questions and propositions. New questions will become the source for further experiences in which yet even more questions can arise. In this model, learning is a construction in progress or in Dewey’s words, “a continuous process of reconstruction of experience” (p. 87).

In the free-choice learning model, Falk and Dierking (2002) encouraged ‘real-life’ learning styles in which learning is viewed as a process and learners have the agency to act upon their prior knowledge and experiences to construct new understandings and meaning for further experiences and explorations. Learning inside schools also needs to be grounded in experience, interaction, and participation. It should not be abstract and removed from children’s immediate environment and daily experiences. Inquiry-based learning is one model that envisions learning as a process and views learners as the co-constructors of this process.

*Inquiry-based learning.*

The Ontario Kindergarten program (Ministry of Education, 2006) requires learning through inquiry and “a balance of investigation or exploration, guided instruction, and explicit instruction” in which children have many opportunities to “build on their existing knowledge, create and clarify their own new understandings, and experience a variety of approaches to a problem or question” (p. 11). The inquiry-based learning model assumes children are innately curious about the world in which they live, so teaching needs to start from children’s natural
curiosity and questions and then draw resources from different places to investigate those questions (Helm, 2008; Katz & Chard, 2000). Inquiry-based learning needs to involve hands-on experiences in situations which are familiar to children but present enough challenges to require critical thinking and problem solving skills (Colbrun, 2006). This model invites a culture of collaborative learning in schools where students and teachers reflect, discuss, problem solve, and ask new questions to build new knowledge and make sense of their prior understandings and ideas. In this model, learning is active and learners are constructing and co-constructing knowledge.

Inquiry-based learning places the process of inquiry at the center, arguing against limiting learning to decisions made by a pre-determined curriculum and pedagogy. This model encourages teachers to start with children, empowering them to genuinely investigate their own questions and ideas in order to construct new knowledge (Eady, 2008). In an inquiry, the process of children’s investigations should not be guided and directed by a rigid set of procedures but be open to challenges, critiques, and creative ways of inquiring and learning. This approach requires a specific way of thinking about learning and teaching “that is open to others, that is open to doubt and to the awareness and acceptance of error and uncertainty” (Rinaldi, 2001, p. 46). The ideal is to extend the driving force of children’s inquiry beyond the final product or the correct answer but to bring in “the real emotion and passion of learning” (Rinaldi, p. 46).

Considering the characteristics of inquiry-based learning in schools, time plays an essential role in ensuring the quality of learning in this model. Extended and sustained quality time in which children are not rushed to finish a task or do a test is vital. According to the educators of Reggio Emilia “Giving oneself time to pause, to stop for a moment and reflect, often means giving quality to the learning that takes place and the relationships that are found”
(Rinaldi, 2001, p. 15). Sustained time is needed for children to create and develop their questions, for teachers to listen and build upon the children’s questions, and for learning to be actively and purposefully constructed.

Helm and Katz (2011) distinguished between open and closed learning in an inquiry-based model and suggested that the more teacher-directed the learning, the more closed the inquiry and vice versa, the more student-directed the learning, the more open the inquiry. Figure 1 (Helm & Katz, 2011, p. 3) illustrates the degree of child initiation and decision making in different approaches to teaching across a spectrum.

Figure 1. Degree of child initiation and decision making in different approaches to teaching (Helm & Katz, 2011, p. 3).

<table>
<thead>
<tr>
<th>Single concept</th>
<th>Integrated concepts</th>
<th>Units</th>
<th>Thematic teaching</th>
<th>Teacher-directed inquiry</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher instructs, determines content; single skills, or concepts</td>
<td>Teacher instructs, determines content; integrated skills, or content</td>
<td>Teacher instructs, determines content; unified exploration of several content areas on a narrow topic</td>
<td>Teacher instructs, determines content or Child-initiated; learning experiences integrated over a broader topic</td>
<td>Thematic approach with teacher directing and planning in-depth research and exploration by children</td>
<td>In-depth investigation; maybe child- or teacher-initiated, research focused on finding answers to students’ questions, direction follows children’s interests</td>
</tr>
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</table>

**Less child initiation and decision-making**

**More child initiation and decision-making**
It is always not easy to decide how much of an inquiry needs to be initiated by children and how much by teachers; it is also uncertain how this may affect the process of learning. If teachers are co-learners and co-constructors of the learning experience, then it would be a contradiction to deny them the role of leading and directing. In the inquiry-based model, teachers do not carry a certain fixed end or product in their minds but they should have their own authentic and relevant questions and control over the process of learning. In other words, a better way to approach inquiry is to say it is less open when the questions are not developed by students and teachers, the process and direction of learning is not planned and controlled by them, and the end is not decided by them.

In figure 2, I summarize and visualize some of the defining characteristics of inquiry-based learning based on the reviewed literature.
Why inquiry-based learning?

Using real-life contexts in which to develop activities for the kindergarten program is a highly effective way of motivating young learners (Ministry of Education, 2006, p. 13).

Research suggests that when engaged in an inquiry, children are often more communicative, creative, and develop practical thinking as they are active in discovering,
exploring, and making decisions (Curtis, 2002). They co-construct knowledge based on experience and experimentation with the real-life situations, which, in turn, promotes meaningful learning experiences as children connect their prior knowledge and experience to new learning situations (Westwood, 2006). In an inquiry-based learning model children are often encouraged and supported to exercise a great amount of control over the direction and modes of their learning which, in turn, motivates them to take more responsibility for their own learning. This is particularly important for children because they feel more powerful when in the process of learning they view themselves as authors, designers, composers, inventors, or scientists.

The defining characteristics of inquiry-based learning imply a context in which children with different learning styles can take initiative based on their own questions and level of interest as well as the modes and senses over which they have more competency. This model recognizes the theory of Multiple Intelligences by Gardner (1993) who proposed that people are born with the potential to develop multiple intelligences. His theory encourages educators and teachers to develop learning situations in which each individual child can choose to explore and investigate what best meets his or her personal learning styles. The dynamic and emergent process of the inquiry-based learning makes this possible by emphasizing learning through multiple and diverse means of investigation.

There is a relationship between the role that children have in determining their own learning experiences and the development of social skills. In a study of three kindergarten classes, researchers found that children negotiated, shared more experiences, and became more interpersonally interactive when they were offered a context to make decisions and build their own learning experiences (DeVries, Reese-Learned, & Morgan, 1991).
Helm and Katz (2011) argued that children are born with certain dispositions or habits of mind; for example, they are able to make sense of their experiences, hypothesize, theorize, predict, and check predictions. Curriculum and the teaching methods have to offer children many meaningful opportunities to develop and practice these intellectual habits; otherwise, they may become weak and even lost. Orr (2005) also believed that even the innate sense of wonder in children is fragile and “once crushed, it rarely blossoms again” (p. 24). If children become continuously discouraged to ask their own questions and seek the meaningful path to answer those questions, they stop noticing, asking, analyzing, and synthesizing. Instead, their intellectual abilities may be constrained to focus on the correct questions and answers, according to the curriculum and teachers’ expectations. In contrast, by fostering a culture of inquiry, children have more opportunities to become observers, thinkers, and creators (Katz & Chard, 2000).

The benefits of offering young children opportunities to follow their own questions and have more control over their learning extend beyond the early years. For example, Marcon’s (2002) study showed that children from preschool classes that had more opportunities for child-initiated learning experiences and inquiries, as opposed to teacher-directed, did generally better in reading, language, and math and had higher marks in most subject matters. In particular, boys from preschools that were offered more self-initiated learning opportunities, performed better academically in grades 6 to 8 (Miller & Bizzell, 1983).

The new findings from research in the field of neuroscience have shown that the ability of the brain to think in different ways, problem-solve, reflect, and communicate is built through direct and hands-on experiences over time (Zull, 2002). Catherwood (2000) suggested “experiences that support the child in making connections among the domains of knowledge are likely to impact on and enhance the richness of neural networks in the child’s brain” (p. 33).
Opportunities for direct experiences are crucial in the beginning years of life, as the brain has the greatest plasticity and potential (Wexler, 2008).

The role of inquiry-based learning is even more significant when we consider the role of nature in helping children to understand a complex and inter-related world, in which learning in school is not separated and isolated from real life but is informing and informed by it (Kolb & Kolb, 2008). Lieberman and Hoody (1998) suggested that the natural environment can be used as an integrating context for learning. Kellert (2005) also emphasized, “The natural environment broadens opportunities for experiencing complexity and diversity and developing the capacities to name, count, label, and classify, which are basic to the first stage of cognitive maturation” (p. 68).

The rich and complex components of nature have the potential to support children with diverse learning styles and intelligences. In his theory of multiple intelligences, Gardner (1999) discussed naturalistic intelligence as the ability to recognize patterns in nature and classify objects. He argued the value of this intelligence in our evolutionary past and for survival, when human beings needed to know, for example, which animals to hunt and which to run away from. Naturalist intelligence may support learning in and from nature for those children who may or may not be good at taking tests but are inquisitive and know how to probe and problem-solve.

Another aspect of inquiry-based learning in nature is that it is often an active process of many hands-on and direct experiences which involves multiple senses. These are key aspects of learning, especially in early childhood education, in which children are often willing to use all their senses to both describe their learning experiences and to store them in their memories (James & Bixler, 2008). Eisner (1993) encouraged teachers to challenge children to fully use all their senses to respond to the wonders of the environment. For example, after visiting a local
park children may talk about ‘touching a rough bark,’ ‘feeling a soft flower petal,’ ‘hearing a loud storm,’ or ‘seeing spider webs.’ Children experience with their senses, interpret those experiences with their senses, and build an understanding and express their learning with their senses.

**The role of the teacher.**

*The guidance of a thoughtful teacher is essential to enable children to learn through inquiry. Teachers should use inquiry-based learning to build on children’s spontaneous desire for exploration and to gradually guide them to become more focused and systematic in their observations and investigations* (Ministry of Education, 2006, p. 11).

Teachers play a crucial role in an educational system based on experience and inquiry-based learning. Rather than focusing on transferring information and knowledge through a series of prescribed and pre-determined lessons to cover curriculum expectations, teachers start from and build on their students’ needs, interests, and abilities while including their own experiences, knowledge, and professional expertise (Dietze, 2006; Katz, 1998). Therefore, the main role of a teacher is to be a partner and facilitator to assist children to make connections between their prior knowledge and a new experience (Helm & Katz, 2011; The laboratory school at The Dr. Eric Jackman Institute of child study, 2011). In this model, teacher’s planning is flexible and responsive. The assumption is that with the support of teacher, children will be more motivated and successful. Likewise, with the lack of such support, the motivation of children to participate would be diminished (Chawla, 1988; Fraser, 2000).

In inquiry-based learning, teachers are not only expected and encouraged to build on students’ interests and questions but also to act as guides and nurturers. In Dewey’s (1938/1963)
opinion, teachers have to see the direction of children’s experience and use their wide range of insight, knowledge, and experience to plan and guide them to create the best context for learning. However, teachers’ guidance and plans are not fixed or the end points; they are the “starting point[s] to be developed into a plan through contributions from the experience of all engaged in the learning process” (Dewey, 1938/1963, p. 72).

The significant role of teacher as an observer, researcher, and consequently a learner accompanying children is also recognized in an inquiry-based approach to learning and teaching (Edwards, Gandini, Forman, 1998; Helm & Katz, 2011). With this approach, teachers are also learners and do not necessarily have all the answers but are willing to seek answers to the many questions that they, or the children, may generate. At the same time, teachers are keen observers and researchers of their own classrooms and practices hoping to learn more about their students, learning, and teaching. This role especially has been emphasized in Reggio Emilia approach, in which the pedagogical documentation of the learning process is the main tool in informing teachers as researchers in designing learning contexts (Rinaldi, 2005).

Being a researcher and a learner, teachers are also role modeling inquiry-based thinking processes for their students. For example, by observing, asking relevant questions, seeking resources to investigate those questions, and using multiple modes (visual, written, oral, etc) to express their ideas and understanding, teachers are offering children a model of how to think and learn in an inquiry-based learning environment. This role-modeling builds a context in which children feel safe to take risks in asking their questions, in sharing their developing thoughts, and in offering and receiving criticism (Scardamalia, 2002, p. 9).

One challenging aspect of teaching with an inquiry-based approach is the ongoing negotiation between teacher’s interests and questions and those of children. The above
discussions suggest that to be a successful facilitator and partner, teachers need to show an authentic enthusiasm towards children’s questions and interests in order to involve and motivate them. But the research does not recognize the fact that teachers’ interests may not necessarily always match the children’s. If teachers force themselves to follow what is merely the interests and questions of the children, would they still be effective and motivated partners, guides, and co-constructors of the learning experiences? In other words, how can teachers negotiate when their interests and questions differ from those of their students?

In addition, in inquiry-base learning, teachers are often expected to be able to maneuver between their many roles and depending on their degree of experience, personality, and education, teachers may be at times challenged with the responsibilities and demands of all these roles (Helm & Katz, 2011). Teachers may feel the pressure of a lack of time, resources, and training when teaching from this approach. They may also be uncertain as to how to evaluate and assess the children’s learning; they may still feel the need to teach for content. Teachers need an ongoing supportive context in school and helpful resources to develop required knowledge and skills to teach in this model.

Research also points out some other issues which arise when using inquiry-based learning. For example, Duschl, Shouse, and Schweingruber (2008) discussed the problem of separating the teaching of concepts from the teaching of processes, skills, and practices. Considering too many objectives, benchmarks, and standards in teaching a subject, some teachers may have challenges to help their students to simultaneously develop problem-solving strategies, collaborative skills, and disciplinary knowledge bases (Howard, 2002). In other words, when the processes are isolated from the conceptual learning goals and contents, inquiry-based learning may result in a decrease in content knowledge.
In figure 3, I summarize and visualize the role of teacher in an inquiry-based teaching model based on reviewed literature.

Figure 3. Concept map of the teacher’s key roles in an inquiry-based learning model.

Reflection

Since traditionally right answers and test scores are considered the most valid evidence of learning, I am challenged to determine how to illustrate the children’s learning experiences in and with nature in this study. A review of the literature informed me to question the safety of
standardization and a one-size-fits-all approach to learning and teaching. To avoid the tradition of “describing the product to understand the process” (Klint, 1999, p. 163), I chose to focus on making the process of learning visible through extensive and detailed narratives, examples, vignettes, and photographs, instead of evaluating or measuring the learning products or outcomes.

**The Field of Environmental Education**

Research in environmental education greatly inspired and informed the context and the findings of the present study. This study is situated in a naturalist and holistic approach to environmental education. I examined young children’s engagement with nature regardless of pre-determined outcomes and expectations. With minimal formal education in environmental education, the classroom teacher, Mrs. Hansen, was hesitant to incorporate it into her kindergarten program. However, I suggested that her intentional kindergarten program would enrich her children’s connections with nature within the possibilities of the immediate socio-cultural contexts of her school, the Ontario Kindergarten program (Ministry of Education, 2006), and the children’s families; and, it could easily be situated in the field of the environmental education.

Environmental Education is a diverse and rich field which is receiving increasing attention from the public, media, schools, academia, and governments across the world in response to increasing concerns for the quality of the environment at the local and global levels. Each group may adopt a different discourse to raise specific concerns and questions and advocate its own vision for environmental education. For example, some governments are interested in sustainable economic development and view environmental education as a way “mainly to develop human capital and encourage technical progress as well as fostering the cultural
conditions favoring social and economic changes” (Albala-Bertrand, 1992, p. 3). Their goal is to effectively use human capital to ensure the rapid economic growth while reducing the possible impact on the environment. On one hand, schools may approach environmental education with an emphasis on environmental themes that raise students’ social and ethical awareness about the impact of human’s activities on the environment. On the other hand, media may follow a different agenda by focusing on the environmental crisis to raise the public’s attention to push for major environmental changes.

Addressing the wide range of theoretical and practical possibilities, visions, and discourses, Sauvé (2005) recognized 15 different currents in environmental education. She used the notion of a “current” to refer to “a general way of envisioning and practicing environmental education” (p. 12). Within this range, some approaches consider the social and ethical value of educating children to become responsible citizens and, when necessary, to take action individually, locally, or nationally. Other approaches place more value on the personal connections, emphasizing the significance of children developing love and care relationships with nature. Here, I will briefly examine three currents which primarily informed and influenced this study’s approach to nature and environmental education. The first is the naturalist current which focuses on human relationships with nature, promoting the intrinsic values of nature beyond its immediate benefits for human beings. Sauvé suggested this current may take various directions and wrote, “The approach may be cognitive (learning about nature) or experiential (living in nature and learning from it), or affective, or spiritual, or artistic (allying human creativity with nature’s own)” (p. 13). According to Sauvé, van Matre developed the first educational model based on this approach to environmental education in 1990. In his pedagogical model, van Matre (1990) emphasized both cognitive and affective encounters and
learning in and with nature to reconnect children and develop a strong sense of attachment with nature.

Sauvé (2005) also identified a humanist current which “places the accent on the human dimension of the environment, forged at the junction of nature and culture” (p. 18). In this current, environment has a historical, political, cultural, social, and economical construct. Environment shapes and is shaped by human activities and includes a broad range of places such as city landscapes, humanly-managed gardens, and so on. In this current, environmental education starts with examining the place of the human being in the environment with the goal of developing a sense of belonging to a specific environment and, in turn, of increasing a sense of responsibility.

Finally, the holistic current proposes that environmental education must include each person as a whole considering his or her deep interconnection with other beings and realities (Sauvé, 2005). In this case, the goal of environmental education is to educate people to listen to these other realities, talk to them in their own languages, and to develop new and meaningful forms of understanding, explaining, living, and growing in harmony with nature in its whole being.

These three approaches to environmental education have primarily inspired this study’s research questions and informed the methodology used in examining children’s learning in and about nature. My goal has been to resist those anthropocentric approaches that place human values and needs above the ecological systems and nature itself (Jickling, 2001). The hope for education is, rather, to go beyond the limits and contradictions of anthropocentrism and to help children develop a deeper understanding of their connections and interrelatedness to all other parts of nature.
Environmental education in Canada.

In 1993, as the international attention and focus on environmental knowledge and education were increasing, the provincial ministers of education in Canada, the Council of Ministers of Education (CMEC), initiated a process to re-define Canada’s position in the global context and to develop a national science curriculum. The Council finally published the Pan-Canadian science curriculum as a framework to guide provinces to move away from the traditional models of teaching science and incorporate social and environmental themes within the science curriculum (Council of Ministries of Education, Canada, 1997). As a result, Environmental Education (EE) is, to a great extent, incorporated into every aspect of the Pan-Canadian document with an emphasis on knowledge, skills, and attitudes and the key concepts of critical thinking and stewardship (Hart, 2002). This document emphasizes the societal and environmental attitudes and values in teaching science and technology (Council of Ministries of Education, Canada, 1997).

Hart (2002) problematized this process and guideline in terms of both policy and practices. He argued that teachers and practitioners were isolated from the process of developing the Pan-Canadian document; therefore, the Council overlooked the impact of this policy on science teachers and schools and failed to consider “the complexity of learning and of the change process itself” (p. 1249). To close the gap between intended curriculum (as mandated by this policy) and enacted curriculum (where teachers direct and practice the thoughts, goals, and implementation of this policy), professional development could play a significant role (Hart, 2002, 2003; Palmer, 1997). However, research suggests that environmental education has not yet received adequate attention in the institutions which prepare Canadian teachers and the number of courses in environmental education offered to pre-service teachers is still very low (Towler,
For example, in a survey on the position of environmental education in the Canadian pre-service teacher education programs, Lin (2002) found that 65.7% of Canadian institutions did not offer environmental education courses at all and 26.1% of them which offered environmental education, offered it as an integrated part of other courses.

**Environmental education in Ontario schools and the report of The Writing Group.**

Within the federal vision, the initial mission of the Ontario Ministry of Education was to remove Environmental Education (EE) as a stand-alone subject or course and integrate it across the curriculum (Puk & Behm, 2002). However, a body of research has demonstrated that the Ontario’s integrated model has some shortfalls. First of all, teachers do not know how to bring environment education into the classroom; they face challenges as they attempt to integrate EE across different subject areas. Second, because EE is not a formal part of the curriculum guideline and at the same time the emphasis is not clear, teachers tend to spend minimum of class time to explore EE (Puk & Behm, 2002; Kola-Olusanya, 2008). Many teachers lack the knowledge, skills, and background required to teach EE across curriculum. A recent report by the Writing Group (Bondar, 2007) illustrated that “in the absence of teacher training and expertise, there is likely a gap between the environmental education ‘intended’ in Ontario’s curriculum and that which is taught and received in the classroom” (p. 2). Instead, the Writing Group clearly recommended further pre-service and in-service education for teachers to help them to develop the required knowledge and skills to include EE contents and discussions across grades and subjects.

A growing number of environmental programs have been initiated within the current Ontario Curriculum; they have embedded environmental education not only across the curriculum but also in school designs and operations. For example, the Ontario EcoSchools is an
environmental education and certification program for grades K-12, emphasizing the choices each school can make in operating and planning classroom programs. It consists of four components: ecological literacy, waste minimization, energy conservation, and school ground greening (Ontario Ministry of Education, 2010). Initiatives such as EcoSchools demonstrate the significance of the individual and institutional commitment and collaboration of children, families, teachers, staff, and principals to meet the vision of environmental awareness and a dedication to positive change.

However, The Writing Group’s report (Bondar, 2007) indicated that even with these programs in place, the content of Environmental Education is still fragmented and inconsistent and lacking a comprehensive approach to EE in Ontario schools. The Working Group’s recommendation rather focuses on applying environmental knowledge in a broad and multidisciplinary way across curriculum and subject matters to engage students “personally in their own learning, connect them to the world they live in, and give them the systems thinking and futures thinking they will need to become discerning, active citizens” (p. 5). In doing this, environmental education “will provide a rich context for learning … and draw on effective learning strategies – including inquiry, problem solving, critical thinking, and assessing alternatives” (p. 5). The report emphasizes the crucial role of individual teachers and schools in informing and empowering students to engage in the current environmental discussions and actions that are relevant to them, their families, and communities.

To achieve these goals, the report of the Working Group (Bondar, 2007) also recommends putting students in touch with both natural and human-built environments as sites of first-hand experiences and learning to appreciate, understand, and develop awareness about the environment. According to them, school boards need to “incorporate environmental
awareness into the school culture” (p. 12) through “problem solving, hands-on learning, action projects, scientific inquiry, higher order thinking, and cooperative learning” (p. 6). The ultimate goal is to actively engage children as informed and responsible environmental citizens.

The report of The Writing Group (Bondar, 2007) offers a general overview of the position of Environmental Education (EE) in Ontario schools and the current shortfalls of the provincial curriculum and guidelines to approach EE as an integrated subject across curriculum. Although, their recommendations are helpful in many ways, more studies and specific guidelines are needed to fully understand how each school can authentically engage in relevant environmental discussions and actions. With a lack of comprehensive knowledge, understanding, skills, and background, teachers and principals may still experience challenges in interpreting and implementing these recommendations or guidelines.

In addition, other environmentalists such as Stables and Scott (2002) argued that Environmental Education should not be studied as a holistic cross-disciplinary topic to replace the subject-based curriculum. They neither suggested that EE should be given a pre-imposed and pre-determined content all crowded under one big subject. Their approach is to develop Environmental Education within the existing school subjects. One possibility is to navigate implicit motives and attitudes towards nature inherent in different subjects such as art, literature, technology, history, or religious education. Bonnett (2007) challenged the abstract disengaged approach to understanding nature which in his idea, “not only further separates them [students] from what has been argued to be essential to our experience of nature, but also raises the danger of leaving them disaffected” (p. 718). To accomplish this, Bonnett suggested inviting students to bring in a metaphysical understanding of the nature to challenge approaches that
require them to conceive a local pond or a hedgerow as essentially part of an abstract deterministic causal network, or energy flow, or information system, rather than, say, as sensuous things experienced as having an intimate place and value in their own life. (p. 718)

Both Stables and Scott (2002) and Bonnett (2007) proposed environmental education to encourage children to draw upon arts and humanities as much as upon sciences and technology to critically investigate and reflect on their own familiar and relevant experiences as situated in the larger life issues.

With this approach, one can criticize the report of the Writing Group (Bondar, 2007) for not clearly and strongly encouraging a creative engagement through arts or literature. The report promises to critically monitor, question, and improve the undesirable impact of human behavior on nature. Nevertheless, the long-term goal for Environmental Education can be to move toward opening the space for critical discussions and explorations and to offer opportunities for the construction of a poetic and spiritual relationship with nature though arts, literature, and humanities (Bonnett, 2007).

**Conclusion**

As Sauvé (2005) discussed, there are many diverse approaches to environmental education with various levels of emphasis on the content, knowledge, affective understanding, or respectful and appreciative relationship with nature. A legitimate question to be asked is whether children should start by knowing and connecting with nature, or by focusing on local or global environmental problems and crises. When do teachers need to first introduce and explore the environmental concerns? Does it need to be necessarily a binary teaching approach, or could it be both? Which approach might be more relevant and meaningful to young children living in
big cities? I suggest these are the questions that need to be addressed and explored by each individual teacher for his or her classroom within the unique context of a school. Each group of learners should have the opportunities to ask its own questions and define its own ways to seek answers for those questions. In this case, Environmental Education would unfold in a curriculum that arises through

*emergent engagements*, whose unity is not the result of pre-formed interdisciplinary connections determined by academics distant from particular sites of learning, but the result of an evolving inter-play of consciously felt demands arising from a receptive participation in the issues and listening to the call of the as yet unknown (Bonnett, 2007, p. 719).
Chapter 4: Methodology

Introduction

The purpose of this dissertation is to study how the process of engagement with nature can contribute to children’s learning experiences in a kindergarten classroom. In this study, I investigate some of the complexities of defining nature in an urban school setting and examine the process of children’s learning in and with nature. I also seek to better understand the role of the classroom teacher as the facilitator of children’s learning experiences. I explore these complexities in their natural settings while attempting to interpret and understand the phenomenon of my study at the same time examining the meanings and interpretations that the research participants bring to the situation (Denzin & Lincoln, 2008). The central question that shaped this research is:

- How does the process of engagement with nature contribute to learning experiences in an urban kindergarten classroom for children ages 4 and 5?

The following sub-questions emerged as the research unfolded:

- Within the context of a mandated public kindergarten curriculum, what are the possibilities and challenges in actively and holistically engaging children with the natural world?
- What factors in a kindergarten classroom may contribute to facilitating and sustaining children’s engagement with nature?
- What is the role of the classroom teacher as the facilitator of children’s learning experiences?

In this chapter, I begin by discussing the main features of qualitative research methodology and discuss the grounded theory design as the method of my data collection and
data analysis. My use of case study is described, including information on methodological challenges and considerations in choosing a setting and entering the field. The data collection section follows in which I discuss my data collection strategies and finally, I explain my use of the Grounded theory to analyze my findings.

**Qualitative Research Methodology**

In this study, I used a qualitative research methodology with the assumption that the world is complex and ambiguous and “events are the result of multiple factors coming together and interacting in complex and often unanticipated ways” (Corbin & Strauss, 2008, p. 8). As a consequence, the methodology that we use to understand and explain this world needs to allow us to constantly reconsider our questions and answers but ultimately help us to produce some answers. Creswell (2005) wrote, "Qualitative research, however, is best suited for research problems in which you do not know the variables and need to explore" (p. 45) to obtain a deep understanding of the lived experience of individual participants. The goal of qualitative research is “to discover rather than test variables” (Corbin & Strauss, 2008, p. 12). Qualitative research allows researchers to learn about a core phenomenon by collecting and analyzing data from a variety of resources and to explore and holistically describe “the ways people in particular settings come to understand, account for, take action, and otherwise manage their day-to-day situations” (Punch, 2005, p. 142).

Educational research deals with questions that are multidisciplinary, multilevel, and inherently complex; therefore, “not just any methodology is appropriate” in this field (Guba & Lincoln, 1998, p. 201). The methodology which researchers choose shows their “way of thinking about and studying social reality” (Strauss & Corbin, 1998, p. 4). Qualitative research is one answer to the trends toward complexity, in which the researcher defines complex constructs,
collects data recognizing the complex contexts of multiple perspectives, and analyzes these data for themes, patterns, and finally meaning (Bartel, 2006; Creswell, 2005; Denzin & Lincoln, 2008; Miles and Huberman, 1994). In qualitative methodology, researchers constantly question, deconstruct, and reconstruct what they have initially held “aiming towards consensus but still open to new interpretations as information and sophistication improve” (Guba & Lincoln, 1998, p. 211). So, one important aspect of qualitative research is the researcher’s willingness to take risks and to be open to doubts and uncertainties.

Qualitative researchers need to become more and more reflectively aware of the frames of interpretation of those they observe, and of their own culturally learned frames of interpretation. According to Stake (1995), interpretation is at the centre of the role of a qualitative researcher, “nothing of that outside world can register independent of our constructed interpretation” (p. 101; also, Denzin & Lincoln, 2008).

Considering the features of qualitative research described by Bartel (2006), Creswell (2005), Denzin and Lincoln (2008), and Strauss and Corbin (1998), I chose a qualitative methodology to study a small number of children in one kindergarten classroom. I suggest that the use of qualitative methodology can help to strengthen our knowledge of the learning experiences of young children in and about nature.

The main question of this study justified designing an emergent qualitative research design which started with a broad question and a systematic inquiry to answer it in a circular reflective process. Stake (2010) argued that the process of data collection in a qualitative research study can take the research in unexpected directions so that research questions that are too specific in advance can be problematic. A qualitative researcher rather prepare “a flexible list of questions, progressively redefines issues, and seizes opportunities to learn the unexpected"
Therefore, I started with one central research question allowing sub-questions being developed during the study.

**Grounded Theory Design**

I used a grounded theory design to collect and analyze data to understand, explain, and gain empirical knowledge about the connection between children’s engagement with nature and their learning experiences at school. In a general definition, the grounded theory can be described "systematic, qualitative procedures" that enable researchers "to generate a general explanation (called grounded theory) that explains a process, action, or interaction among people" (Creswell, 2005, 53). In particular, I am using Charmaz’s (2011) constructivistic version of the grounded theory, in which she puts the emphasis on first, the tools that this method offers for “analyzing and situating processes” (p. 361), second, the analytic precision of the method that helps researchers “in explicating their participants’ implicit meanings and actions” (p. 361), and third, the attention that it allocates to “context, positions, discourses, and meanings and actions” (362). In her version, researchers do not necessarily use the grounded theory to develop an abstract theory, because they view “knowledge as located in time, space, and situation” (p. 365) and consider the active role of the researcher in constructing this knowledge. Instead, most of the grounded theorists engage in the following actions,

1. Conducting data collection and analysis simultaneously in an iterative process;
2. Analyze actions and processes rather than themes and structure;
3. Use comparative methods;
4. Draw on data (e.g., narratives and descriptions) in service of developing new conceptual categories;
5. Develop inductive categories through systematic data analysis. (Charmaz, 2011, p. 364)

One of the main assumptions of the grounded theory is explained by Strauss (1993),

We are confronting a universe marked by tremendous fluidity; it won’t and can’t stand still. It is a universe where fragmentation, splintering, and disappearance are the mirror images of appearance, emergence, and coalescence. This is a universe where nothing is strictly determined. (p. 19)

This assumption of the grounded theory encouraged me to frame my research question with a “flexibility and freedom” (Strauss & Corbin, 1998, p. 40) that enabled me to explore the phenomenon of my study and directed “the looking and the thinking enough” (Stake, 1995, p. 15) within reason. I purposefully kept my initial research question broad hoping new questions would emerge while simultaneous data collection and analysis informing and focusing each other allowing the theory to emerge from the data (Strauss & Corbin, 1998).

The data collection strategies that I employed (e.g., detailed observations, interviews, audiovisual recordings) justified grounded theory as an appropriate design for offering detailed procedures to collect research data in the present study. Corbin and Strauss (2008) emphasized that “techniques and procedures are tools, not directives” (p. 12). Researchers need to trust themselves, not becoming to fixated on following a pre-determined set of procedures to collect data. Instead, flexibility, thoughtfulness, creativity, and openness to ambiguity are valuable characteristics in the process of qualitative data collection.

I used the techniques and procedure of the grounded theory to analyze the data of the present study. The grounded theory method emphasizes the “fluid and dynamic nature of qualitative analysis” (Corbin & Strauss, 2008, p. 12) and recognizes analysis as both “an art and
a science” (p. 47). Corbin and Strauss (2008) challenged researchers arguing, “The analytic process, like any thinking process, should be relaxed, flexible, and driven by insight gained through interaction with data rather than being overly structured and based only on procedures” (p. 12). The complexity of the phenomenon of this study, that is the children’s engagement with nature, and the variety of data sources required the use of a method that acknowledges my own repertoire of thinking strategies but offers me analytic tools to purposefully mine the data and dig “beneath the surface to discover the hidden treasures contained within data” (p. 66).

**Triangulation**

Interpretation is central to any research and “the function of qualitative research during data gathering is clearly to maintain vigorous interpretation” (Stake, 1995, p. 9). Interpretation should go hand in hand with sensitivity in data collection. Interpretation does not decrease the rigor and validity of qualitative research; instead the protocols of triangulation allow the researcher to seek out multiple interpretations, rather than to confirm a single interpretation (Stake, 1995). Triangulation helps the researchers to seek more complex explanations for what they have observed.

Stake (2009) suggested that informal triangulation should occur throughout the research while researchers constantly reconsider and re-examine their interpretations. Stake (1995) recommended that researchers use data source, investor, and/or methodological triangulation “to gain the needed confirmation” and “to increase credence in the interpretation” (Stake, 1995, p. 112). In the present study, multiple data sources and ongoing dialogue with the teacher and the children informed data interpretation and acted as a means of data triangulation. In addition, I maintained open communication with the classroom teacher and checked my interpretations and data analysis by asking her for correction and comment. This was a vital process to ensure the
rigor of the analysis as well as to offer the teacher the opportunity and time to participate in this stage of data analysis.

**My Role as Researcher**

Qualitative researchers place high priority on direct interpretation of events calling “for the persons most responsible for interpretations to be in the field, making observations, exercising subjective judgment, analyzing and synthesizing, all the while realizing their own consciousness” (Stake, 1995, p. 41). Qualitative research relies primarily on human perception and understanding (Guba & Lincoln, 1998). I acknowledge that this research is primarily interpretive, personalistic, and situational (Stake, 2010). It is interpretive in the sense that it is my interpretation of an experience, an observation, and an interaction. It is personalistic as I am acknowledging my role as the main research instrument (Denzin & Lincoln, 2000). I was the key person in collecting data through my facilitative interaction that created a context where the research participants shared their experiences and life. I looked closely and became sensitive to their feelings, thoughts, and interactions. Nevertheless, I sought the participants’ points of view recognizing and attempting to understand the diversity of individual perceptions, including my own. As the research instrument, I also played a central role in translating and interpreting the data into meaningful information using my own personal and professional experiences and knowledge.

Charmaz (2011) argued that grounded theory “locates researchers’ generalizations and considers researchers’ and participants’ relative positions and standpoints” (p. 360). This research is also situational. It is situated in a unique set of contexts and does not seek to generalize, but aims to be holistic in communicating how things worked in this particular context, at a certain time, and with certain participants.
Throughout the research, I was also aware of my adult conceptions of children’s activities and abilities. I acknowledge that I often explain the children’s behavior with my adult view of the world. It is not feasible that researchers completely exclude their own interpretations and point of views; however, researching with young children, they need to be aware of this limitation. Bezaire (2009) suggested that researchers can increase the validity of their research with children by “including children’s voices and interpretations and conducting the research with them, rather than on them” (p. 45)

As an experienced early childhood educator, I consider myself a connoisseur too. Teaching in Reggio-inspired childcare centers and primary schools for many years, I often played the role of both a non-participant and a participant observer learning to be a keen and sharp child observer who was constantly challenged to use a variety of tools to document the process of children’s learning. Throughout my teaching experience, I learned not only to sit beside children, to listen to their dialogues, and to observe their play, but also to participate in their conversations, to be their play partner, and to develop and explore authentic questions with them. As an early childhood educator, I practiced how to co-create and share spaces with children, but also when and how to allow them to develop their own space excluding and protecting it from the adults in the room. Recognizing my role as a teacher-researcher, I often worked closely with children to learn how to be a sincere partner and facilitator of their learning and inquiries while developing my own questions and seeking answers for them. As a learner myself, I stayed open to what children always had to offer me to better understand both how they learn and what teaching young children means. My attitude and approach on how to live, teach, and learn with children helped me to approach the children in this study with ease and enthusiasm, feeling ‘at home’ but excited about the opportunities to discover many new things
with them. This helped me to gradually develop a trustful relationship with my research participants and facilitated my transition from being an ‘outside stranger’ to being an accepted/tolerated ‘insider’ and later a desired partner.

**Research Design**

**Case study approach.**

A qualitative case study was used to examine and understand one urban Junior/Senior Kindergarten classroom’s engagement with the natural environment. Stake (1995) argued that “Quantitative researchers regularly treat uniqueness of cases as ‘error’, outside the system of explained science” (p. 39). But, the qualitative researchers emphasize the uniqueness of each individual case and context as important to understanding. In conducting a case study, qualitative researchers then attempt to catch the complexity of a single case by “gather(ing) comprehensive, systematic, and in-depth information about each case of interest” (Patton, 2002, p. 447). The goal is to “optimize understanding of the case rather than generalization beyond” (Creswell, 2005, p. 246). In instrumental case study, researchers start with a question and a belief that they can explore and seek answers for their question by studying a particular case. Case study here is instrumental because a particular case is used to understand something broader.

In the present study, I chose to use a qualitative case study believing the extended observation involved in a case study would enable me to holistically treat the phenomena of children’s learning experiences while engaging with nature in a classroom setting. As Gummesson (2007) suggested, case study "allows the study of complexity, ambiguity, ... allows holistic, systematic approach with an unlimited number of variables and links, the purpose is usually increased understanding” (table 4.1, p. 90). In this research, I suggest that the learning processes, characterized by deep engagement with nature, can be best examined by the “thick
description,” “experiential understanding,” and “multiple realities” of a qualitative case study (Stake, 1995, p. 43).

In the following sections, I will first describe the methodological challenges and considerations to choose a setting for the present study explaining how I acquired the permission to enter the field to conduct this study. Next, I will discuss the process of data collection introducing the setting of the study, the data sources, and the participants. It is my hope that the detailed description and discussion of the methods employed in this research will enable the reader to better understand and evaluate the substantive findings and interpretations presented in the subsequent chapters.

**Methodological challenges and considerations in choosing the setting.**

I chose extensive participants’ observation to be at the centre of this research hoping to develop some empirical understanding and knowledge of when and how an emergent, first-hand, and less structured engagement with nature might contribute to children’s learning experiences. Detailed observations in a classroom for young children is challenging for several reasons. First, there is the general problem of intrusion which necessitates negotiating permissions with both adult caretakers and children. Second, in the case of kindergarten children, the researchers face the problems of physical size and perceived power in their initial contacts with children. Adults are often perceived as being socially more powerful and physically bigger. The first problem can be reduced substantially with gradual field entry strategies to create and maintain a trustful relationship with children. In addition, in ‘child friendly’ methods, children are invited to actively participate in the process of the study by sharing their questions, taking notes, photos, and videos along with the researcher (Christensen & James, 2000). The problem of physical size and power dynamics can never be overcome completely; however, it can be diminished in
importance by staying at children’s eye level and negotiating and sharing the power and
decision-making attempts with them.

In the case of adults’ (teachers and parents/guardians) permission, the researchers face
two problems of seeking trust and building relationships. In the following section, I briefly
describe certain methodological strategies I employed to look for a setting that best met my
needs for conducting fieldwork on children’s engagement with nature. I hope the discussion
provides the reader with a sense of the methodological challenges encountered to enter and study
one kindergarten classroom in a public school.

Field Entry.

Obtaining permission.

Obtaining permission to conduct a case study with young children within the public
school system has proven to be very difficult for outsiders. With this fact in mind, I started in
March 2009 to build relationships with some of the kindergarten teachers in one of the major
district school boards in the city where I conducted my study. In a workshop on the Reggio
Emilia approach to early childhood education offered to teachers after school hours, I met Mrs.
Andrea Hansen (a pseudonym), a highly qualified experienced and enthusiastic kindergarten
teacher. I explained my research plan and outlined my general interests in children’s learning
experiences with nature. Andrea expressed her own professional and personal interests in
exploring this topic and invited me to observe her classroom. I accepted her invitation and visited
her classroom in April 2009. In that visit, she first introduced me to her class and then I spent
about one hour as both a non-participant and participant observer in the classroom. During that
period, I did not observe much formal direct teaching, but the children mainly spent their time
playing with and manipulating the rich materials provided in various areas of their classroom.
The teacher highly appreciated, encouraged, and supported their play and investigation and provided them with extended periods of self-initiated free time to explore their own questions and interests. I observed that she interrupted the flow of the children’s exploration only twice, once for going out to play in the playground and the second time for snack time. I realized that the loosely-structured and children-directed routine of the class could meet my needs for observing the children’s free, spontaneous, and self-initiated engagement with nature over a long period of time.

During my earlier conversation with the teacher, I stressed the necessity for intensive observation, digital photography, audiotaping, and videotaping during my data collection process. The teacher had pointed out that she has been audio-video recording the children in the past, so that both the children and their parents were accustomed to this. At the end of my visit, I talked to Andrea about my interest in conducting my research with her in her classroom. She was also excited to participate in this research and so introduced me to the school principal, who also promised her support.

I reflected on my conversations with the teacher. To some extent, I had obtained a sense of the setting and learned about the schedule of the day as well as the physical layout of the classroom. What most attracted me to that classroom was the teacher’s commitment to emergent curriculum and support of children’s investigations as well as her personal passion about the natural environment. In addition, the cultural and linguistic diversity of the children, the urbanized neighborhood, and the proximity of the school to a small local park were some other positive factors proving the suitability of that school for my research study. I decided to offer to volunteer in that classroom.
Volunteering to build relationship and trust.

I started volunteering in Andrea’s Junior/Senior Kindergarten classroom once or twice a week from April 2009 to June 2009 and then from September 2009 to December 2009. This long period of time offered me a considerable opportunity to know the teacher and to build a trustful relationship with her, her assistant teacher, and the children as well as to communicate with them my personality, teaching experiences, and research plans.

While assisting the teacher with the pedagogical documentation (Edwards, Gandini, Forman, 1998), I tested my digital video-camera and digital voice recorder to be prepared for the time when I could officially collect data. During this period, I invited the classroom teacher to spend 15 minutes after her classroom to talk about what she did on that day and revisit some of her teaching strategies. We were both committed to this ‘dialogue time,’ which in return helped us to gradually build a strong relationship with each other.

I spent most of the class time with children playing and helping them with their activities. My years of teaching experiences with young children helped me to create a relationship in which the children felt comfortable and excited to interact with me both as a playmate and a partner. I also sometimes helped the teacher assistant to prepare materials for the classroom or to initiate and develop activities for the children. As a result of my building a relationship of mutual trust with the teacher assistant, she also considered me as a resource, often discussing with me new books and ideas that she wanted to try with the children in the classroom.

The children’s families learned about me through a newsletter that the teacher sent home in April. I also used the drop-off or pick-up period to introduce myself to the parents and talk to them. At this phase, most of the parents did not seek any other information other than my name and role in the classroom.
Qualitative research is a collaborative process where the participants play an active role with the researcher in the process of meaning making (Glesne, 1999). The trustworthy, enthusiastic, and long lasting relationship that I built with the classroom during the months that I volunteered made me less of a ‘stranger’ or outsider when I started data collection in January 2010. Most importantly, when I applied to get the ethical approval from the Research Review Committee of the district school board, both the classroom teacher and the school principal wrote a letter to support my research and my application.

**Consent process.**

After the ethical permission was granted by the Research Review Committee, I met with the school principal and the classroom teacher to sign the consent forms (see appendix A, B, and C). Once again, I talked about the study and all of its components in detail. I assured the classroom teacher that I would be available to debrief with her at any time in-person or through e-mail and by phone. In order for the teacher to have maximum input into the study, all collected data were also available to her throughout the study to comment upon, provide further insights, or review them for the purpose of curriculum planning.

In consultation with the school principal and the classroom teacher, I held an information session for the parents to offer information about my study and to gain their consent and input. Ten parents participated in the first information session in which I talked about my research, read the consent forms to help them to understand their rights and their children’s rights as my research participants, and answered their questions about the benefits of my study to their children. I assured them that participation was voluntarily and they could withdraw at any time with no consequences (see appendix F and G). I provided each participant with two copies of the form, so they could keep one copy for their own records. The classroom teacher was very
supportive of my research and highly encouraged the parents to sign the consent forms. All the present parents signed the consent forms and allowed me to observe, audiotape, and videotape their children.

Next, I asked the parents to complete the parent’s questionnaire that took about 15 minutes of their time. Two parents asked to take the questionnaire home. Andrea helped me to send the consent forms to the rest of the families who could not participate in that information night. After two weeks, I organized another information night for those families who could not come the first time. Another five parents participated, signed the forms, and completed the questionnaires. Eventually, all parents/guardians signed the consent forms and 15 parents completed the questionnaires.

Finally, in co-operation with the classroom teacher, I met with the children to offer information in age-appropriate ways (see Appendix I), explaining the purpose and methods of this study, as well as, emphasizing the value of their thoughts and feelings about their experiences during the research project. I obtained the children’s verbal consent and started the data collection in January, 2010.
Table 1. Data Collection Process.

- **March 2009**: Met with the classroom teacher in a professional development workshop
- **April 2009**: Visited the classroom; chose the site as the potential place of the research study
- **April 2009**: Gained the teacher and the principal’s consents to volunteer in the classroom
- **April 2009 – June 2009 and September 2009 – December 2009**: Volunteered in the classroom
- **January 2010**: Gained official consent from the Research Review Committee of the district school board
- **Late-January 2010**: Parents information night: distributed and collected the parent/guardian’s consent forms as well as the questionnaires
- **January 2010**: Gained the consents from the school principal, the classroom teacher, and the children
- **Late January 2010**: Teacher’s first interview
- **February – Late May 2010**: Data collection process, visiting the class during the afternoon routine
- **Early May 2010**: Teacher’s second interview
- **June 2010**: Revisited the collected photos with the teacher in two separate sessions
- **End of school year 2010**: Provided the teacher, the school principals, and the families with a visual brief of the study

**Research setting.**

**The classroom.**

The setting of the study was a half-day combined Junior/Senior kindergarten classroom located in a public primary school in a metropolitan area in Southern Ontario in Canada. The school served a population of approximately 946 students from Junior Kindergarten to Grade 5 representing 42 countries and over 33 languages. About 739 of children speak a primary language other than English (based on the figures on the school website).

The class time was from 12:30 to 3:00 p.m. five days a week. The physical layout of the classroom consists of one big room divided into two smaller spaces by two wide columns in the middle of the room. The classroom had three windows facing east over the school’s front lawn to
a row of bungalows across from the side street. The classroom consisted of some of the main learning centers in a typical public kindergarten classroom such as house center, block center, computer center, puppet center, carpet area, writing table, science center, reading center, and water and sand tables. In addition, a part of the class was dedicated to arts in which the children could explore a rich variety of materials for creating various forms of art.

Any visitors to Andrea’s classroom would notice the walls which were covered by children’s art work and pictures. Some of the children’s larger paintings were also hanging from a clothes line from the ceiling across the classroom. All the works were dated and signed by the children and were showing some of the old projects and some of the in-progress project by the children and the teacher. Through displaying some of her pedagogical documentations on the walls, Andrea was trying to keep track of children’s experiences in the classroom.

The walls in the reading and writing centers were also covered by different words, the English alphabet, numbers, and the classroom rules. Creative work and projects were encouraged by offering quality rich and authentic art and writing materials in the different learning centers. The children were allowed and encouraged to move the materials from one center to another when needed.

The teacher had provided a variety of natural materials throughout the classroom and in each learning center. The teacher chose to use wood baskets to organize books, writing and craft materials, toys, collected natural materials, and her own belongings. There were rocks, shells, leaves, bark, pine cones, and acorns in the science center. The ‘art studio’ was also equipped with many natural materials, such as pieces of wood, leaves, dried flowers, pebbles, colored sand, beans, and pieces of fabric with various patterns. There were different shapes and sizes of scrap wood in the block center, with which children could make different sculptures combining
them with the big hollow wood blocks. Window sills were decorated by green plants and some short sunflower pots that the teacher brought back to her classroom from a workshop that she participated in during the summer. Books about nature were visible in the block center, carpet area, writing table, ‘art studio’, and book shelves and the teacher often read those books to the children.

Table 2. The general timeline of the classroom schedule

- 12:30-1:00: children’s arrival and carpet time: informal time for children to greet each other, share stories, choose and read books, plan for the day
- 1:00-2:20: play, self-chosen activity time
- 2:20-2:40: snack time
- 2:40-3:00: group time, wrap up the day, hand out messages for home, get ready to go home

The above schedule was altered on the days that the children had music, gym, or library class; or if the class went outside.

Research participants.

The children.

The class had 20 children with an even number of boys and girls who all participated in this study. The children ranged in age from four years and two months to five years and three months at the beginning of my data collection. The children, of which seven were considered English Language Learners by the teacher, came from diverse cultural and linguistic backgrounds; all the children, however, spoke mainly English when communicating with the teacher and each other. Two of the Senior kindergardeners were able to translate into their home
language when the teacher asked them to help her with those children who were developing their English fluency or for a family member who spoke languages other than English.

None of the children was officially identified with learning or physical disabilities; however, the teacher had some concerns about one child who had shown some characteristics of Attention Deficit Hyperactivity Disorder (ADHD). In general, the children demonstrated a broad range of competencies and intelligences being keen observers, excited explorers, serious researchers, and creative investigators.

Image 8. Children are gathered around Aisha to look at the caterpillar that she just found.
The classroom teacher.

The classroom had one core teacher and an assistant teacher who helped for about 1.5 hours in each class. The classroom teacher, Mrs. Hansen has an Early Childhood Education diploma from a community college, a Bachelor of Education degree, and recently received her Master of Education from a research University. She has been teaching in kindergarten for 12 years and has been at her current school for 7 years.

Image 9. Mrs. Hansen often invited the children to help throughout an inquiry.

Teaching philosophy and strategies.

Everyday, Mrs. Hansen started her class by greeting the children and carefully listening to what they had to share with her. She highly respected each of her students saying, “I believe there should be no power struggle between the child and me. And I think they have a lot to offer.” In addition, Mrs. Hansen had high expectations of herself and her classroom suggesting,
“The deeper you go and the better teacher you are, the more work you have. Constantly, constantly, constantly. So I like my job a lot but I feel like I’m always ten steps behind.”

In the first interview with the teacher, I learned that she valued relationship and a sense of community as the core of designing a curriculum and thinking of a school for young children. She believed in family involvement and often invited and encouraged the families to feel comfortable to visit her classroom and participate in what was happening. Believing in play as a learning context and valuing inquiry-based learning, she dedicated about one and half hour of the class time to the children’s inquiries, activities, or play supporting them with time, space, materials, and her expertise. Considering the mandated curriculum, each day she selected two or three children to work with one-on-one in reading, writing, and numeracy for about 15 to 20 minutes.

Although she did not consider herself an environmentalist educator, her teaching practice incorporated a multidisciplinary approach to teaching and learning that incorporated naturalistic inquiry, critical thinking, and literacy skills which are the integral part of Environmental Education (Bondar, 2007). Her teaching practice and the learning environment of the classroom offered the children many opportunities to acquire knowledge about the environment, build a caring and appreciative relationship with the environment, and develop an environmental ethic.

Data Collection

In qualitative methodology, the researcher plays an important role in deciding what data is relevant and what it means (Stake, 2010). The data collection is a detailed and extended process through which researchers collect and study a variety of materials to understand the lives of individuals of their interest (Denzin & Lincoln, 2000). Qualitative researchers often use a number of sources including observation, interviews, artifacts, personal experiences, and cultural
and historical texts (Denzin & Lincoln, 2000). The researcher’s understanding, interpretation, and analysis of data are situated in a qualitative research methodology which claims its main goal is “to capture the complexity of the reality (phenomena) we study, and how to make convincing sense of it” (Strauss, 2003, p. 16).

In this study, data was collected through classroom observations, interviews with the classroom teacher, parent’s questionnaire, and samples of the children’s artifacts, reflective journaling, and a review of the Ministry of Education documents related to the kindergarten curriculum. The use of these multiple sources allowed me to triangulate the findings with a goal to examine and illustrate the complexity of the phenomena of my study: kindergarten children’s learning experiences in and with nature (Creswell, 2007). However, I recognize that my experiences as a graduate student, a teacher, and a parent of a kindergarten child influenced the questions I asked, what I chose to observe and collect, and how I made sense of the data. Punch (1998) reminded us, “The personality of the researcher helps to determine his or her selection of topics, his or her intellectual approach, and his or her ability in the field” (p. 162)

**Classroom observation.**

Qualitative classroom observations tend to be open-ended and less structured allowing for a recording of actions and events as they unfold (Punch, 2009, p. 184). Classroom observation was at the centre of this qualitative research with observations focusing on the children’s emergent, first-hand, and self-initiated engagement with nature and their teacher’s pedagogical strategies to facilitate and respond to their initiatives. Through ongoing informal conversations with the children and the teacher, I sought their input and perspective which enabled me to also collect what were meaningful and important to them.
I visited the classroom four times a week often at the same time during the regular classroom time of 12:30 to 3:00 pm from January to the end of May, 2010. Classroom observations were recorded using field notes, digital photography and video- and audio-recording. This part of the data consisted of hundreds of photos, about ten hours of videos, ten hours of audiotapes, and an average of three to four pages of field notes per visit.

**Teacher’s interview and the ongoing dialogues.**

The classroom teacher was interviewed on two separate occasions using semi-structured interviews (see Appendix D and E). Each interview lasted about 45 minutes and was recorded on a digital recorder and then transcribed. To member-check for the accuracy and the validity of the data, the teacher was offered opportunities to review and make amendments or deletions to the transcribed interviews.

The first interview took place in February 2010, at the beginning of the classroom observation to learn about the teacher’s overall philosophy of early childhood education and its influence on her classroom organization and curriculum planning, the teacher’s overall understanding and definition of nature and its position in her classroom, and the teacher’s view of the Ontario Kindergarten Program (Ministry of Education, 2006) in terms of valuing/emphasizing children’s experiences in and with nature. The second interview took place in early May 2010 to seek the teacher’s overall feeling and thoughts on the researcher’s presence in the classroom, the focus of the study and the possible impact on the children’s learning experiences in general and specifically with nature.

The semi-structured interviews gave me the opportunity to ask my specific questions, but proved not to be adequate to gain an in-depth understanding of the teacher’s teaching strategies and more importantly, to build a collaborative relationship with the teacher. Instead, the ongoing
informal conversations with the teacher throughout the data collection and data analysis offered me the context to know the teacher, personally and professionally, learn more about her teaching philosophy and pedagogy, and to co-create a relationship based on trust and mutual understanding.

After I finished the classroom observation, I invited the teacher to revisit some of the data with me on two separate occasions, on June 16 and 17, 2010. In each session, we looked at photos and videos recollecting our memories of what had happened in each inquiry, what was most significant to us as the researchers, what the children had experienced and learned, and how we might understand and interpret those experiences differently at the end of the school year. Each session lasted about one hour and was audio-taped.

Parents/guardians questionnaire.

In order to learn more about the children’s experiences with nature outside the school, I invited all the parents/guardians to complete a questionnaire regarding their family’s experiences with the natural world (see appendix H). The questionnaire took about 15-20 minutes to complete and the families completed them at the end of the family information night or took them home. A translation in Urdu or Punjabi was offered, but none of the families asked for it.

Children’s artifacts.

The teacher supported and encouraged the children to use various media to express their thoughts, feelings, and experiences during each inquiry. The children often drew pictures, created collages, took photos, and built sculptures to further explore a topic and communicate their ideas and feelings. I decided to collect samples of the children’s artifacts with their permission to further examine their questions, thoughts, and hypothesis about their engagement with the natural world.
Reflective journaling.

Corbin and Strauss (2008) discussed the importance of self-reflection “both in its relation to what reality ‘is’ and to its role in ‘knowing’ it” (p. 5). I chose to keep a journal to reflect upon how I influenced the research process and how, in turn, it influenced me. At the end of each visit, I wrote about one page on what I observed and experienced in the classroom as well as on my conversations with the teacher and the children. While driving home from the school, I also had the opportunity to audio-tape myself for about half an hour reflecting on what most interested, excited, or surprised me. I also articulated and reflected on my challenges visiting and collecting data on that day.

Reflective journaling helped me to first jot down my immediate interpretations of my observations and field notes as well as keep a record of my sense-making endeavors while my memories were still fresh. Later, I further examined these interpretations and analysis during each stage of the data analysis. Second, it created a safe context for me to reflect on my position and role as the research instrument, which allowed me to become more aware of and reflect on my feelings, thoughts, decisions, and biases and how each had an impact on what I focused on to observe and how I collected the data.

Document analysis.

The documents that were analyzed in this study were those that the classroom teacher frequently used or referred to in her planning and teaching. They consisted of the recently revised Ontario Kindergarten Program (Ministry of Education, 2006), the Early-Learning Full-day Kindergarten draft (Ontario Ministry of Education, 2010), and the teacher’s resource material.
**Data Analysis**

Qualitative research recognizes that data analysis is an interpretive process to examine something to understand and explain it. Meaning and interpretation are the researchers’ impression of that data and so “They are always ongoing, emergent, unpredictable, and unfinished” (Denzin & Lincoln, 2008, p. 276). Corbin and Strauss (2008) added that “more than one story can be derived from data” (p. 50). The same data can be interpreted and constructed differently by each researcher focusing on a different aspect of the data or the same researcher choosing a different lens to examine the data. Saying this, however, does not disregard the rigor and validity of qualitative analysis as the analysis is always grounded in data. Corbin and Strauss (2008) emphasized, “It systematically develops concepts in terms of their properties and dimensions and at the same time validates interpretations by comparing them against incoming data” (p. 48).

Analysis is a process and Stake (1995) argued “There is no particular moment when data analysis begins. Analysis is a matter of giving meaning to first impressions as well as to final compilations” (p. 71). Based on Stake’s approach and the method of the grounded theory that strongly suggests “data collection and analysis reciprocally inform and shape each other through an emergent iterative process” (Charmaz, 2011, p. 360), the data analysis of this study started at the very beginning of the classroom observation in January 2010, when I started writing a reflective journal revisiting and analyzing my observations at the end of each visit as well as keeping an ongoing conversation with the children and the teacher to seek their interpretations and thoughts on the data. This process was continued while I revisited the collected data to organize it into files and transcribe the recordings after each visit. This initial and immediate analysis of data informed and gave a focus to the data collection process and helped to prevent
me from getting too fixated on my initial research questions and the research plan (Parlett & Hamilton, 1977). Instead, while gathering data, I continued asking new questions while reshaping some of my primary questions which proved to be less relevant. This simultaneous process of collecting and analyzing data helped me to situate the data collection in the context of my ongoing research study rather than set up in abstract.

At the end of the classroom visits in May, this stage was followed by more detailed and systematic procedures to organize the data. The grounded theory was used to analyze and synthesize the data for this study. Strauss and Corbin (1998) defined Grounded theory as “theory that was derived from data, systematically gathered and analyzed through research process” and drawn from data, grounded theories “are likely to offer insight, enhance understanding, and provide a meaningful guide to action” (p. 12). Grounded theory offers researchers strategic and detailed procedures to reach new meanings through constantly reading, comparing and contrasting, and mining the data. This process involves a careful examination of the data for emerging themes and then putting the initial themes together to reach to larger and larger themes. Charmaz (2011) suggested a “comparative and interactive process” in which researchers develop codes, compare data with codes, then compare codes to develop categories, and finally, treat major categories as a theme (p. 361).

To develop the themes, I carefully read all the field notes, examined all the photos, listened to the audio recordings, and watched the videos. After several readings, patterns started emerging among the data and through constant analysis, I became able to systematically categorize these patterns into categories. Relevant examples of the data were then sorted under each category. To create a broader and more representative picture of how things worked and to discover the relationships among the categories, these categories were constantly compared
across all data sources (field notes, audio-visual data, the questionnaire, teacher’s interviews, and children’s artifacts). This constant comparison analysis ensured that these categories were fully grounded in the data.

This phase was followed by the progressive merging of smaller categories into larger and larger categories to develop a list of first minor and then major themes. This approach finally provided a more fine-grained view of how the process of engagement with nature contributed to the children’s learning experiences. Throughout the data analysis and the writing process, I constantly re-examined the data to clarify, polish, reclassify, modify, and reduce these themes. According to Gustavsson (2007) “The real aim of grounded theory is to elucidate a hidden phenomenon, or to elucidate a known phenomenon in a new light” (p. 67). My intent of writing and analyzing simultaneously was to develop “a discursive set of theoretical propositions” (Creswell, 2007, p. 160) which then allowed me to see the phenomena of my study with new eyes putting them into new theoretical contexts (Gustavsson, 2007, p. 69).

The Complexity of Data Representation and Written Texts

In qualitative research, there is more than one way of knowing and communicating knowledge. Recently, there has been an increasing debate that knowledge is personal and the depersonalized and objective language to communicate and represent it is not sufficient (Bartel, 2006). Expressive forms such as poetry, life history, drama, and visual images are gradually receiving more respect as multimodal texts to represent and disseminate research findings. In addition, in a society in which print text is losing its dominance, graphic and artistic representations may be even more powerful for reaching a broader audience.

To study and represent the rich and complex phenomena of engagement, learning, experience, and nature, many traditional ways to collect data and represent findings were not
enough and I was often challenged to find the best ways to *write* this study. Bartel (2006) suggested, “Knowledge, like intelligence, exists in multiple forms or types. Knowledge, therefore, can be represented in multiple forms” (p. 367). Since traditionally right answers and test scores are considered the most valid evidence of learning, I was challenged to determine how to illustrate the children’s learning experiences in and with nature in this study. A review of the literature informed me to question standardization and a one-size-fits-all approach to learning and teaching. To avoid the tradition of “describing the product to understand the process” (Klint, 1999, p. 163), I chose to focus on making the *process* of learning *visible* instead of evaluating or measuring the learning products or outcomes.

In this study, I used a variety of forms to describe and represent the findings. I used my personal and professional stories to discuss the roots of my research questions and the context of this study. To communicate the findings, I used narratives to not only describe what happened during each learning episode, but also to create a picture in which the reader can imagine how the children and the teacher felt, what their struggles and desires were, and how things happened in real situations. I used photos and scans of the children’s artifacts as an integral part of this dissertation to communicate the data and provide a visual representation of real people in real situations. Graphic presentation such as tables and charts was another tool to visualize and summarize the findings of this study. Weaving these multiple forms and texts may, at times, challenge the reader to follow and relate to this study; however, with the reader maps that I have offered throughout this text, I hope the reader would gradually feel more familiar and comfortable with the organization and multimodal texts of this dissertation.
Considering the Perceived Limitations of the Study

The methodological approach and research processes I used in this study were the most effective methods in light of time and resources available to me. However, a number of limitations must be considered when looking at the findings and the data analysis in this study. First, within the framework of the Contextual Model of Learning, I was challenged to record and analyze a complex process such as children’s engagement in and about nature. Many factors may influence the children’s engagement and involvement with nature including their family background and culture, their outside school experiences, and the teacher’s personality, but this study’s main focus is on the children’s learning experiences inside their classroom with an interest in the teacher’s pedagogical strategies to facilitate their engagement. The findings of this study do not predict or assess what the children learned from a single lesson or activity. Instead, I present the findings to make the children’s learning visible and illustrate how each inquiry contributed to what the children already knew and understood.

Second, the study was conducted in one kindergarten classroom involving 20 children and one classroom teacher. This is a sufficient number for an in-depth qualitative study, but not large enough to generalize across all populations. The classroom teacher showed a strong commitment to inquiry-based learning and she had many years of teaching experience and a high status in the school. At the same time, the children were from primarily lower middle class families, many of them recently immigrated to Canada and spoke languages other than English at home. The results may have been different given a different demographic.

Third, the family’s questionnaire is my primary data source to understand the children’s experiences with nature outside the school. In spite of the teacher’s commitment to inform and involve the families in their children’s experiences in her classroom, the families’ participation
was very low due to many factors, such as language, culture, and the school policy. Therefore, the analysis of the findings is primarily based on my observation of the children in their classroom and the inputs from them and their teacher.

Fourth, the teacher’s tight schedule and the fact that my opportunity to talk to the children was limited to the class time often challenging me to member-check or have follow-up discussions. Although I continued my communication with the classroom teacher via emails and in-person after the classroom visits ended, the opportunities were limited and I could not interview the children any further. Therefore, in the middle of the data analysis and the writing stage, I was faced with questions that I could not seek answers for any more.

Finally, Punch (1998) argued, “The personality of the researcher helps to determine his or her selection of topics, his or her intellectual approach, and his or her ability in the field” (p. 162). As a researcher, I acknowledge my personal and professional assumptions/interpretations, especially having pre-existing experiences teaching children and parenting two children myself. In addition, my own strong fascination and personal connection with nature may on a conscious and unconscious level have influenced the process of data collection and analysis. I may also have influenced the teacher’s practice and the children’s choices through the focus of my study as well as the emotional bonding that we developed during the first three months that I volunteered and the following five months that I collected data. In other words, the questions that I was interested in asking and those that I failed to ask have shaped the design and the findings of my present research study. These limitations do not decrease the validity and rigour of the findings but rather only limit its broad generalizability inviting the reader to situate the study in its particular context (Guba & Lincoln, 1998).
Chapter Summary

The chapter describes how the purpose of studying the children’s learning experiences through engagement with nature was achieved through the research methods that were used. This chapter outlines the main features of qualitative research methodology and provides a rationale for its use in the present study. The process of triangulation and my role as researcher in the present study are then discussed. The case study research design is described with a focus on identifying the methodological challenges and considerations of choosing a setting, entering the field, and getting consent/permission. After describing the research setting and the participants, I discuss the process of data collection and data analysis to make the case that the research process was appropriate and rigorous.

In the next four chapters, I use “thick descriptive narrative writing” (Geertz, 1973) and visual texts to present the findings of the study through in-depth examination of five learning episodes.
Chapter Five

When children meet nature: One classroom, two stories, and two learning experiences

“There is an information explosion going on, by which I mean a rapid increase of data, words, and paper. But this explosion should not be taken for an increase in knowledge and wisdom, which cannot so easily be measured. What can be said truthfully is that some knowledge is increasing while other kinds of knowledge are being lost” (David W. Orr, 1990, p. 3)

Introduction

Reflecting on the knowledge and wisdom that might be less emphasized in our schools, I would like to invite you to examine the possible learning experiences that Mrs. Hansen’s kindergarten classroom had during the two learning episodes that I will discuss in this chapter. The first episode is finding a dead squirrel, in which the children’s curiosity and the teacher’s response to their inquiry will be discussed. The second episode is a visit to a local farm, in which the children’s lack of curiosity and disengagement and the teacher’s response will be examined and contrasted with the first episode. It is interesting to examine these two experiences side by side, because in both learning episodes children directly experienced nature, but each experience evoked different personal, emotional, and cognitive responses from the children and the teacher. I will describe each learning episode using Comic Sans MS font to distinguish them from the rest of the text. After the two narratives, I will first analyze each learning episode separately and finally compare and contrast them in the discussion section.

I observed both experiences during my position as a volunteer in the classroom and my data consisted of both my field notes and the teacher’s pedagogical documentation of the two episodes (Edwards, Gandini, Forman, 1998). I invite you to read both my visual and verbal
interpretation and representation of these two learning experiences bearing in mind the questions of what engaged these children, what have they learned on their own and what they learned through assistance from the environment and the more informed adult. How can educators know when children are developmentally prepared to deal with such experiences? If as Eliot Eisner (1993) argued, no curricula can be value free, how do the following two learning episodes challenge us to examine our own social, ethical, and educational values about children’s connections with nature?

**Narrative one: An unexpected encounter and a desire to take risks**

*Meeting a dead squirrel*

Often a walk to the park behind the school playground offered Mrs. Hansen’s kindergarten classroom various opportunities to explore and discover a part of the natural environment close to their own school. I learned from the teacher that the children were more ready and hopeful for unexpected encounters when outside the school property. So, when on a chilly afternoon, the children found a squirrel lying on its side under a very tall tree, their excitement led the class and the teacher to a unique experience.
The children's first close observation showed that the squirrel was not moving. They sat quietly beside the squirrel (image 10). Some of the children attempted to touch him with their hands. Aisha adamantly said, “Don't touch him. He will wake up.” When Mrs. Hansen reminded them that it was not a safe choice to touch the squirrel themselves, the children improvised and found sticks and markers to touch, examine, or even poke the squirrel. At this moment, Alisha announced, “It’s not moving. It’s dead! It won’t wake up.” Andrew added, “Look! There’s blood coming from his mouth.” Aisha, Mina, Isra, and Alleena each re-examined the squirrel. It was still not moving. “Why did he die?” “What has happened to him?” were the repeating questions as interest in the dead squirrel grew. I noticed that Mrs. Hansen chose to be more of a listener and a note taker.
allowing the children to ask questions and offer possible answers. Nikki suggested, “Maybe he swallowed an acorn and died.” Aisha and Alisha looked up and noticed the squirrel was under a big half-broken tree, so they suggested, “He fell off the tree.” This suggestion did not get accepted quickly and was re-examined by Andrew, John, and Justin who went to have a closer look at the squirrel. They needed time to re-think and reconsider their first thoughts. Finally, Andrew suggested, “Maybe he was hungry and died.” John disagreed, “No, I don’t think so.” Alleena looked sadly at the dead squirrel, “I think he wants his mommy.” I noticed a look of worry on some of the children’s faces. Aisha offered a solution, “He’s sick. His mother must be sad. We should take him to a doctor.”

Noticing the force of the children’s questions, their efforts to offer answers, and their worries, Mrs. Hansen invited them to draw some of their thoughts to help them to think through their observations and questions.
They worked both individually and in pairs while giving feedback on each other’s drawings. While drawing, the children went back and forth to examine the dead squirrel (images 11 and 12). Did they need to re-examine their first observations or were they enjoying the opportunity to be very close to a squirrel and to be able to examine and re-examine his body and his reactions? Were they getting too close to the dead squirrel? Should the teacher have stopped them? Observing the children’s interests in studying all parts of the squirrel’s body so closely, the teacher offered her camera to the children to take pictures. Aisha, Andrew, and Alisha asked Mrs. Hansen to show them how to take close shots and took turns taking pictures of all parts of the squirrel’s body.

The question of how the squirrel died did not get raised again. Rather, the children’s interest shifted to the features of the squirrel’s body. They observed and discovered a significant characteristic of the squirrel’s body, his tail. Alisha asked, “Why is his tail so big?” She then asked the teacher to show her how to focus the camera on just his tail and then took some photos.

It was time to go back to the classroom to go home. The teacher reminded the children that they could finish their drawings the next day. Nobody wanted to leave! Their faces showed how anxious they were about leaving the squirrel all alone. Alma and Mina started picking up leaves to cover the dead squirrel. Mrs. Hansen asked them why and they explained, “He may wake up and be cold. We have to cover him. We don’t want anyone to step on him.” With this suggestion, four other children joined them to cover the squirrel with leaves. Finally, the children agreed to leave. Did they feel more comfortable leaving the squirrel assuming he would be safe and warm until they came back the next day?
After the children had left for home, the teacher and I revisited the experience admitting our surprise over the children's level of comfort with a dead squirrel. Examining the photos, we noticed the children's strong desire to observe, examine, and investigate this animal. Thinking about the children's observation that the squirrel was dead, we also wondered how much they knew about the concept of death. When I asked Mrs. Hansen, “What are you going to do next?” She smiled and said, “I can't make this the focus of my class but I won't stop the children from going back to see him again. I go where they want to go.”

Image 13. The inquiry emerged based on the children’s curiosity and questions to further investigate the squirrel that they found in the park.
Five days of investigation emerged based on the children’s curiosity and questions

For five days, the class asked the teacher to take them to the park anxious to continue their investigation. They continued taking photos and drawing pictures focusing on how the dead squirrel’s body was gradually changing. Some of the children revisited their drawings after each observation. The repeated close observations of the squirrel offered the children an opportunity to notice the details that otherwise would have not been seen.

For example, on the first day, Alisha quickly drew a squirrel without many details (image 14).

In her second observation on the second day, Alisha first drew a squirrel on the top of the paper with the details of his head, body, and bushy tail (image 15). However, she did not look satisfied and drew another squirrel in the middle of the paper. In her third attempt, the body and long bushy tail of the squirrel are more visible (image 15). Noticing the blood marks around the mouth and hands of the squirrel, she also coloured these areas darker. Scribbles and dots around the two squirrels also show the leaves and grass around where the squirrel was found (image 16). When Arsh asked her why she drew two squirrels, she explained, "Look!
This squirrel is dead. But this one is not dead and can run again. I want him to be happy."

In these five days, the teacher was cautious not to direct the focus of the classroom indoor time to merely squirrels. Rather, the children who were interested in using extra time and resources approached her with their questions and needs and the teacher offered them her expertise as well as a supportive context for further investigation. Some of the children used circle time and activity time to talk and read books about the squirrels. The questions of why and how the squirrel died were repeated. Even one day when grade 5 children came in to discuss the food drive regarding hungry children, Alisha stood up and said, “I know why our squirrel died. He didn’t have enough food to eat!”

Over this period of time, the children demonstrated a deeper level of awareness and concern about the ‘well-being’ and the condition of the dead squirrel suggesting various ways to make him feel better, warmer, safer, and less hungry. A week of close observations and interactions had created a strong feeling for that
squirrel. On the last day of the week, Arsh who was showing strong concerns covered the squirrel with leaves, repeating, “He’s hungry. When he wakes up he’s hungry!” (image 17). Other children joined him in covering his body. They all looked very hopeless. It was hard for them to leave the squirrel on that day. That was when the teacher decided to remove the squirrel after the children had gone home.

The squirrel disappeared.

The next school day the children ran to the park excited to see the squirrel again. Feeling worried that the first one died of hunger, they were also carrying some nuts to feed the other squirrels in the park. They were excited hoping to see the squirrel again; however, to their surprise, he had disappeared (image 18). The children needed to find some explanations. Andrew suggested, “I think an animal
picked him up.” Justin proposed another idea, “I think he went into the ground.” Alisha’s offer, however, was more hopeful, “No he came alive again. You know why, because the blood was still in him!” The disappearance of the dead squirrel remained a mystery.

The stories and memories of this encounter never disappeared. Later, the teacher wrote to me, “They are still running every time we go outside to see the dead squirrel.” They also kept spotting and chasing the squirrels in the park.

Image 18. Surprised that the dead squirrel was gone, the children searched for a few minutes to ensure it disappeared.

In the following narrative, I first examine the children’s visit to a farm and then I analyze and discuss these two learning episodes by comparing and contrasting the children’s learning experiences.
Narrative two: Visiting a local farm: An attempt to reconnect children to the natural environment

Prior to the visit

Two weeks after finding the dead squirrel, the school asked the teachers to plan for a visit to a local farm in November. The kindergarten teachers organized their trip individually. I noticed that the classroom teacher did not involve the children in discussions to engage them and raise their curiosity prior to the visit. There were some discussions about what the children knew or wanted to know about the farm. However, those discussions were dominated by the safety and housekeeping rules that the children needed to follow during the trip. The teacher also had to spend a large portion of her time collecting the consent forms and money and discussing the details of booking the bus, scheduling the date of her class visit, and so on with the administrative office.

On the day of the visit

The class was excited to take a school bus to visit the farm. For me, it was an opportunity to observe the children’s first-hand interaction with nature with their parents and teachers at a beautiful farm. When we arrived at the farm, I expected to observe the children directing their visit and interacting with the farm animals for an extended period of time with adult support. To my surprise, the visit was tightly scheduled and pre-planned by the farmers. The children started the visit by making a line for a pony ride and continued by lining up for visiting all the other animals. For example, a very energetic young female farmer offered a tour of the barnyard focusing on fenced-in animals. She stopped longer to introduce her best animal friend, a donkey that she got to do a few tricks to
make the children laugh. The donkey seemed comfortable around the children allowing them to pet him.


Image 20. The little chicks attracted the children’s attention.
Next, the children visited the barn walking from one stall to another and stopped longer to see the newly-born ducklings and piglets, but they were not invited to get close or touch the animals as the fences often separated the children from the animals (images 19 and 20).

![Image 21. The children lined up behind a hose waiting for their turn to milk a cow.](image)

The visit followed with some adult-directed activities, such as milking a cow, in which a farmer demonstrated how to milk a cow and asked the children to line up to milk, which most of the children did (image 21).
Image 22. The colourful leaves of the fall invited the children to throw them about, jump and dance.

After an indoor lunch, the children had about half an hour to explore the farm with their peers. The sensory rich and the open-ended natural environment of the farm was inviting. The children found big rocks to climb on and jump off of. They challenged each other to jump higher and faster. They danced on the fall leaves throwing them up and catching them (image 22). They walked on the dry leaves listening to the sound their shoes were making. They were not happy to return to school complaining they did not have enough time to play. On their way back on the bus, the children, their parents, and the teachers seemed happy, relaxed, though physically tired.

Days after the visit to the farm

The days after the visit, the teacher noticed that none of the children asked or mentioned anything about the farm visit. So she decided to offer them time and a context to revisit the experience. She displayed some of the photos on
panels and hung them on the wall right outside the classroom. The children noticed the panels as soon as they came to the class and paused to look at the pictures before entering (image 23). Aisha said, “This is me!” Alisha answered, “Yeah! Look at me here!” Arsh added, “Look! You fell asleep on my shoulder!” Jamie questioned, “Where is my picture?” For two days, the children continued to look at the pictures before going to the classroom, but they did not bring their questions or excitement about their visit of the farm to the class.

![Image 23. The photos attracted the children and invited them to pause and revisit their experience of visiting a farm with their class. But they merely commented on photos about themselves and not about what they were doing or experiencing.](image)

**Data Analysis**

It is important to compare and contrast these two very different learning episodes because in both episodes, children directly experienced nature, though at different levels. In the next sections, I will examine the children and the teacher’s learning experiences and the teacher’s personal as well as pedagogical responses to co-construct each experience with the children.
Encountering a dead squirrel: The roles of the learners

The children: When questions are asked by the learner

*Prior experience, knowledge, and interest.*

Children are active agents, the protagonists, in building their own understanding and knowledge of the world (Malaguzzi, 1998). They always bring prior experiences, knowledge, intuition, and questions into a learning situation (Helm & Katz, 2011). When Ms. Hansen’s kindergarteners encountered the dead squirrel in the park, they brought into the learning situation funds of knowledge, experience, questions, intuitions, and personal interests which were developed through their regular encounters with squirrels. For example, they knew what squirrels look like and what they eat and do. They were fascinated by spotting and chasing squirrels. Although the encounter happened unplanned and without any prior class discussion, children’s prior knowledge, experience, and interest quickly engaged them as scientists with questions and the desire to investigate a natural phenomenon. The novelty of the situation and the surprise of an unexpected close encounter with a ‘non-pet’ animal also helped to increase the children’s level of engagement.

*Cognitive engagement.*

In this process of inquiry, the children’s exchange of questions and answers about what happened to the squirrel illustrates a high level of cognitive engagement involving all senses to observe, touch, and feel. As soon as they found the squirrel, the children used their senses to answer their first question about whether he was alive or asleep. Children have not acquired many of the adults’ assumptions and judgments and often approach a new situation with fresh minds. Although hesitant not to wake up a sleeping squirrel, some of the children started examining him with their hands. When the teacher asked them not to do so, the children
compromised to find other tools, such as sticks, to examine the squirrel. The checking, rechecking, and frequent close observations led the children to reach a collective agreement to answer their first question: the squirrel was not alive; he was dead.

This answer then engaged them even further prompting their curious minds to search for a reason for his death. Each suggested reason was carefully examined by the group; however, the children never came to an agreement and some even suggested he came back to life. When a question is relevant and interesting to children, they are more enthusiastic about participating in the discussion and challenge each other’s answers (Falk, 2005). They feel that they have a voice and develop a sense of empowerment which can have a significant impact on their cognitive engagement (Kahn, 1999). They tend to own the situation and the question and so search for the most reasonable answer (Fisher, 2005; Wegerif, 2005).

In this episode, it is also interesting to notice that the children looked for the reason for the squirrel’s death in the immediate environment where they had found him. For example, they hypothesized that if the squirrel is under a tall broken tree, he must have fallen out of that tree. Examples such as this can help educators learn more about the children’s thinking process and hypothesis-making practices.

**Science in a real-life context.**

Sitting very close to a dead squirrel was a completely new scientific learning experience for the children. As scientists, they observed, asked questions, offered hypothesis/interpretations, tested them, and made suggestions. What is stunning about the children’s investigation is that, scientifically, how else could they have been able to observe and examine a squirrel so closely, intensely, and more importantly, watch his body changing over time in its natural environment? They had the unexpected rare opportunity of having a dead squirrel in front of them to
investigate. This is a different experience compared to studying a squirrel in a book or a cage. The pictures of a book, even when they are precise and look real, can never offer the same experience, connection, and feeling.

The children also had an opportunity to explore two major scientific concepts: non-living versus living things and life cycle in a meaningful real-life context. Through observation, examination, drawing, photography, and discussion, the children were able to investigate the action of a living thing (a squirrel) changing to a non-living thing (a dead squirrel) hypothesizing what would happened to him afterward.

In addition, the children had the tools and the teacher’s support. For example, the teacher proposed drawing as a language and tool to help the children work through their observations and thoughts. (Eisner, 1993; Edwards, Gandini, Forman, 1998; Gardner, 1983) The demand of drawing and the force for some children to be accurate encouraged some of them to observe, to reflect, and to work together to reach the best possible visual representation of the dead squirrel. Later, when the teacher offered her camera, the children’s attention entirely shifted to study the squirrel’s body. Focusing the lens on the squirrel’s body and looking through the screen of a digital camera, the children found a new medium to study him. They took many pictures, in particular, of his bushy tail. Drawing and photography are two strong tools intriguing observation and re-observation offering a media to visually represent thoughts and create new understandings (Britsch, 2010). Alisha’s drawings (images 14 and 15), and the photos that she took offered her an opportunity to revisit her experience and observe the details of the squirrels body that otherwise would have been left unnoticed.
**Emotional engagement.**

As the children were getting more cognitively engaged, they also became emotionally involved. They started developing feelings and a sense of responsibility towards the squirrel. They did not want to leave him alone. They were worried about him being hungry or getting hurt. They brainstormed for ideas to make him warm, safe, and less hungry. The desire to get physically close to him, to touch him, and to examine him did not diminish while the squirrel’s body was changing and decomposing. Rather, the children’s relationship with the squirrel grew deeper, more intimate, and sensitive. Encountering and dealing with a dead animal, regardless of the children’s understanding of the concept of death, generated strong emotional connections and responsibility towards the squirrel. Again, learning about squirrels from a book or a movie may not create the same level of emotional connection.

A sensitive relationship and a strong attachment, even to a dead animal, are not necessarily harmful feelings in a child’s life. When two of the children suddenly lost family members a few months later, the bond became clearer. More recently, I asked the teacher if she had remembered anything of what children said or felt connecting their losses to the dead squirrel. She emailed me, “It was very sad and relating to the squirrel, I believe assisted them in understanding about death more deeply. Using the squirrel as a reference helped them to relate. They seemed to feel more comfortable to put ‘death’ in a bigger context.” The connection that those two children were able to make to their own personal lives was an emotional learning experience beyond the teacher’s plan.

Later in March, the class also experienced the death of one of its favourite chicks that the children hatched in their classroom and I will further discuss in chapter 8. Connecting all their
losses, the children were able to explore and ‘make sense’ of the concept of death in a broader and deeper context facing life and death together as a part of the reality of life.

It was a challenging choice to examine the children’s investigation of the dead squirrel in detail. Often we tend to romanticize the role of nature and the natural environment in children’s lives offering them a ‘clean’ and ‘nice’ view of nature. However, death is a vital part of our interconnected lives as much as birth and growth are. Not banning less pleasant real life situations and experiences, but offering support from informed and caring adults in a safe environment allows the children to observe and explore even difficult concepts such as death in a meaningful and relevant context.

**Summary of learning experiences.**

In short, in the process of engagement with a dead squirrel, the children learned how to generate their own authentic questions based on their scientific close observations. In collaboration with their peers and teacher, they practiced how to hypothesize and defend their argument in seeking answers to their questions and making (tentative) conclusions. In this inquiry, they explored with a variety of tools such as binoculars, digital cameras, and drawing and writing materials and used them to observe and record their observations. Along with their deep cognitive engagement, they developed feelings of caring and responsibility towards not only that squirrel that they found but also the other squirrels who live in their city. Thinking about and dealing with the concept of death in nature was also an important part of their emotional learning.
The teacher: Partnering with children, respecting the inquiry

An informed observer.

The classroom teacher played two significant roles during the above inquiry. First, Mrs. Hansen chose to take the role of an informed observer allowing the children to explore their own questions and interests. She stayed very close to the children to make the best decision possible based on the moment and the rhythm of each child. Although she intervened after some of the children attempted to examine the squirrel with their hands, she offered them other options, such as using sticks or markers. She offered her knowledge and teaching expertise when the children needed extra help to move to the next stage in their inquiry. For example, the teacher proposed drawing and photography as two media to challenge and help the children work through their observations and thoughts encouraging them to focus on their initial questions while generating new ones. The children’s drawings and photos acted as a memory holder offering them opportunities to visit and revisit the process of their learning.

A guide and a partner.

Second, Mrs. Hansen played the role of a partner, at times, guiding the children to a more focused exploration. This role was critical in creating and sustaining a context of listening in which, children felt comfortable and confident to take risks investigating answers, meanings, and emotions (Edwards, Gandini, & Forman, 1998). Listening as a metaphor means to give “value to others, being open to them and to what they have to say” (Rinaldi, 1998, p. 120) and to seek “to follow and enter into the active learning that is taking place” (Edwards, 1998, p. 181). Mrs. Hansen co-constructed and maintained a context where such listening was possible by supporting children with time, resources, tools, and her photography.
The teacher used photography to document her own observation of the children’s investigation and interactions. Photography is a strong tool for teachers to track the processes of children’s learning as well as the product and the outcome, if there is any (Britsch, 2010). Photos taken during an inquiry can potentially stimulate teachers’ self-reflection and help them to further plan to keep children engaged and sustain cognitive and social dynamics of their investigation (Forman & Fyfe, 1998). In addition, this form of documentation offers teachers a medium to discuss with children their questions and to support their curiosity to discover their own answers.

Both inside and outside the classroom, she offered them drawing materials, books, binoculars, a camera, and a plenty of time to continue to investigate the dead squirrel individually or in pairs. Her role is particularly important considering encountering the squirrel was unexpected and the direction of the children’s inquiry was unplanned and emergent while the situation was changing fast. Respecting children as the protagonists of their own learning, she did not interrupt their inquiry, other than when they had to go back to their classroom to go home. Mrs. Hansen successfully managed her role of staying “present without being intrusive” (Rinaldi, 1998, p. 118). The teacher’s choice/approach gave a higher responsibility and control to the children to brainstorm, problem solve, project, guide the inquiry, and seek an adult or peer’s help when needed.

The teacher also role modeled creative thinking and inquiry-based learning for the children by asking and discussing her own questions and role modeling how to seek answers for them. Bringing various resources to examine her questions, the teacher took notes and photos while closely observing and investigating the squirrel. Her positive attitude towards and active participation in the children’s talking, problem solving, and hypothesizing was also encouraging
and showed the children the value of learning as a process rather than merely an end product in her eyes.

*Taking pedagogical risks.*

Within these two roles, the teacher had to make decisions and take many risks which can be grouped in three categories of physical, emotional, and social. First, the teacher allowed her class to get close to the squirrel and investigate him for five days. Adults often do not feel comfortable consenting for children to get close or study a dead animal in detail and are concerned about the physical risk to the children. The safety and health of the children are often the reason adults put forward to protect the children from the harm of a dead animal which may carry some germs. However, trusting the children, staying as close as possible to them, and partnering with them, the classroom teacher took a very responsible risk. Risk taking is not always necessarily negative; in contrast, it can even reduce possible losses and increase expected gain as was the case when the class had to interpret and experience some later losses (Miller & Byrnes, 1997; Reio, 2005).

Second, considering fear of a dead animal, or in this case, the children’s attachment to the squirrel, involved some emotional risks in the children’s investigation. Adults may question the emotional burden on the children. Also, the teacher did not stop the children from exploring a deep concept such as death. She did not correct children’s misunderstanding about a dead squirrel being hungry, missing his mother, or coming back to the life again. Even at the end of the inquiry, although the teacher knew the children did not fully understand the reality of death, she did not attempt to ‘correct’ them. In our conversations, she told me she thought the children’s hope that the dead squirrel would come back again might be valuable in helping them to cope with the depth and weight of death of a loved one. Mrs. Hansen chose to push the pre-defined
and out-of-the-context boundaries of what is safe for children in a particular situation and challenged the underestimation of the children’s power in understanding, developing, and bearing emotional attachments. Her thoughtfulness makes me think that for teachers and children who are ready for instability, unexpected experiences, and less predictable curriculum, “the guiding metaphor is not so much ‘design’ as ‘caring’” (Hart, 2002, p. 1250).

Third, the teacher could have faced some social risks considering the possible reaction and challenges from the families and the school principal. In this case, I assume none of them questioned the professional decisions and practice of the teacher because of the trustful and positive relationship among the teacher, the families, and the school principal.

**Co-construction: Learners composing the learning experience together**

Learning is socially constructed; with help from a more knowledgeable and skilled adult or in collaboration with competent peers, children often accomplish beyond their immediate performance level (James, Jenks, & Prout, 1998; Vygotsky, 1978). The children’s authentic and emerging interest in the squirrel created a context in which each child was able to pursue her or his own questions constructing interpretations and understandings in flexible learning groups. Children made the decision to either work individually or in groups, while the groups were created and recreated by the children based on their mutual needs and interests. In the emergent flow of movement, attention, emotion, questions, and dialogues within complex nodes of interpreting observations, building knowledge, and making sense, learning became a construction-in-progress (Falk & Dierking, 2002). The ‘correct’ answer, the ‘right’ direction, and the end or the product, were not the controlling forces of the children’s investigation. Rather, the children, that is, the learners, played the key role. When “the learner exercises a large degree of choice and control over the what, when, and why of learning” (Falk, 2005) and when the learner
experiences flow “act(ing) with total involvement” (Csikszentmihalyi 1975, 36), the emergent learning experiences will be beyond what a planned and scripted lesson can offer.

In table 3, I highlighted the elements of the children’s inquiry giving a few examples for each element. This table summarizes the above-discussed learning experiences.
Table 3. The learning experiences that emerged in encountering a dead squirrel

<table>
<thead>
<tr>
<th>Elements of the inquiry</th>
<th>Some examples</th>
</tr>
</thead>
</table>
| **Prior knowledge, experience, and intuition** | Discussions in the classroom  
Books about squirrels in the classroom  
Children’s experience of spotting and chasing squirrels |
| **Encountering** | Not planned  
Unexpected context  
Physical proximity to the dead squirrel  
Close to the school and the children’s homes |
| **Pauses and revisits** | Child-directed and teacher-supported  
Non-linear structure  
Flexible in timing and directions  
Real-life situation  
Informal learning context |
| **Co-construction** | With the peers, with the teacher  
Flexible group size  
Forces of the children’s questions and desires  
Authentic dialogue  
Construction-in-progress  
Cognitive efforts: Making sense; interpreting information  
Developing feelings and responsibilities |
| **Engagement** | Teacher and children’s high level of personal, emotional, and cognitive engagement over time and place |
| **Risk taking** | Physical and health risks  
Emotional risks: fear of or bonds to a dead animal, the concept of death  
Social risks: The possible challenges from the families and the principal  
Unpredictable context and direction of the children’s choices |
| **Decision making** | Made by both the children and the teacher  
Uncertain, fast-moving, fast-changing context  
Where to put the boundaries  
Where to look for possibilities |
| **Endings** | Children’s questions and worries of what happened to the dead squirrel when he disappeared  
Hope to see him again  
Take food to the park for other squirrels  
Continue chasing and being fascinated by the squirrels  
Books about the squirrels in the classroom  
Discussions about the squirrels in the classroom  
Connection to the death of two family members: revisiting the concept of death  
Connection to the death of a chick hatched in the classroom: revisiting the concept of death |
A visit to a farm: The roles of the learners

The children: When questions are already asked

*Lack of prior knowledge, experience, interest.*

Life in the farm was not a daily and familiar experience of this class’s interaction with nature. The parents’ questionnaire indicates that only four of the 20 children had visited a farm before. It is hard to know how much prior knowledge and experience the children took to the farm because the main focus of the class discussion time prior to the visit was on rules about safety and behaviours while at the farm. The classroom teacher did not take the children’s questions or help them to create new questions before their visit to the farm. Lack of engaging discussions and enough prior direct experiences with the life on a farm made the children’s visit cognitively and emotionally a different experience compared with their encounter with the dead squirrel. The children did not start their visit with authentic self-initiated questions. The plan to visit a farm was laid on rather than emerging from the children’s interests and curiosity.

*Lack of opportunities for a deep level of engagement.*

When at the farm, the visit was mostly planned, organized, and run by the farmers who had years of experience hosting school visits and working in a farm. The farmers passed to the children some relevant and important information about life on a farm, the animals, and the source of our food. However, the pace of the farm tour, set by the adults, did not necessarily match the children’s rhythm. The fast linear structure of moving from one activity to the next did not offer the children a context to become cognitively and emotionally engaged. Young children need plenty of time to make choices, communicate those choices, and act on them by observing, developing questions, and making connections (Katz & Chard, 2000). Riding a pony, visiting the barnyard animals, and milking a cow are potentially highly engaging and informative
experiences, but the pre-scripted plan and the formal context of the visit did not offer the children a context to walk through the process of inquiry: to reflect on what had been taught, observe, wonder, ask questions, and seek answers to reach to a deeper level of cognitive and emotional understanding. In this context, the children did not become motivated to self-initiate drawing or photo-taking either.

Each farmer talked to a large group of 25 to 30 kindergarten children which made it harder for the children to focus, to process, to ask questions, and to develop an understanding of the information passed on to them. Also, this large group, not being created by the children, did not offer social stimulation of close collaboration and co-construction among the children and the adults (Rimm-Kaufman et al. 2005; Qi, Kaiser, & Milan, 2006). The pre-planned structure of the grouping seemed to diminish the children’s motivation to control the direction of their own learning while enjoying having authentic choices and agency. The questions and answers were already developed for them.

**Some positive learning experiences.**

The visit to the farm offered some valuable experiences to the children; for example, they practised how to ride a pony, milk a cow, and interact from a distance with some of the farm animals. They had the sensory experience of natural play jumping and running in the farm. Even the ride on the bus offered the children an opportunity to learn about the safety rules of going on a field trip outside the school property.

**The teacher: When questions are not asked inside the classroom**

*Less agency, less engagement.*

The school scheduled the visit to the farm for the teachers. This top-down decision took the agency out of the hands of the teachers and consequently the children. Lack of authentic
agency could discourage teachers from investing personally and professionally in an activity or inquiry (Burnard & White 2008; Paris & Lung 2008). In visiting the farm, the classroom teacher still played a central role in organizing the visit; however, the absence of prior engaging discussions with the children in the classroom suggested the teacher’s lack of cognitive and emotional interest in visiting the farm. Perhaps, the teacher’s several visits to the same farm with her other classes made the trip more as an ‘expected’ excursion also diminishing her challenges and motivation to authentically engage with the experience. The farm was already ‘discovered’ by her.

At the farm, the teacher was available to the children to answer their questions or to redirect their attention to the tour when distracted. However, she chose to trust the professional expertise of the farmers to plan the activities and to structure the main part of the visit for her classroom. Her participation in the visit seems to be more as a visitor than as a co-constructor of the learning experience. In the pre-determined plan of the visit, she seemed less interested in promoting discussions with the children to challenge them with provocative questions or guide them to generate their own questions. She chose to be guided by the farmers’ interests and understanding of what might be of value to know about a farm and how to know it which, as a result, took the spontaneity and the sense of ownership from the teacher who was also in a potential position of a learner. The questions were already asked and answered for her too.

**Stimulating further discussion.**

Playing the role of a memory holder and a guide the teacher invited the children to revisit the experience of visiting the farm by displaying the photos that she took to refresh the children’s memories and encourage discussions in the days after the visit. The display drew the children’s attention and sparked some talk about the visit. Recognizing their faces, the children felt they
belonged to the experience and what they did was important enough to be pictured and displayed. However, their interests and excitement did not bring any further discussions to the classroom in the days after.

Co-construction: When the questions are not asked by the learner

The farmer’s methods to reach out to the children and to teach them about life on the farm was more in line with direct teaching methods, in which the main role of the teacher is to transfer the information to the learner through direct teaching/lecturing, often in large groups (Rosenshine, 1983). The assumption is that the learners would receive and internalize what has been passed to them. In this method, the learners have not lost complete control over what to take and what to ignore; but, they may have less or no mutual interests and questions to work together, engage in the process of the inquiry or to co-construct some understanding and knowledge. Exploring the life on a farm with a large group of 20 to 25 young children did not form the best circumstance to stimulate collaboration among the children and the adults.

Often, the implicit assumption in a teacher-directed method is that there is only one answer to each question and the teacher is the one who knows and owns that answer. This structure can create a framework for a scripted lesson, in which the questions and answers are already made. In the visit to the farm, the classroom teacher, although engaged in observing and listening to the farmers, was not challenged to ask her own questions and in partnership with the children to seek answers to some of those questions. Instead, the farmers made the decision about what and how the learning experiences would happen, rather than trusting the learners (the teacher and the children) to discover them on their own.

In table 4, I highlighted the elements of the children’s inquiry giving a few examples for each element. This table summarizes the above-discussed learning experiences.
Table 4. The learning experiences that emerged in the visit to a farm

<table>
<thead>
<tr>
<th>Elements of the inquiry</th>
<th>Some examples</th>
</tr>
</thead>
</table>
| Prior knowledge and experiences | 4 children had visited a farm  
Some children read about farm animals in the books |
| Visit/tour                    | Planned and structured by the teachers and the farmers  
New environment, far from the children’s homes and school  
Fences between the children and the animals |
| Activities                    | Adult-organized, farmer and teacher-directed  
Structured activities  
Objective-directed/oriented  
Facts and numbers, scientific knowledge  
Timed by adults; formal context |
| Free-time exploration/ natural play | Child-directed  
Play-based exploration; running, jumping, climbing  
Happy faces |
| Co-constructing               | Large ratio of adults to children  
Large group of children/whole class activity  
Questions and answers are already made  
Direct teaching method |
| Engagement                    | Various levels of attention |
| Decision making               | Adult-made  
Scripted plan; pre-determined context  
Driven by the farmers and the teachers’ interests and knowledge |
| Endings                       | No follow up questions and discussions by the children  
Display of photos stimulates some interests |
Even the world of nature is not a 'scene,' or even a landscape. Nature for the child is sheer sensory experience.

Edith Cobb 1977, 29

Image 24. The children reached to pet a donkey at the farm. This photo illustrates competent, sensible, and curious children who possess many desires, among them a strong desire to understand and connect to the larger world around them.

Image 25. The children encountered a dead squirrel in their own immediate and familiar environment. The desire to be accurate in drawing encouraged them to closely examine the squirrel several times.
Discussion: The boundaries and possibilities of learning: Two stories, one classroom

It is important to put the two learning experiences of encountering a dead squirrel and visiting a farm together. In both learning episodes, children directly experienced nature. However, the data indicate that the children had a higher level of emotional and cognitive engagement to further investigate the squirrel. The force of the children’s questions and interests showed that the elements of wonder, discovery, interpretation, and surprise were strongly involved in their learning experience. The data illustrate competent, sensible, and curious children who possessed many desires among them a strong desire to understand the larger world around them. Nevertheless, in visiting the farm, the quick move from one interaction to another had left no time for deep cognitive and emotional involvement. Haul, Jickling, and Kool (1999) asserted, “A framework that claims to offer suggestions about educational activities cannot be narrowly prescriptive” (p. 106). The way that the visit to the farm was structured was prescriptive. The children’s interests in the farm finished at the end of the visit and did not stimulate further questions and inquiry when they went back to their classroom. The teacher’s attempt to encourage them to revisit the experience (by displaying the photos) also failed to prompt sustained discussions and talks.

When children encounter nature in their own immediate and familiar environment, nature will have a particular relevance and meaning to them (Aasen, Grindheim, & Waters, 2009). It offers them a better opportunity to investigate things in context, to ask probing questions, to feel responsible and motivated, and to consider and reflect on the complex inter-relation between their own life and actions and nature (Esterl 2008; Falk 2005; Helm 2008; Kahn and Kellert 2002; Kellert 2005; Louv 2006; Wells 2000). In the above-discussed episodes, while these children were used to see squirrels running and climbing up and down the trees and streets of
their city everyday, the farm animals were not a part of their familiar natural environment. In contrast, the visit to the farm was limited to a one-day excursion. The learning possibilities, though enormous, were more controlled and organized by the adults. Moving from one activity to another following a farmer, the children did not have time to explore the farm on their own, connect their prior experience and knowledge with their experiences in a new context, and develop a deeper awareness and understanding of the natural environment of a farm.

In these two learning experiences, it is also important to re-examine the two teaching models of co-constructing versus transferring knowledge. The investigation of the dead squirrel is a good example of children and teacher co-constructing knowledge. In the complex intersections of interest, curiosity, desire, and sense-making endeavours, children demonstrated abilities, sensibilities, and values that exceed what a formal and mainly teacher-directed lesson plan might be able to offer them (Rinaldi 1995; Stephen, Ellis, & Martlew 2010). In contrast, during the visit to the farm the pedagogical/educational assumption was that the ‘knowledge’ could be transferred to the children through talks and direct teaching. However, this method of teaching to a large group of 20 to 25 children did not offer them the best context to think and interact with their peers, construct questions, hypothesize, predict, and propose answers.

In encountering the squirrel, the children and the teacher were engaged in a most serious form of play, one that strongly supports inquiry and learning, with the teacher playing a supporting role as ‘listener’ and ‘follower’ and the children playing the leading roles of ‘experts’ and ‘scientists’. Such role play is thought to provide optimal conditions of learning as evident in the children meeting and then transcending the everyday mandated curriculum (Bezaire, 2009). They consolidated their knowledge about squirrels, per se, but also dealt with the mysteries of life and death. In contrast, at the farm, the adults were the experts guiding the learners through
the flow of content and discussions leaving less space for them to choose and direct their roles within the context of learning.

Learning about the natural environment is beyond acquiring scientific knowledge. It includes facts and numbers, but it is also about reading the environment emotionally and aesthetically (Bonnet, 1995; Chawla, 1994; Kahn & Kellert, 2002; Kellert, 2002; Wilson, 1997). Orr (2005) argued, “The goal is not just mastery of subject matter but making connections between head, hand, heart, and cultivation of the discern systems” (p. xi). However, teachers often feel these informal learning experiences and achievements are the hardest to observe, record, and finally assess or test. In the above two learning episodes, the classroom teacher showed that she valued the process of investigating, questioning, thinking, and risk taking by the children, as well as, their endeavours and abilities to develop emotions and care for a dead squirrel. Mrs. Hansen emphasized her philosophy in many of our conversations, “The investigation of the dead squirrel offered children many opportunities to use and train all of their senses. I think it increased their sensitivities towards their environment and themselves.” This is one of the main goals of environmental education (Bondar, 2007; Charles, Louv, Bodner, & Guns, 2008; Moore & Wong, 1997; Palmer, 1998).

Although children’s development of intimate personal relationship with the natural environment is easier to observe in the example of the dead squirrel, I believe both experiences had potential to offer the children a context to develop love, appreciation for the natural world and our collective lives. For many environmentalists, the “emotional bonds with nature” (Fritjof Capra, 2005, p. xv) is at the center of environmental education (Meadows, 1989). Valuing the personal and emotional connection with the natural environment can create a framework which feeds and inspires the environmental education outside its traditional roots within science,
technology, or outdoor education and find ways to enact it across the curriculum, including arts and social sciences (Bonnet, 2007; Hart, 2002; Palmer, 1998; Proctor, 1998; Senechal, 2007).

Table 5 compares and contrasts the elements of the two episodes offering the reader a summary of this chapter.

Table 5. Comparing the elements of inquiries in the two episodes: Encountering a dead squirrel and visiting a farm

<table>
<thead>
<tr>
<th>Elements of the inquiry</th>
<th>Encountering a dead squirrel</th>
<th>Visiting a farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior knowledge, experience, and intuition</td>
<td>Almost daily direct experience spotting and chasing squirrels Discussions and books in the classroom</td>
<td>Four of the children had visited a farm Some discussions and books about farm animals</td>
</tr>
<tr>
<td>Encountering/Visiting</td>
<td>Unplanned, emergent Close to children’s homes and school Familiar natural environment</td>
<td>Planned, structured, and scripted by adults Far from children’s homes and school Less familiar natural environment Fences between the children and the animals</td>
</tr>
<tr>
<td>Pauses and revisits/Activities</td>
<td>Child-directed, teacher-supported Non-linear structure Informal learning context Flexible in timing and directions Real-life situation</td>
<td>Adult-organized, adult-directed Structured activities Objective-directed/oriented Facts and numbers Real-life situation</td>
</tr>
<tr>
<td>Co-construction/Transferring model</td>
<td>Co-construction-in-progress Flexible group size Forces of the children’s questions and desires Interpreting information; cognitive efforts Feelings and responsibilities</td>
<td>Large group of children Farmers’ questions and interests Pre-determined questions and answers Direct teaching method</td>
</tr>
<tr>
<td>Engagement</td>
<td>Teacher and children’s high level of personal, emotional, and cognitive engagement over time and place</td>
<td>Various levels of attention</td>
</tr>
<tr>
<td>Risk taking</td>
<td>Emotional bonds to a dead animal Concept of death Unpredictable context and direction of the children’s choices Families and school’s responses</td>
<td>Taking the children outside the school property Trip on a bus</td>
</tr>
<tr>
<td>Decision making</td>
<td>Made by the children and the teacher Uncertain, fast-moving, fast changing context Boundaries, possibilities</td>
<td>Mainly made by adults Pre-determined context, scripted plan Boundaries, possibilities</td>
</tr>
<tr>
<td>Endings</td>
<td>Children’s questions, cares, and worries continue Hopes for the dead squirrel Chasing, spotting, and feeding squirrels continue Books in the classroom Revisiting the concept of death</td>
<td>No follow up questions by the children Display of photos by the teacher Books in the classroom</td>
</tr>
</tbody>
</table>
Reflection

Examining these two learning episodes, I am challenged to view nature beyond “a pre-packaged entity” (Louv, 2006). An authentic real-life encounter with nature often is situated within an uncertain context of exploring, discovering, and risk-taking. Reflecting on each of the above two learning episodes, I wonder to what extent the Ontario mandated kindergarten curriculum can provoke and support teachers to create such learning contexts. The mandated curriculum and the teaching method promoted along with it tend to ‘sanitize’ children’s questions taking them out of context. Books, screens, and some pre-determined fixed learning environments do not offer the children a first-hand direct opportunity to explore/meet nature; however, they are important resources to start with.

My ethical and educational values are challenged by the children’s learning experiences in the above-mentioned two episodes. Questioning my praise and support of the children’s desire to investigate nature, I ask myself: is it ethical to allow children to touch a dead animal? Is it ethical to allow a cow to be milked by about 100 visitors a day? In what ways can nature be the ‘subject’ of human inquiry and curiosity? Where are the boundaries? Where are the possibilities?
Chapter Six

Redesigning the Science Center: Responding to the Children’s Disengagement

Introduction

Environment in general and the natural environment specifically can play a significant role as a “third teacher” (Edwards, Gandini, & Forman, 1998) in inviting children to explore, ask questions, hypothesize, seek answers, reflect, and take actions. The classroom environment should be flexible enough to respond to the vibrant interests and curiosities of the children and adults who inhabit it. With children spending between 2.5 to 6 hours of their day inside a classroom in primary schools, the classroom environment plays a significant role in encouraging and facilitating their engagement and experience with nature.

In this chapter, I will examine how the classroom teacher redesigned the science learning center to response to the children’s lack of interest in using this center. First, I will use narratives to describe how the process of redesigning started and how the children initially responded. Next, in analyzing the data, I will discuss the natural elements that engaged the children examining their scientific and socio-emotional learning experiences while interacting with the natural world at the window. Third, I will examine the crucial role of the classroom teacher in designing a classroom environment that encouraged and supported the children’s engagement with nature. Fourth, I will use narratives to discuss in detail one child’s experience arguing that this new design had a positive impact in facilitating her engagement and participation in class activities.
Narrative: How Did It Start?

In January 2010, Mrs. Hansen invited me to examine the learning centers in her class. I had noticed the children’s lack of interest in spending time in the science center in the last four months. Responding to the children's disengagement with the materials in the science center, I suggested to Mrs. Hansen that we re-examine and re-design this center. We decided to focus on ways that this center may encourage interaction with and investigation into nature.

The teacher's Provocation/Invitation

The science center had a big window facing a big pine tree, a small grassy hill, and the neighborhood houses and streets. The window sill was decorated with plants, decorative statues, and books. The rectangular table under the window was covered with baskets and boxes unrelated to the center. On a big round table in the middle, there were a bird’s nest and a book related to the class discussion about birds in the last two weeks. There were baskets of shells, rocks, and magnifiers on the shelves; however, the shelves looked unorganized and cluttered (image 26).
Mrs. Hansen and I discussed the possible reasons the rich and natural materials in the science center were not able to intrigue the children. We realized the materials were not visible or organized properly and there were too many materials and furniture in a small space. Reflecting on my research topic on children's engagement and direct experience with nature, I suggested making the window the heart of the science center. The window could potentially offer the children spontaneous opportunities to directly experience the natural environment just outside their own classroom. Rather than being a barrier, the window could be a channel for "osmosis with the world outside" (Ceppi & Zini, 1998, p. 15) through which the complexity and the richness of the outdoor natural environment could
reach the children, stimulating the exchange of information, ideas, inspiration, knowledge, new questions and thoughts. For example, the children could further investigate birds by using a binocular or a camera to look out of the window. To give the children a higher and better view, the teacher then replaced the table under the window with a bench to offer the children a platform to climb up on and look out (image 27).

Image 27. The bench under the window
The teacher and I both agreed that 'less is better', so we removed the unnecessarily materials and merely left some natural materials, such as shells, barks, acorns, and fall leaves for the children to explore (images 28 and 29). We allocated the round table to the children's inquiry on birds. At the end, the center looked less cluttered, more appealing, and bigger. The teacher and I agreed to leave room for the children to modify their own environment instead of making all the decisions about the design of the science center.

Trusting children as competent learners, we were excited about what we were proposing to the children. We hoped the bench and access to the window would encourage children to spend time observing the outdoor natural environment and their neighborhood. The teacher and I chose to be observers documenting the children's interactions with the natural world using the tools and materials available to them. How would they respond?
Image 30. Seven children were sharing the space and excitement looking out of the window.

The Children’s Response

When the children came to class the next day, they noticed the re-organization of the science center and all went there. They were puzzled to see a bench under the window. However, the message was clear: climb up and look out of the window! The bench, the window, and the outdoor landscape were inviting. Even though they had just come in from outside, they were attracted to the window to see if anything new was happening (image 30). After a few minutes, they asked me to open the window. The fresh cold breeze blew onto their faces and into the classroom. Some of the children decided put on warmer clothes. They were excited
and happy; they all wanted a space to climb up and stand by the window. I noticed they were taking turns spontaneously but with few disputes.

Image 31. The children drew to represent their observations, imaginations, and conversations at the window sill.

The children's interest and joy in looking outside prompted Mrs. Hansen and me to gradually remove the rest of the plants from the window sills. This modification became an invitation to Alma and three other children to bring clipboards and markers using the window sill as their drawing site (image 31). After a while, more children joined them at the window to draw pictures or observe. There were at least five children on the bench at any time and as many as ten on that first day. Responding to the children's interests in drawing at the window sill, the teacher put a variety of drawing materials as well as observational and measuring tools by the window. For the rest of the year, the window and the sill
continued to be the hot spot for children who wanted to enjoy the fresh air, observe the world outside, watch for birds, and be at a 'higher' height in the classroom. The window remained the osmosis site where the indoors met the outdoors.

In table 6, I compare and contrast the two old and new designs of the science centre.

Table 6. Compare and contrast the two old and new designs of the science centre

<table>
<thead>
<tr>
<th>Classroom environment</th>
<th>Old science center</th>
<th>New science center</th>
</tr>
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<tbody>
<tr>
<td>Configuration of furniture</td>
<td>Traditional, crowded</td>
<td>Simple, bare</td>
</tr>
<tr>
<td></td>
<td>Barrier to the window</td>
<td>An invitation to the window</td>
</tr>
<tr>
<td>Materials</td>
<td>Bird’s nest, shells, etc:</td>
<td>More direct contact</td>
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<tr>
<td></td>
<td>de-contextualized nature</td>
<td>Nature in context: breeze, trees, birds, squirrels</td>
</tr>
<tr>
<td>Design concept</td>
<td>Traditional</td>
<td>Responding to the children’s use and lack of use</td>
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<tr>
<td>Traffic pattern</td>
<td>Children’s avoidance</td>
<td>Children’s crowding</td>
</tr>
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In chapters 7 and 8, I will further discuss how this new design of the science center facilitated the children’s engagement with the natural environment while two other inquiries were unfolding in the classroom: investigating birds and hatching chicken eggs.

Data Analysis

In this section, I first discuss what engaged the children while at the window and what sustained their interest in exploring and connecting with nature showing the children’s scientific as well as socio-emotional learning experiences. Next, I examine the teacher’s ‘strategy of attention’ in responding to the children’s initial lack of interest and their eventual curiosity and
fascination with nature. Finally, I examine one child’s response to the social dynamic of the groups of engaged and excited children on the bench.

**Nature in context: Direct experiences with nature engage young children.**

Observing and reflecting on the children’s sustained engagement with nature at the window in the above learning episode, I believe the children had all three kinds of vicarious-symbolic, indirect, and direct experiences with nature (Kellert, 2005). The books about birds offered them symbolic experiences, while the window provided them with indirect experiences with the human-managed green landscape of a grassy hill, a pine tree, and the bushes. However, in that humanly controlled natural setting, the children had many direct experiences observing birds and squirrels, feeling the fresh breeze and natural sunlight, and studying the rhythm of the day and the change of the seasons.

In the previous design of the science center, the children had opportunities for vicarious and indirect contacts with nature through books and the natural materials, such as shells, stones, or the bird’s nest that the teacher provided them with. However, these two levels of experiences did not sustain their interest. It was the richness of the direct experience with nature through the open window that invited and stimulated the children to manipulate, investigate, arrange, and plan their own experiences at the science center. I suggest a window to the ‘nature in context’ engaged the children’s mind and body, whereas the de-contextualized nature previously offered by the science center had failed to sustain their interests. The window offered the children opportunities to observe and reflect on components of nature, such as wind and breeze, sunlight, trees, squirrels, and birds, but also to interact with them in their real context. In contrast, the bird’s nest, the shells, and the rocks were pieces from the natural environment but outside of their context. In addition, they were mainly collected and brought to the class by the teacher.
Furthermore, the previous observations of this class helped me to recognize that the most engaging investigational topics in nature were those that the children encountered and experienced on a daily-basis. For example, in the learning episode of the dead squirrel, I observed the children were deeply engaged in their investigation, because squirrels were a part of their daily direct experience with nature. They spotted and chased them on their way to school and in the playgrounds and parks everyday. Similarly, the children invested more time and intellect exploring nature through that open window while avoiding the shells displayed on the shelves or the bird’s nest on the table in the science center.

One may argue that children often show interest in a novel thing or a change in their classroom. For example, when Mrs. Hansen put a puppet show stand to the house center, many children quickly chose to play with the puppets in the house center. However, after half an hour, there were only three children remaining. Gradually after a few days even less children showed interest in the puppets and the stand. In contrast, the children’s interests in interacting with nature through the window in the science center continued and inspired further inquiries for the rest of the school year. All of the children continued spending time at the window every day with some children spending longer periods of time and initiating a variety of activities.

I propose that experiences with the natural environment are full of ‘ordinary’ moments which are capable of offering children opportunities to observe together, ask questions, discuss a matter, and take actions. These ordinary experiences and moments, however, are often unexpected and so do not lose their novelty. Consider the following episode,

The children were on the bench at the window watching the birds when Mina suddenly screamed. Tarn asked, “What’s that?” Mina screamed again and showed a dead bug which was stuck in the window frame, “A bug!” Alma
 objected firmly, “Stop! No screaming!” Kevin joined them, “Where is the bug?” John became  
interested too, “Oh! You got a bug?” Alma asked Kevin, “You see that green bug? He broke and 
this is his head. That’s his body. Can you get that little bug?” Mina suggested, “This is a lady bug.” Alma 
disagreed, “No, she’s not.” Mina repeated, “Yes she is.” Alma disagreed again “No she is not! Throw it away.” Kevin picked up the bug and threw it out of the window.  

An unexpected surprise from the nature, a dead bug hiding in the window frame, and an 
uncomfortable feeling towards dead bugs made Mina scream. Her scream, indicating something  
unusual was happening, drew Tarn and then Kevin and John to the window for a closer  
inspection. Offering her perspective, Alma did not find a dead bug scary and rather shared her  
close scientific observation of his body. She also noticed and announced that the bug is broken, 
dead. Perhaps she used the word broken to imply how some parts of his body were missing. She  
asked Kevin to remove the bug seeing the children’s discomfort around the dead bug. Mina and  
Alma’s strong opinions about the kind of bug it was remained unresolved when Kevin threw the  
bug out of the window. Kevin’s action could be interpreted as a gesture to respond to his friend’s  
request. As this example illustrates, for young children, experiencing nature involves developing  
keen and sharp senses for close observations and investigations, growing strong awareness for  
recognizing details, and building conversational skills to discuss different topics and co-construct  
(scientific) knowledge.  

**Learning experiences.**  
To address the research question of how the process of engagement with nature may  
contribute to the children’s learning experiences, I will discuss in this section the children’s
scientific as well as social and emotional learning experiences while interacting with nature at the window.

**Scientific learning experiences.**

The direct contact with the natural environment provides children with many scientific learning experiences (Dewey, 1900/1968; Helm & Katz, 2011; Steiner, 1996). In the redesigned science center, an encouraged access to an open window offered the class a context to observe, ask questions, seek answers, develop rules, and solve problems, individually and collaboratively. These activities of the mind are at the center of scientific thinking and learning.

Furthermore, at the window, the children experimented using various tools such as binoculars, cameras, and magnifiers to observe and record their observations of the natural world while standing at the window. The sustained time as well as the sense of autonomy over one’s own learning encouraged the children to explore each tool in depth while teaching each other how to use them. For example, they became surprised to discover on their own how magnifiers made things look bigger:

Examining a bird’s seed with a magnifier Tyler excitedly said: *Look! Look Miss Farveh! It’s big.*

Holding two magnifiers in front of his eyes, Kevin joined and invited me to participate in their discovery: *Look at this! Look at this!*

I responded: *Now you have two magnifiers.*

Kevin agreed: *I see you bigger.*

They both laughed and continued playfully exploring the magnifiers.
Tyler’s excitement at discovering that magnifiers make the seed look bigger encouraged Kevin to experiment what would happen if he put two magnifiers together. Would that make the things look even bigger? The opportunities for non predetermined and spontaneous experiments, such as this, allow the children to include the elements of surprise, joy, and curiosity in their own learning and encourage them to take initiatives when exploring scientific phenomena on their own and with their peers.

The window, being open to the world outside, helped the children to gradually develop a stronger sense of what was happening outside their classroom. Consider the following example:

*Julie and Andrew had been waiting for birds for ten minutes by the window. Andrew whistled and called to the birds, “Come birdie birdie!” Julie quietly asked, “Do you see them? We need to hide. You’re scaring them.” Andrew agreed, “Yeah! Let’s hide. We don’t want to scare them.” Julie cheered seeing a bird eating the donut hanging from the pine tree, “Oh, birds are coming to eat this!” They both shouted, “They’re coming!”*

The sustained time and undisturbed space to watch for birds offered these two children unique learning experiences. Their curiosity led them to observe and listen carefully, to realize they need to be quiet and even hide not to scare the birds. So, they took actions based on their observations and thinking and finally, their mutual endeavor worked and a bird came to eat seeds from the hanging donut.

I also observed that the children’s interest in interacting with and understanding the natural world encouraged them to bring writing and drawing materials and turn the windowsill into a drawing spot. They used writing and drawing as two mediums to discuss and record their
observations, thoughts, and feelings. When I studied their drawings, I was surprised about how their various perspectives and knowledge of the natural environment were reflected in their drawings. The big pine tree, which was in the middle of their view, was at the center of most of their drawings. However, the picture of that big pine tree was combined with children’s knowledge about birds, their interests in squirrels, and their feelings towards nature and their neighborhood. They created pictures that were combinations of fact and fiction; of what they really saw and what they imagined seeing. Their prior knowledge and experiences with nature and the inspiring green view from the window engaged children in an ongoing dynamic of cognitive development, observing and interpreting the environmental processes of caring, feeding, and surviving.

Figure 5 summarizes and visualizes some of the children’s scientific learning experiences.
Figure 5. Scientific learning experiences of the children at the window.

Scientific learning experiences

- Using tools
- Writing & Drawing individually & in a group
- Observing, discussing, predicting, recording, asking
- Creating nature fiction
- Developing a sense of awareness and curiosity about nature
Social emotional learning experiences.

In this section, I discuss the children’s social emotional learning experiences, first examining Alma and Alisha’s drawings and then bringing more examples from the data. I invited Alisha to talk to me about her drawing. This is her story:

Baby bird was lost. Mommy was so high that couldn’t see her. I looked at the baby bird who was lost. I used the magic seeds. And the tree said to me, find a snow castle and then get the baby back to her mom. So the baby bird can eat the donut and fly to her mom. And it’s a happy ending and a love from me. (image 32)
Watching for birds, Alisha drew a story of a baby bird that was lost; however, by using *the magic seeds* and the advice from the tree Alisha was able to return the baby back to her mom. The story had a happy ending with the baby bird being able to fly back to her mom. In her drawing, we can see all of the characters in the story: the yellow baby bird on the ground, the bird’s mom flying, and Alisha herself in a purple dress on the left side. There are also two donuts hanging from the tree and a purple ‘love’ on top of the page representing Alisha’s care and love for the baby bird. Other than the tree and the donuts, the rest of the picture is based on Alisha’s imagination. The view of the green landscape and Alisha’s interest and affinity for birds engaged her in drawing and telling a story while observing the natural world through the window.

Next, I talked to Alma and she was very excited to tell me her short story too:

*I see rainbow everywhere. A beautiful tree with sparkles. A blue hole for a friend squirrel, a donut, and a rainbow bird. They fly like eagle* (image 33).

Image 33. Alma’s drawing
Examining Alma’s drawing, I notice a big blue hole in the middle of the pine tree, a rainbow at the right, and a purple scribble in the left side of the pine tree representing the rainbow bird. She decorated the tree with green sparkles. Unlike Alisha, Alma did not tell me a story with a beginning, middle, and an ending; she rather described what she saw or imagined seeing looking through the window: a tree, but also rainbows and shiny sparkles everywhere. Noticing the squirrels looking for food around the pine tree, she also wished for and drew a home (the blue hole) for a friend squirrel. Her drawing illustrates how she imagined a beautiful caring natural world.

Biophilia hypothesis suggests that human beings have a biologically innate affinity for nature (Wilson, 1984). The biophilic values are significantly represented in Alisha and Alma’s drawings. Both drawings express affection for birds and squirrels illustrating the emotional ties between human beings and nature. While Alisha felt responsible for the lost baby bird, Alma drew a home for her squirrel friends. Alisha was able to talk to the tree taking its advice to help the baby bird get back to her mom. Alma, on the other hand, imagined a beautiful world decorated with rainbows and sparkles. Opportunity to have direct contact with the natural environment through the window stimulated not only their affections, but their moral and ethical responsibilities toward nature. Some environmentalists argue that developing a sense of affection for nature throughout childhood is crucial if we hope for citizens who care, feel responsible, and advocate for positive changes in human-nature relationship (Palmer, 1998; Sobel, 2008).

Research also suggests that there is a relationship between children’s autonomy in taking responsibilities for their own learning and the development of social skills (DeVries, Reese-Learned, & Morgan, 1991). For example, the high level of interest in observing and directly experiencing the natural environment at the window offered the children opportunities to
negotiate and self-regulate during the management of the limited space on the bench. Consider the following episode:

Four children were at the window watching birds. Their conversations and enthusiasm attracted Mina to the bench. But, Kevin blocked her way up, "No more room! Only 4 people." Mina insisted, "I want to see birds too." Julie interfered, "Mina can come." Kevin disagreed, "No! Only 4 people." Julie challenged him, "Who said that? I don't see any sign for that." Mina climbed up the bench saying, "The sun is coming out and it's warm." It seemed a little bit overcrowded on the bench but the children stopped complaining.

Young children often have a desire to practice their power and develop rules. This is their way of making meaning and sense of the world around them: why they need rules; who can make rules; how they can negotiate them, and so on. Number four was symbolic for them as only four children were allowed at the same time at three other centers in the classroom. However, when Kevin tried to enforce the same rule on the bench, Julie interfered to support Mina. Despite Kevin’s insistence, she challenged him saying there was no sign for that rule. Noticing Julie’s support, Mina did not wait for confirmation from Kevin and climbed up to feel the warm day outside. Finally, the children managed to share the space with their peers without any intervention by the adults. Because of the children’s fascination with the natural world outside, with the world of birds, squirrels, sunlight, and the fresh breeze, the bench and the window continued to support the children’s development of social skills throughout the year.
Figure 6. Socio-emotional learning experiences of the children at the window.

- Developing a sense of responsibility
- Self-regulating the use of the space, developing and negotiating
- Developing affection and caring relationship with the natural world
- Self-awareness and self-reliance
- Spontaneous cooperation, turn taking
A teacher that listens: “Strategy of attention” at the center of pedagogy.

Challenging the standard and traditional ways of organizing learning centers in a classroom for young children, teachers could consider creative possibilities of bringing outside inside, connecting their classrooms to the natural environment. Noticing that the children were not spending time in the science center, Mrs. Hansen decided that the center was not responding to the current questions and interests of her class. Although she had offered a rich and engaging variety of materials, the center did not connect to the children. There were too many materials in a small space; the center looked cluttered leaving no space for children to move around and to explore things on their own. In addition, the materials were mainly collected and displayed by the teacher.

Taking into consideration the children’s active bodies and interest in nature, the teacher decided to offer them a less crowded space and access to the world outside. She imagined a classroom that went beyond a closed, isolated, and fixed room imprisoned within four walls. Consequently, her response to the children’s interests and needs turned the unused science center into a space where children initiated activities to explore the natural environment. In chapters 7 and 8, I will also examine how the teacher, in partnership with the children, connected two other classroom projects to the natural world through that window.

The teacher took an informed risk by putting a bench under the window in her classroom, not only allowing but actively encouraging climbing. The physical risk involved in this practice was that the children might have fallen off the bench or out the open window. Considering this physical risk, the school principal and the families could have challenged the teacher for putting a bench under that window. However, trusting the power and the desires of the children and observing their respect for their teacher, Mrs. Hansen considered they would appreciate the
Riley's story.

Riley was a quiet child who often chose to sit and watch what other children were doing in the class. She hardly talked to anyone or volunteered to share her thoughts during circle time. The teacher often attempted to facilitate her involvement in different activities and the children's play, but Riley seemed happier to remain an observer. The teacher believed her to be a strong student in need of encouragement and support to take risks in the social dynamic of a kindergarten classroom.

It was surprising to see Riley on the bench and at the window on the first day that the children were exploring the new design in the science center. She was comfortable on the busy bench; she asked the children to give her room to watch outside; she joined Alma and three other children to draw at the window (images 31 and 34). More importantly, she talked to other children, "Can I have that red marker? Where are the birds?" She returned to the window in the days after and always seemed happy to be a part of the group of the children on the bench observing and talking.
The engaging experience of observing the natural world through the window, the variety of activities and the intense exciting conversations by the window, the class and the teacher’s high interests in exploring the world outside, and the dynamic grouping in the science center were inviting and encouraging to Riley. The desire to be a part of the active groups of children on the bench motivated her to take a risk which was a significant step forward for this quiet child. The children’s deep engagement with the natural world facilitated by that window prompted Riley to slowly but gradually feel more comfortable to express herself around the other
children. Since then, she gradually developed confidence to become more involved in the other activities in the classroom and started making friends too.

**Discussion**

A window, as a symbolic object, offered a possibility to bridge the inside and outside worlds, between the questions and excitement developing inside a classroom and the enormous natural world outside the classroom doors. Regardless of challenges such as time, resources, and cost in any classroom, as the teacher’s experimentation with the open window shows, there are often many creative ways to encourage and support children’s scientific or socio-emotional learning experiences in nature. Discussing different forms of knowing nature, Bonnett (2007) argued that there is a need for, “a kind of knowing in which personal, moral, and aesthetic dimensions are embedded, i.e. a knowledge of things in which ‘fact’ and ‘value’ are not separated out because things are perceived in their life, wholeness, and inherent mystery” (p. 714). Examining and experiencing nature in its wholeness, children will have opportunities to construct personal, moral, and aesthetic knowledge of and with nature (Kellert, 2002; Pyle, 2002).
Chapter Seven

The Children’s Inquiry about Birds

Introduction

In the previous chapter, I examined how by redesigning the science center, the teacher encouraged the children to use the center more often as well as supported their interactions and experimentations with the world outside. In this chapter, I will examine how the children’s extensive observations and discussions at the open window encouraged them to ask new questions and initiate another inquiry to investigate the life of birds.

First, I will use narratives to describe the process of the children’s inquiry, examining how it started, developed, and continued. Within the narratives, I share a few short thoughts and interpretations using textboxes to separate them from the narratives. Second, in analyzing the data, I will discuss the elements of nature that engaged the children and examine their learning experiences throughout this inquiry. Third, I will examine the crucial role of the classroom teacher in facilitating the children’s inquiry. Fourth, I will discuss one child’s participation in this inquiry and how the process of engagement with nature supported her learning styles and developmental rights. Finally, in the discussion section, I relate the findings back to the literature arguing for the value of viewing and facilitating learning more as a process than a product.
Image 35. At the carpet time the teacher challenged the children with a question: “How did the nest get to the top of the tree?”

**Narrative: The Process of the Children’s Inquiry**

*Sources of the children’s questions.*

While the window and the science center were receiving a lot of attention from the children, the children’s discussions and questions about birds became intense. Responding to their curiosity, Mrs. Hansen brought a bird’s nest to the classroom and challenged the children with a question at the carpet time, “How did this nest get to the top of the tree?” Her question stimulated a discussion among children. Nosheen suggested, “Somebody put it on the tree.” Tarn thought, “The birds came and built the nest.” And Julie added, “It’s made of grass.” Andrew continued, “The birds came and built the nest to keep their eggs warm. So the babies come out and say it’s me!”
Akeira, who was often quiet during the carpet time, raised her hand and said, “Maybe the bird flies away.” Her suggestions that birds flew away from their nests changed the direction of the class discussion. Alisha explained, “They [birds] all go to south and stay there when the cold is not finished.” Mrs. Hansen expanded on what Alisha said inviting the class to think about the validity of her suggestion, “So, what do you think about what Alisha said? She said there are no birds here in the winter. Did anybody see any birds at all this winter?” Some of the children disagreed saying they had seen some birds. A conversation started between Alisha and Julie who confronted each other about the bird’s migration in winter. Julie was very certain, “I saw five birds.” But, Alisha defended her initial idea, “I think you saw five birds when they were going to south.” Julie strongly disagreed, “No!” Mrs. Hansen moderated their discussion, “How do you know that they were not going south?” Julie paused and then said, “Because they were trying to find food.” “What do you think about that Alisha?” asked Mrs. Hansen. Alisha replied, “I think they were trying to find food and then go to the south.” Mrs. Hansen valued this cognitive conflict and encouraged Alisha and Julie to investigate their questions further at the window in the science center.

The children’s initial questions emerged from different sources and the conversations flowed naturally with the children and Mrs. Hansen offering their thoughts, asking new questions, challenging each other’s ideas, and seeking answers. Alisha and Julie’s disagreement shows their prior knowledge about the birds’ migration in winter. They were capable of arguing and rationalizing their observations and thoughts on whether all the birds migrate to the south or if some birds stay. A mutual quest emerged from Alisha and Julie’s cognitive conflict on the carpet and they moved from asking questions to the next stage to search for answers.
Seeking answers for one's questions, following one's own interests.

The quest to seek an answer led Alisha and Julie to collaborate to reach a resolution. So, they walked to the window in the science center to watch for birds to prove or disprove their hypothesis. At the window, they shared the available tools (binoculars, a monocular, and magnifiers) and taught each other how to use them. Their enthusiasm and engagement encouraged many other children to join them; however, Alisha and Julie left after 15 minutes while the number of the children on the bench was growing.

Other children brought their perspectives and interests while watching for birds at the window. Alma was seriously aiming to find a bird, so holding a binocular she climbed up the bench announcing, “I need to see something.” Kevin joined her but was more interested in exploring the tools playfully. Holding two magnifiers in front of his eyes, he surprised Alma, “Boo!” Alma smiled, enjoying his playfulness, but turned towards the window and continued watching for birds. Now Borna climbed up and crawled under the two children’s arms to reach the window and find a comfortable space to observe. Kevin offered one of the magnifiers to him, inviting him to join their exploration. The two boys looked for birds a little bit. Kevin was still more interested in role playing so holding a magnifier in front of his eyes, he announced to me, “I’m a bird hunter.” He then left the center to ‘hunt for birds’ but soon came back and called Borna, “Borna! Borna! I’m a bird hunter.” Borna found this role playing interesting, stomped his feet on the bench, looked at me, and announced, “Mrs. Farveh, I’m a lion hunter.” The two boys found the two roles of a bird hunter and a lion hunter more thrilling, active, and playful compared to the role of a ‘bird-watcher’ that Alma and Alisha were taking on the bench.
After ten minutes, Julie again joined the group. Alma quickly offered her the binoculars, inviting Julie to watch for birds with her. Alma had previously refused to share the binoculars with Kevin, but this time she perhaps realized the potential benefit of partnering and creating a peer bonding with Julie. Alma emphasized this bonding by reminding Kevin, “Just girls can have a turn with this. You can’t have it. You’re not a girl.” The two boys did not seem happy with her rule, paused, and stared at her for a few seconds but did not challenge her.

In this learning episode, all four children were interested in watching for birds and looking out the window, but Kevin and Borna were also interested in being playful and pretend play.

While at the window, the children initiated and experimented with different strategies and playful activities to attract birds. One day, Andrew decided to examine whether imitating birds’ sounds and calling them could attract some birds to the window. He called, “Beep beep! Hey birdie birdie!” However, Alisha thought it would be better to stay quiet not to scare the birds and suggested, “We have to be very quiet if we want the birds.” Julie added, “And we need to hide.” She then lowered her voice, “Are they coming?” Her suggestion inspired Andrew to cheerfully say, “I have an idea! Be quiet because birds can be a little shy.” Lowering his voice, he further explained his idea, “Sometimes they are shy because they are scared from us.” The children stayed quiet for a few minutes. When Andrew’s strategy did not work, he returned to his first strategy of calling birds aloud, “Birdie birdie! Come for seeds! Come on birdie!” Alisha suggested another strategy,
“Throw the seeds and the birds will come.” Then Julie announced in a deep voice, “Attention! No bird is coming!” The children continued watching.

Although these strategies did not attract birds to the window, the desire to understand and make sense of the bird’s life, to explore the outdoor environment, and to be in charge of one’s own questions and interests encouraged this group of children to continue developing new strategies and testing their old strategies for the next three weeks.

So where are the birds?: A window, a bench, and too many sunflower seeds.

When the children did not see any bird, they turned to the teacher for help, “We didn’t see any birds.” Noticing their determination and enthusiasm, the teacher suggested, “What do you think about making a birdfeeder and hanging it on the tree? That might bring some birds to our windows.” The children found the idea interesting, “Yeah! Let’s do it!” A new hope grew among children that the birdfeeders might attract birds. The teacher assistant worked with the children to make birdfeeders and hang them from the pine tree. The bench turned into an ‘observation stage’. The children spent time watching for birds individually, in pairs, and at times in a big group of 10 or more (image 36).
The exciting conversations became loud and intense again while the children were sharing what they had discovered looking out the window and giving suggestions on how to attract birds.

Mina: Akeira, look outside! Look outside!

Aisha: Did you see any birds?

Julie: We need to hide. Are they coming?

Mina: No. Why they’re not eating the seeds [from the birdfeeder]?
Feeling disappointed that the birdfeeders did not attract any birds, Alma went to bring a handful of seeds to throw out. Soon, all the children found throwing seeds out of the window an appealing activity. A negotiation started between me and the children to agree on the amount of seeds the birds would need. But, very soon, the children took the responsibility to regulate the throwing of the seeds.

Alma: *No more! No more or I close the window! The teacher said no more food. Stop! No, Aisha. Listen to the teacher.*

Three children did not listen to her and continued throwing seeds out.

Julie: *No! Stop. You’re wasting the seeds.*

Finally, they all agreed that there were enough seeds for the birds on that day.

Gaining some awareness of not wasting the seeds, Julie and Alma attempted to regulate the use of the seeds. Alma emphasized that the rule had been set by a teacher. Julie brought to the children’s attention that they were wasting the seeds when no bird was coming to eat them.

Developing rules and managing the space to facilitate peer involvement.

The ongoing conversations, enthusiasm, joy, and the variety of activities that were simultaneously happening (e.g., talking, drawing, role playing, picture taking) were constantly attracting the children to the window. The space on the bench was limited; however, turn taking and space sharing often happened with few dispute. The children were pleased to squeeze together to accommodate more friends on the bench.

Nayla: *Give me some space.*
Alma moved to give room to Nayla on the bench: *You're my friend. Yeah?*
Banu followed Nayla and climbed up the bench: *Me too.*

For these three girls, building social bonding was important and by sharing the space on the bench, they indicated their friendship.

**Was the cognitive conflict ever resolved?**

When after a week, no bird came to eat the seeds when the children were at the window, some of them came back to the original question of whether any bird stayed in their city over the winter. Alma suggested, “I see nothing. They don’t come in winter. They just die. When summer comes they come back.” Alisha suggested her hypothesis again, “There’s no bird coming in winter.” Alma agreed, “They’re only coming in spring when it’s warm.” Tarn did not agree, “No. Some will stay and don’t go south.” I tried to clarify, ”Did you see any of them?” Tarn replied, “Yes, when I was going home.”

When Alma did not see any bird at the window, she hypothesized that they died but would come back alive in summer. Although, Alisha agreed with her, Tarn disagreed and supported his idea by saying he actually saw some of them on his way home. It was almost the end of February and some birds were back in our city. Hadn’t Alma and Alisha seen any birds so far? If they had seen birds, were they so highly attached to their initial hypothesis that they tried to confirm and support it anyway?

Gradually more children added that they had seen birds in the sky; however, still no bird came to the classroom window. The children started asking, “*Why don’t birds come to our window?*” until one afternoon …
Julie cheerfully discovered, “All the birds are going to my uncle’s house. That’s why they don’t come here” (image 37). Mrs. Hansen asked, “Why do you think the birds are all there?” Aisha suggested, “Let’s go and see.” Under light snow, six children and Mrs. Hansen put their coats on and left to find out the answer. The rest of the class watched them from the window. They came back excited to share what they had found, “There are lots of birdfeeders and birdhouses there. They are beautiful! He put lots of food for them everywhere.” Five of the children squeezed back at the window. Mrs. Hansen challenged them, “I wonder how we can get the birds from that house across from the street?” Andrew suggested excitedly, “I know! I know! Let’s make a trail of seeds from the uncle’s house to here.” The teacher was impressed by his suggestion, “Make a trail of seeds, from the uncle’s house to here?! Wow! That’s a very interesting idea.”
Julie’s suggestion, the teacher’s provocation, and Aisha’s call for an action led the children to quickly seek an answer for the mystery of bird’s avoidance of their window. The many previous opportunities that the teacher had been offering the children to spontaneously and comfortably explore the natural environment encouraged these children to be curious and motivated when it was time to investigate a phenomenon in nature. In their short visit/investigation, the group realized that Julie’s uncle had put a lot of food for birds in beautiful birdfeeders and birdhouses. Could this be the possible reason that birds were going to his house rather than their window? Squeezing back at the window, the children showed they were still looking for more explanations. The teacher’s question challenged the children to think about how to attract those birds to their window. Andrew’s suggestion was well received by the teacher and remained valid for further investigation.

Another visit to the neighbor’s house.

Mrs. Hansen continued to respond to the children’s interest in understanding why birds were not coming to their window. So when four children asked to visit the uncle’s house again she agreed that the children and I visit him again to seek his advice on how to attract birds to our window.

When Julie’s uncle welcomed us in his front yard, Julie asked, “Why do all the birds come to your house?” Her uncle asked, “Do you feed them over there?” Julie and Banu nodded their heads, yes. He was surprised, “How come? I’m getting them all here!” He went inside and came back with a bowl of seeds for the children to feed the birds. Andrew asked the uncle, “Excuse me! What kind of birds are they?” He replied, “Oh, they’re all sparrows and then some old pigeons. It’s funny; they’re not there but as soon as I come out of the door, bingo! Down they come. They know. Same ones all the time. Same ones.”

The children came back to the class reporting what they had learned from the uncle. While they continued watching for birds, another inquiry (which I will examine in chapter 8) was starting in their classroom that engaged them to investigate some new questions.
The above vignette described another spontaneous and un-predetermined move from the class to further investigate the group’s interest in birds. Considering the uncle as an expert, the children asked to meet with him. His friendly approach encouraged the children to comfortably ask their questions and challenge his first idea arguing they also put a lot of seeds for birds, but birds still did not come to their window. Visiting Julie’s uncle and talking to him as an expert was an important move from the teacher to connect her class to a local expert valuing and respecting the body of knowledge that he might be able to offer. In his short conversation with Andrew, the uncle shared with him some of his most important experiences with birds; that is, birds were smart knowing when he came to feed them and they also had bonded with him.

Alma’s Story

Alma was an active girl who often moved from one learning center to another constantly seeking the adults’ attention but had difficulties following the classroom’s rules and the teacher’s instructions. The classroom teacher had noticed that she often has challenges to focus on an activity or finish a task on time. She could not maintain her relationship with her friends and seemed too sensitive, often feeling frustrated when playing and working with her peers. The teacher suspected signs of impulsiveness and hyperactivity too. Alma was not identified with Attention Deficit Hyperactivity Disorder (ADHD), but she showed characteristics of ADHD. Research shows that these children often have difficulties sitting for a long period of time and are often disengaged in the classroom. To me, Alma seemed very curious, at times, loud. I noticed she rarely spent more than a few minutes in any learning center, except the painting easel where she could paint over a longer period of time. She had challenges in sitting during carpet time and easily becoming distracted.

Taylor (2001) suggested that specifically children with ADHD symptoms could perform better in school if they spent more time interacting with the natural environment and even “something as simple as a view out the classroom window onto a green space” (p. 32-33) could
help them focus their body and mind. Therefore, it became particularly important to me to further examine Alma’s engagement with nature at the window in the science center.

In the following two vignettes, I would examine how the natural environment supported Alma in realizing and demonstrating some of her competencies that otherwise could have been missed, if not misjudged.

Vignette one: To explore the life of birds, Alma brings four resources to the window: her prior knowledge about birds, a bird’s nest, a few books, and her interests in drawing.

Watching for birds, Alma brought two picture books to the window sill about the life cycle of chicks inside eggs and after hatching. The pictures challenged her to share and re-examine her prior knowledge about birds with me. Pointing to a picture of some eggs in a nest, Alma said invitingly to me, “Look! They live in that. They sit on them, because they get cozy.” Being confused as to how the chicks got inside the eggs, Alma continued, “Some chicks died and they turned into eggs.” I repeated what she said to help her to rethink her thought, “Some chicks died and then got inside the egg? Is that what you mean?” Now Alma was not quite sure, “Yeah! No, they’re alive there.” She then left to bring the bird’s nest from the table. Looking back and forth between the book and the nest, she said, “The little birds make it”
(image 38). Holding a magnifier she bent over the book to look closely, “You know, they make it with grass. Look! I want to draw a bird’s nest.” She left to bring the markers and sat to draw for about 15 minutes.

Image 38. Alma brought various resources including a nest, a book, and drawing materials to the window sill to further investigate the life of birds.

In the above vignette, Alma was capable of creating and developing her own learning map. I chose to be a keen observer and listener asking her for more clarification when I was confused. It was Alma herself who initiated the investigation into her questions and brought various resources to use in this quest to help her better understand the life of birds. Picture books, a nest, and a drawing complemented her direct observation of birds at the window. She knew that
birds lay eggs and sat on them to make them cozy, or warm and safe. She knew the chicks were alive inside the eggs but it became challenging for her to understand how they got there. She used a magnifier to carefully examine the nest and observed that it was made of grass. Alma was competent to assemble and disassemble the realities to make meaning of what she was experiencing.

Vignette two: Alma’s looking at the picture of a chicken embryo.

Alma and I are looking at a book showing chicken embryos.
Alma: Why? Why? What’s that?
Farveh: That’s the little bird inside the egg. She is small but is gonna grow and grow.
Alma: Inside the egg?! Look! Look!
Farveh: It’s the blood vessel.
Farveh: Because the bird needs food and that’s how she gets her food.
Alma: Blood?!
Farveh: Through the blood vessels.

Alma expressed her confusion and surprise by repeatedly asking why. She was surprised to see the picture of a chicken embryo all covered by blood vessels. Did she expect to see a small version of a new-born chicken inside those eggs? She was also surprised to hear the little chicks receive their food through the blood vessels.

I acknowledge that Alma’s enthusiasm for spending time with me as her partner and guide was a strong motivation in sustaining her investigation of birds; however, she was powerful and persistent in her observations, question making, and meaning making attempts. My
role, as a facilitator, was to offer my prior knowledge, to challenge her to think through her thoughts, to create a context to encourage her to use her own skills and competencies, and to keep her company, so she would feel valued and motivated. More importantly, Alma’s enthusiasm, happiness, and never-ending questions were strong forces in engaging me in what she was experiencing.

In contrast with the regular activities in the classroom, Alma was the most engaged child throughout the inquiry about birds. I suggest that nature engaged her by offering not only a variety of resources to explore but also a selection of medium to communicate her feelings, thoughts, and to hypothesis with. There is a delightful stimulation in exploring nature with varied animals and landscapes. Kellert (2005) suggested that children often interact with animals with some emotional states such as, like, dislike, doubt, joy, fear, and wonder. Alma’s emotional responses stimulated her imagination, curiosity, and communication, improving her awareness, observational skills, attention span, reasoning, problem-solving, and decision making (Trancik & Evans, 1995; Wells, 2000). The benefits for Alma were not limited to her involvement in this inquiry. These positive learning experiences fostered her natural curiosity helping her to gradually participate in many other class activities as well. She became more focused, developed and maintained a closer relationship with her peers, was able to follow the teacher’s instructions, and to better manage her impulsiveness/emotional feelings.

**Data Analysis**

In the next two sections, I will first discuss how nature, here birds and the natural landscape, supported and enhanced the children’s ways of learning in a non-predetermined context of exploring, discovering, and risk-taking. Secondly, I will discuss the role of the classroom teacher in facilitating the children’s inquiry.
“I can’t see any birds. I’ve been patient.”: The nonlinear and non-predetermined process of the children’s learning experiences with nature.

An open window, a bird’s nest, and an invitation from the teacher had set up the context for an inquiry about birds by the children. The inquiry started with a question (Q) *Do all birds go south in winter?* and a desire to answer that question (A). Analyzing the children’s journey between point Q and point A, I would argue that the process of the children’s learning was often not linear and predetermined.

First, the children’s initial questions emerged from their various experiences with and observations of birds but gradually expanded and sometimes even shifted their directions based on children’s interests and quests. This flexibility offers learners a rich context were the possible questions and path to seek answers are not pre-determined but can be invented and developed by learners. For example, while Julie and Alisha were investigating if all birds migrated to south in winter, Kevin and Borna initiated role playing, experimented with tools on the bench.

Secondly, the non-predetermined context of the inquiry offered each participating child opportunities to be a part of a group but also provided them with space and resources to follow their own individual interest and curiosities. For example, Alma initiated many individual investigations that she followed through by herself while she also enjoyed collaborating with her peers to, for example, make a birdfeeder or read books. It is important for each child to maintain her or his autonomy and control while also compromising to be a part of a group of learners.

Thirdly, the inquiry offered the children many opportunities to experience and practice spontaneous learning in nature. For example, being curious and puzzled about why all the birds went to the uncle’s house, the children spontaneously initiated a short visit to his house. I argue that these spontaneous actions were valuable learning experiences encouraging a natural flow of
conversations and investigation, in which the children offered their own thoughts and challenged each other without the teacher necessarily asking them to do so or correcting them. This is in contrast to what children sometimes observe in classrooms where teachers ask most of the questions, know the predetermined answers to those questions, and direct the children to find those answers.

In general, the children learned to encounter nature with a questioning mind and attitude noticing all the details and anomalies and develop a high level of comfort in exploring and building a relationship with the natural world. Nature for them was not something to take for granted, to ignore, and to normalize. These learning experiences are valuable and essential if we wish to assist children to not only keep their natural curiosity and fascination in nature but to build upon and enhance them throughout their lives (Helm & Katz, 2011; The Wring Group, 2007).

The non-linear and non-predetermined process of the children’s inquiry offered them a natural context for self-regulation: to think independently, to regulate their desires to follow up with their questions, to organize their thoughts to discover answers, to participate in group learning, to guide their spontaneity to problem solve and initiate meaningful actions.

Ownership and autonomy: From a cognitive conflict to a social bonding.

In the inquiry about birds, the children took ownership of their own learning. They started with a question, took many open-ended spontaneous initiations, and with the teachers help co-constructed a path to seek answers. Their exchanges of ideas often created cognitive conflicts which generated more questions and follow-up investigations. I believe these cognitive conflicts were learning opportunities for the children to discuss their own hypothesis while considering and reflecting on the point of views of others.
These cognitive conflicts created a context in which the children were encouraged to create groups of learners to investigate mutual agreements and disagreements. The children in each learning group had opportunities to develop social relationships and form a sense of group bonding. For instance, the children collaborated in sharing the space to include peers and develop new friendships while teaching each other how to use the tools. These positive personal and social learning experiences aid children in developing self-efficacy and confidence which both reflects and generates a stronger sense of self-esteem (Dietze, 2006). When children have a stronger belief in their own abilities to achieve a desired goal they are more willing to take responsibility for their own learning (Cambourne, 1988; Cameron & Bartel, 1999; Perry, 2001).

Table 7 illustrates the elements that sustained the children’s engagement.

Table 7. Elements that sustained the children’s engagement

<table>
<thead>
<tr>
<th>Characteristics of the inquiry</th>
<th>Sustain engagement because it is …</th>
</tr>
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<tbody>
<tr>
<td>Nonlinear, non-predetermined processes</td>
<td>An open-ended learning experience</td>
</tr>
<tr>
<td>Learner’s sense of ownership and autonomy</td>
<td>Intrinsically motivating and rewarding</td>
</tr>
<tr>
<td>Social bonding</td>
<td>Creating mutual interests and quests</td>
</tr>
<tr>
<td>Emotional uplifting</td>
<td>Building self-efficacy and self-esteem</td>
</tr>
<tr>
<td>Physical stimulation; hands-on experiences</td>
<td>Promoting fine and gross motor skills; promoting sensory exploration</td>
</tr>
<tr>
<td></td>
<td>Immersing in various forms: visual, tactile, aural</td>
</tr>
<tr>
<td>Cognitive conflict</td>
<td>Cognitively and emotionally challenging</td>
</tr>
<tr>
<td>Integrative scientific exploration</td>
<td>Seamlessly incorporating science, reading, and arts</td>
</tr>
<tr>
<td></td>
<td>Creating contextually meaningful, relevant, and purposeful activities</td>
</tr>
<tr>
<td>Teacher’s facilitation</td>
<td>Offering time, space, tools, expertise; re-energizing children’s thinking</td>
</tr>
</tbody>
</table>

Table 8 demonstrates how the nonlinear process of investigating birds offered the children many opportunities to develop cognitively as well as socio-emotionally. The children’s
rich learning experiences with nature should not be surprising considering the pedagogical innovation and suggestions of seminal scholars such as Froebel, Dewey, and Steiner who many years ago emphasized the role of nature in developing and enriching a curriculum for children (Dewey, 1900/1963; Froebel, 1840; Steiner, 1996).

<table>
<thead>
<tr>
<th>The process of bird inquiry</th>
<th>Learning experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources of the questions</td>
<td>Observation</td>
</tr>
<tr>
<td></td>
<td>Class discussion</td>
</tr>
<tr>
<td></td>
<td>Teacher’s stimulation/invitation</td>
</tr>
<tr>
<td>Prior knowledge</td>
<td>Reasons birds build nests</td>
</tr>
<tr>
<td></td>
<td>Ways birds make nests</td>
</tr>
<tr>
<td></td>
<td>Birds’ migration: to where and why</td>
</tr>
<tr>
<td>Children’s role in the process of the inquiry</td>
<td>Observing, asking questions; seeking answers</td>
</tr>
<tr>
<td></td>
<td>Rationalizing, hypothesizing, arguing, listening</td>
</tr>
<tr>
<td></td>
<td>Collaborating</td>
</tr>
<tr>
<td></td>
<td>Perseverance, spontaneity, self-learning, sustaining the engagement using different strategies and resources (drawing, reading, conversation, collaborating, playing, playful investigation)</td>
</tr>
<tr>
<td></td>
<td>Seeking adults’ company and help</td>
</tr>
<tr>
<td></td>
<td>Developing strategies to attract birds (whistling, hiding, staying quiet, making birdfeeders, throwing seeds for birds)</td>
</tr>
<tr>
<td>Social bonding</td>
<td>Comradeship, friendship</td>
</tr>
<tr>
<td>Social hierarchy</td>
<td>Controlling the social dynamic</td>
</tr>
</tbody>
</table>

The teacher as a facilitator and a guide: Being present without being intrusive.

In his condition of learning model, Cambourne (1988) emphasized the role of teachers in:

a) planning for a variety of resources from which children can draw; b) demonstrating reflective and critical thinking as well as using different tools; c) communicating positive messages about
the value of learning and children’s competencies; d) offering children opportunities to try things in contextually relevant and meaningful ways; and e) facilitating children’s engagement by giving them helpful feedback and developing a relationship based on trust and care. In this study, Mrs. Hansen successfully played many of these roles.

The classroom teacher played the role of a guide and facilitator from the beginning of the inquiry. Bringing a bird’s nest to the class, she stimulated and invited discussion about birds. Next, she provided children with the context to create their own questions and seek answers. She helped the children expand on their initial observations and ideas of what they had noticed and wondered about. She supported their inquiry by providing them with materials, resources, time, and space to further investigate their questions. Knowing where her students were within their zone of proximal development, the teacher guided them at each step throughout the inquiry offering them her support when it was needed (Vygotsky, 1978).

The teacher chose not to force the whole class to study the birds but offered her support and guidance to those children who were motivated to further investigate the birds. Rather than feeling the pressure to involve all the children, she allowed the inquiry to unfold authentically along a child-initiated pathway. She supported the children sometimes by building on their curiosities and interests scaffolding their learning to the next level and at other times, by remaining an observer and documenter allowing them to lead the inquiry.

The classroom teacher can be challenged because she did not offer many direct instructions and allowed some of the children’s questions to remain unanswered or answered incorrectly. However, I suggest the teacher took a pedagogical risk choosing not to rush the inquiry to a pre-determined end where the outcomes and correct answers would be tested. Rather than focusing on transferring information through a series of pre-determined lessons to cover the
curriculum expectations, she offered a supporting context encouraging the children to experiment with the process of their learning (Helm & Katz, 2011). The children had opportunities to be playful, frequently pause and revisit their learning experiences, draw on resources from various learning centers in the classroom, and ask questions which did not necessarily have any immediate answers.

Table 9 summarizes the teacher’s role in co-constructing this inquiry with the children.

Table 9. The role of the teacher

<table>
<thead>
<tr>
<th>The teacher’s role</th>
<th>Observer, listener, partner</th>
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<tr>
<td></td>
<td>Guide</td>
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<tr>
<td></td>
<td>Documenter</td>
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<td></td>
<td>Facilitator: offering time, tools, and a context</td>
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<tr>
<td></td>
<td>Respect learners</td>
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<tr>
<td></td>
<td>Valuing the process; showing enthusiasm</td>
</tr>
<tr>
<td></td>
<td>Supporting and re-energizing children’s thinking</td>
</tr>
<tr>
<td></td>
<td>Risk taking</td>
</tr>
</tbody>
</table>
Image 39. Alisha and Julie brought various resources (tools, books, a feather, and peer’s knowledge) to the science table to examine a bird’s feather that they found in the park. Pointing to the woodpecker, Alisha suggested, “It belongs to this bird.” Julie disagreed, “No! His feathers are black. Look, this bird has white feather.” Alisha wondered, “What’s his name?” Julie, “I don’t know. Let’s ask the teacher.”

**A proposal: Resisting pedagogical rush, putting the process of learning at the center.**

It is challenging to measure the learning outcomes of the children’s inquiry in a more traditional approach to curriculum and learning. However, I argue that when children take ownership of their own learning, the process of learning needs to be valued and respected as much as the outcomes of learning. The findings demonstrated the children developed unique ways of knowing, learning, and connecting to nature through a playful process of exploring, interacting with, and discovering the fresh air, the change of season, and the birds. Reflecting on this inquiry, I consider the value of children experiencing and experimenting with learning as a
playful and joyful process rather than merely pursuing it as an end (Rinaldi, 1998). Nature can offer children many opportunities to approach learning as a continuous construction and reconstruction of experiences (Davies, 2008; Dewey, 1902/1963).

The findings illustrated, the children experienced and realized the joy of learning in a school context. Their deep engagement was reflected in the teacher’s challenge to dismiss them and their frequent complaints that “That’s not fair. I don’t want to go home!” “I love school, Miss. Farveh.” “I want to stay and play.” This can happen when the full of wonder process of learning is not sacrificed for the sake of the product of learning (Falk, 2005).

Unfortunately, opportunities to experiment with learning are sparse in some classrooms and pedagogical approaches. It seems that the focus is often on teaching the learner some contents, facts, and numbers and the value is often laid on ‘good’ questions and ‘correct’ answers. In a pedagogical rush, educators may overlook that young children need plenty of time and practice to learn how to construct knowledge, that is, where to observe, how to ask questions, how to be reflective, how to discuss ideas, and how and where to discover answers. In this rush, children are pushed to jump to the end and denied the right to experience the joyful journey of learning.

When the process of learning is valued, children should be encouraged and supported to be playful and play. Play of young children is often a space for practicing a role, here practicing to be a scientist and a researcher pretending to observe, hypothesize, confront, problem solve, and use various tools to find answers (Garvey, 1977; Goncu & Perone, 2005). In my opinion, the playful use of space and tools offered the children opportunities to be creative while thinking scientifically. For example, putting two magnifiers on top of each other or putting them in front of a binocular to examine a seed is playful, creative, and scientific. Not being confined to pre-
defined and pre-determined practices, the children experimented with new uses for the old tools wondering if two magnifiers could make the things look even bigger.

If the pedagogy and the classroom environment have already decided the outcome and the single way to get to that outcome, children would not be given the context to bring their new and fresh perspectives to our old practices and ways of doing things. I question a program and a pedagogy that do not respect but deny a space and a context for the creativity of young children (Robinson, 2009). Perhaps we should re-conceptualize school as a big laboratory, a “workshop of learning and knowledge” (Rinaldi, 1998, p. 115), in which children have many opportunities to experiment with different ways of knowing.
Chapter Eight

Hatching Chicken Eggs in a Kindergarten Classroom

Introduction

In this chapter, I will examine another extended inquiry of the class which started in March and ended in April 2010. To avoid repetition, I first briefly explain the highlights of the inquiry as they were unfolding one after the other focusing on: a) the role of the teacher in preparing her class for the inquiry and b) the children’s experiences when the chicken eggs arrived, the first egg cracked, and four chicks demanded their care for five days.

I next weave anecdotes, vignettes, and learning episodes into the data analysis discussing the following points: a) the inquiry was pre-planned but not scripted, b) the teacher played a crucial role in creating a culture of collaborative learning in her school, and c) the children were emotionally and cognitively engaged with nature. My hope is that the use of photos, tables, and diagrams will help the reader to better follow my discussions in this chapter.

Beginning of March to March 23: The teacher’s strategies to prepare her class for the inquiry and the children’s responses before the chicken eggs arrive

Early in March, the classroom teacher and one of her close colleagues teaching another kindergarten classroom in the same school decided to hatch chicken eggs. Mrs. Hansen was excited imagining the learning opportunities and the joyful experiences that the children would have. The classroom teacher started reading various books about birds, chicks, and farm animals. She put picture books about chicks and other animals that lay eggs in different learning centers in the classroom. She also put plastic toy eggs, egg cartoons, and some toy birds in the home center encouraging pretend play. During the same period, the children were
investigating birds which made them even more curious about hatching chicken eggs.

Because the other kindergarten teacher was also hatching eggs with her own classroom, the two teachers frequently met to discuss their plans in more detail. They decided to work closely with each other and connect the two classes’ experiences by frequent visits between classrooms and exchanges of ideas, activities, and strategies. This close trustful collaboration made the planning and the project more feasible providing each teacher with an extra hand when needed. For example, to pick up the eggs and the equipment from the farm, one teacher took care of both classes while the second teacher picked up everything from the farm on her way to school in the morning.

At this stage, the children showed their positive feelings and interests by asking questions about the whole process and their roles in it. They persistently sought information in books during class discussions or in informal talks with their peers and teachers. They demonstrated a high level of responsibility by helping the teacher to prepare the house center as a ‘nursery room’ for the eggs.

In general, because of a lack of prior experience with hatching eggs, the discussions and connections remained abstract for the children until the eggs actually arrived.

March 23 to April 16: Twelve chicken eggs arrived in an egg cartoon and stayed in the incubator for 21 days!

When the chicken eggs arrived, the children were enthusiastic and ready to participate fully in the whole process of taking care of the eggs. They had opportunities to explore the experience in many different learning centers. At the art table, for example, they wrote letters to the other classes about their project,
drew and traced birds, and made cut-outs. At the science center, they read and re-read books about chicks and birds and continued to watch for birds at the window. At the home center, they spent long periods of time by the incubator using magnifiers and flashlights observing the eggs, taking pictures, listening for the chicks' peep sounds, role playing using toy birds and plastic eggs, and drawing.

The children felt very responsible for preparing the incubator, frequently monitored the eggs, and played quietly around the incubator (image 40). The chicken eggs and the incubator gradually became the focal point of the children’s interests and investigation.

Image 40. Alma and Anita monitored the eggs in the incubator when the rest of the class were having snacks. They were particularly careful and felt responsible for the wellbeing of the eggs and later the chicks during the inquiry.
Nevertheless, the 21 days of incubation period and the lack of any visible change in the eggs proved to be a challenge for the teacher and the children. I noticed that after a week most of the children seemed less excited and curious to spend time observing the incubator. The experience remained too abstract for these young children. In our conversation, I suggested to Mrs. Hansen to examine real eggs with the children and discuss the differences and similarities between fertilized and unfertilized eggs (image 41). Mrs. Hansen also asked her student teacher to make a visual chart to help the children to imagine the growing life of a chick inside an egg (image 42). I also borrowed a movie about one child’s experience of hatching chicken eggs with her grandmother on a farm to watch with the children.

Image 41. The children and the teacher used a magnifier to observe yolk and albumen of a regular egg.
Lots of other classes came to visit the chicken eggs and later the new-born chicks. These visits created a space where teachers talked about their previous experiences in hatching eggs or asked for advice on how to hatch eggs in their own classroom. Their high level of interest and curiosity added to the excitement of the children and made them feel proud about doing an important investigation in their own classroom. At the same time, Mrs. Hansen and the children sometimes felt overwhelmed by the number of visits which distracted them from their own learning and inquiry as well increasing the noise level to the point of affecting the
flow of other activities in the class. It was, however, not easy to discourage the visits as everybody was hoping to see the eggs and the new born chicks.

April 16: The first and only egg that cracked inside the classroom

The excitement and curiosity of the class increased dramatically as the hatching date approached. On day 21, the children decided to sit by the incubator using different tools to hear the first peep sound or see the first crack in the eggs. While waiting, they were highly attentive and engaged taking pictures and discussing what would happen when the chicks hatched. They collaborated and took turns when one child became tired or wished to play in another center. Feeling very impatient, they often asked the teacher when the chicks would hatch. Finally a crack appeared on one of the eggs and the children became thrilled to observe the little chick’s beak trying to breath in air and struggling to break the shell to come out (image 43).

Image 43. First chick that hatched inside the classroom.
The classroom teacher and her assistant were also excited and engaged in monitoring the final stages of incubation and hatching (image 44). Mrs. Hansen played some nature music on the tape close to the incubator to encourage the chicks to hatch faster and also keep the atmosphere around them calm and peaceful. The two kindergarten teachers often visited each other’s classes to exchange thoughts and suggestions on the possible challenges. In addition, the other teachers and school staff continued their frequent visits to the class to check over the eggs and exchange ideas, expertise, and feelings.

When no other egg cracked or moved, the children and the teachers wondered whether any other chick had survived and would hatch. The two kindergarten teachers even planned to buy some chicks from a farm if none of the chicks hatched so as not to disappoint the children. It was Friday and the teacher had to take the incubator home for the weekend. It was unfortunate that the
children could not see chicks hatching; however, Mrs. Hansen promised to take videos and photos to share with the class on Monday. The children went home talking about chicks with their families and inviting them to visit their class on Monday.

April 19 to 24: The teacher came back to the class with *Princess, Puffy, Fallalot, and Betty*!

On Monday, the teacher brought back to the class four of the chicks that hatched at her home over the weekend. The children entered the class, quickly walked to the mini pool where the teacher had put the chicks, and sat watching with excitement. Their faces lit up with joy and pride (image 45). They were curious to touch or hold the chicks and often asked the teacher for help (image 46).

Image 45. When the children came back to school on Monday, the first thing they asked the teacher was about the chicks. Noticing the little pool, they quickly walked to it and sat to observe the chicks.
Image 46. Some of the children did not feel comfortable holding the chicks on their own but their desires and curiosity encouraged them to ask the teachers for help.

On the second day, the children’s favourite chick, Betty, became very sick and died, although the whole school including the principal tried their best to save her. With deep sadness, the teacher and the children buried Betty, but her pictures continued to be in the children’s drawings and they never stopped talking about her. They did not forget her for the rest of that year.

The chicks stayed for 5 days before the teacher took them back to the farm. The children named all the chicks and drew their pictures every day (image 47).
Image 47. Nikki’s picture of Princess, Puffy, Fallalot, and Betty. First she insisted that she did not know how to draw, but seeing other children’s pictures, she was encouraged to try.
After the chicks went back to the farm, the children's enthusiasm and interest did not wane. They continued making crafts and bird puppets, drawing pictures, reading books, talking about the chicks, and revisiting their experiences (image 48). They also expressed their eagerness to repeat the experiment the following year.

In Table 10, I summarize the timeline of the inquiry.

Image 48. After the chicks went back to the farm, the children used their memories, the books, the photos taken by the teacher and themselves, peer’s knowledge, and their previous drawings to revisit the experience and continue investigating the lives of chicks.
Table 10. Timeline of the inquiry.

<table>
<thead>
<tr>
<th>The timeline of the inquiry</th>
<th>Some examples</th>
</tr>
</thead>
</table>
| **Beginning of March to March 23:** Preparing the class for the arrival of the fertilized chicken eggs | Discussions in the classroom  
Books about chicks  
Art and crafts material  
Writing and making signs |
| **March 23:** First encounter with eggs | Meet the chicken eggs at carpet time  
Discuss the plans of the day: preparing the incubator, numbering the eggs, putting them in the incubator  
Read books about chicks  
Children’s questions and investigation |
| **March 23 to April 16:** 21 days of incubation | Teacher-directed activities: cracking unfertilized eggs  
Structured timeline, timed by nature  
Children’s interests and questions, developing emotional bonds  
Teacher and children’s high level of personal, emotional, and cognitive engagement over time and place  
Real-life situation  
Drawing and photography  
Visitors from other classes |
| **April 16:** First egg cracks | Children’s high level of curiosity, excitement, and interests  
Teachers’ excitement and worries  
Preparation for the chicks |
| **April 19-24:** Four chicks hatch and stay in the class for five days | Sensory experiences: touching, petting, holding, and taking pictures  
Feeding, cleaning  
Drawing and crafts  
More visitors from other classes  
Support from other teachers and the principal |

**Data Analysis**

In the following sections, first I will examine the role of the teacher in initiating and planning the project of hatching chick eggs in her classroom. Next, I discuss how the teacher invited the children to bring their own interests and questions. Then, I will discuss how this inquiry involved the whole school by encouraging other teachers and classes to visit Mrs.
Hansen’s classroom. I will examine how the children engaged both emotionally and cognitively to develop a sense of responsibility towards the eggs and the new-born chicks.

**The role of the teacher to prepare the children for the inquiry.**

*A pre-planned but not scripted project.*

Teachers play a crucial role in inquiry-based learning in starting from and building on their students’ needs, interests, and abilities while including their own experiences, knowledge, and professional expertise (Helm & Katz, 2011). There is a significant difference between the teacher’s role in this inquiry and the other inquiries that I discussed in the previous chapters. In this inquiry, the classroom teacher intentionally initiated and planned the activity. Mrs. Hansen explained her role, “I see myself as a provider and in that way, I listen to the children, to their interests, and to where they are and then give them the resources to explore those interests.” Listening to the children and considering what engaged them most, drawing on her years of experience teaching young children and including her personal and professional beliefs in the unique and authentic values of experiencing nature, Mrs. Hansen decided to offer her class the opportunity to hatch chicken eggs. She developed a flexible and responsive plan to also include the children’s interests and questions as they were raised.

To prepare them, between early in March and until the eggs arrived on the 23rd of March, Mrs. Hansen immersed the children in various engaging resources and tools to explore, play with, and investigate. Considering the children’s lack of prior experience with hatching eggs she wanted to help them to develop some knowledge and increase their curiosity and motivation prior to the arrival of the chicken eggs.

For example, recognizing her children’s strong interest in reading books, she provided them with various books about birds and growing chicks on a farm. Respecting their fascination
in dramatic play and considering the educational value of play, she also put props, such as plastic toy eggs, toy birds, and egg cartoons in the home center for the children to explore. Writing, drawing, and painting were often the main modes of expression and investigation in this inquiry. The teacher invited the children to take the responsibility of making a calendar on which they marked important dates and of drawing signs to inform the visitors of the rules around the incubator (image 49).

Image 49. The children decided what signs they needed in the house center. They made signs such as, “Play quietly!”, “No dogs allowed!” and so on.

In inquiry-based learning, teachers are also facilitators in assisting children to make connections between their prior knowledge and new experiences (Colburn, 2006; Helm & Katz, 2011). They can contribute from their own wide range of knowledge and expertise to co-create
the best context for learning (Dewey, 1938/1963). In this inquiry, the teacher frequently used the carpet time to share her own expertise and discuss the details of the process of hatching eggs. In our conversations, she explained to me that by discussing the needs of the chicks and the possible roles that the children needed to take, she planned to prepare the children for developing a deep sense of responsibility for the care of the eggs. As an illustrative example, consider the following vignette,

*Mrs. Hansen was reading a book about the life cycle of chicks and talking about how the mother hen keeps her eggs warm under her body in the nest. She took the opportunity to remind the children of their responsibility towards the chicken eggs and said, “We also need to keep our chicken eggs warm and safe.” Julie, however, was confused, “But we can’t sit on them.” Andrew thought and suggested, “Maybe, they need some of us to be the mothers.” Children said all together with excitement, “I can be a mommy. I want to be a dad.”*

This exchange of thoughts illustrates how the teacher attempted to deliberately engage the children by raising their awareness about their responsibility towards the fragile lives of chicks. Although, Julie was not sure how they could keep the eggs warm, Andrew offered his solution suggesting playing the role of a mother hen. His idea motivated the other students to volunteer in the role of moms and dads.

Teacher’s guidance and support are essential for helping children to learn through inquiry and gradually guide them “to become more focused and systematic in their observations and investigations” (Ministry of Education, 2006, p. 11). Frequent talks and discussion throughout this inquiry offered the children and the teacher a context to co-construct knowledge and
promote sensitivity towards the chicks by sharing their understandings and helping each other to make meaning of what they read, talked about, or experienced. Hatching eggs was new, unfamiliar, and outside the children’s daily life experiences, but, the teacher’s plan and strategies to stimulate their curiosity and promote positive feelings from the very beginning made them motivated and excited to fully participate in the inquiry.

Being a researcher and a learner with the children, teachers are also role modeling inquiry-based thinking processes (Cambourne, 1988). For example, Mrs. Hansen was a keen observer and listener and often fully participated in the children’s discussions by asking her own questions and offering her thoughts. She challenged the children but allowed them to challenge her with their questions and hypotheses too. The children often saw her taking notes and photos and using different tools such as charts, signs, and the white board to discuss her ideas. She offered the children a model of how to think, be inquisitive, and learn in an inquiry-based learning environment.

Research suggests with the lack of teacher’s support, children’s motivation to participate would often be diminished (Chawla, 1988; Fraser, 2000). So, it is important to contrast this project with the visit to the farm, in which the children had less profound and memorable learning experiences. The visit to the farm started without the teacher’s purposeful preparation through discussions that could give the children a context within which to explore different aspects of life on the farm. As a result, the children started their visit without any prior thought, questions or interests. When in the farm, they did not ask many of their own questions and rather followed the adults’ directions and interests. Although they enjoyed the field trip, once back at school, they did not talk about their visit or connect that experience to the other ongoing inquiries inside their classroom.
In contrast, in this inquiry the children had an extended period of time prior to the arrival of the chicken eggs and a supportive context to deepen and expand their learning about the life of the chicks. They played, read books, had discussions, and created artifacts. As a result, when the chicken eggs arrived, the children already were curious, had developed emotional and cognitive connections and generated many questions to investigate.

Table 11 summarizes the role of the teacher in this inquiry.

Table 11. The role of the teacher.

<table>
<thead>
<tr>
<th>The teacher’s role</th>
<th>Initiate and pre-plan the inquiry; help the children to become interested and curious and wondering about the process</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Guide, role model</td>
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<tr>
<td></td>
<td>Observe, listen, partner</td>
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<tr>
<td></td>
<td>Document</td>
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<tr>
<td></td>
<td>Facilitate: offering time, tools, and a context</td>
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<tr>
<td></td>
<td>Respect learners</td>
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<tr>
<td></td>
<td>Value the process; show enthusiasm</td>
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<tr>
<td></td>
<td>Support and re-energize children’s thinking</td>
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</tbody>
</table>

The teacher’s strategies to invite the children’s questions.

Although the inquiry was planned and initiated by the teacher she did not control the flow of the inquiry and instead she offered the children many opportunities to ask their own questions, create spontaneous small learning groups, and develop emotional bonds and a sense of responsibility. The role of the children in this pre-planned inquiry can then be contrasted to their role in the visit to the farm. In the visit to the farm, the flow and the direction of the learning experiences were mostly guided by the adults. The children received a guided tour of the barnyard but the pace and the content of the talks were pre-determined by the farmers. This
controlled context, as I examined in chapter five, diminished the children’s level of engagement by limiting their choices of activities and preventing them from taking lead in their own learning.

In contrast, the teacher employed various strategies to engage the children in the inquiry about hatching. One such strategy was to encourage and support the children’s play to provoke their interests and invite them to take the lead in the safe but engaging context of play. The teacher provided the children with some toy chicks and eggs that encouraged the children to initiate various play themes with those toys individually or in small groups. They manipulated the toy ‘baby chicks’ putting them inside the eggshells and taking them out pretending they were hatching; they talked to the toy chicks petting and feeding them; they pretended rescuing them from “the bad guys”; they drew pictures and took photos of the toy chicks; and they tried to put small toy animals such as dinosaurs and frogs inside the eggshells.

These experiences are vicarious because the children do not contact with actual features of nature but with images and symbolic representations of nature (Kellert, 2005). These experiences are valuable in helping the children to develop interests in and connect with nature although they should not replace direct and indirect experiences. In this inquiry, the children’s frequent symbolic experiences with nature through books, arts, videos, and plays involved them emotionally and cognitively, so when two weeks later the eggs arrived, the children were already in a highly curious state.

Young children need many sensory experiences such as touching, hearing, tasting, smelling, and manipulating to connect with nature (Carson, 1956; Sebba, 1991). Mrs. Hansen also planned a range of sensory activities. For instance, she brought regular eggs to explore the chicks in small groups (image 50). Together, they spent time observing and learning the names
of the different parts of an egg such as yolk, albumen, membrane, and air pocket using magnifiers and cameras as aids.

It is significant to examine the exploration of four boys who came to the table after Mrs. Hansen and a small group of children had finished their examination and had left some broken eggshells, mixed-up yolks, magnifiers, and books on the table. First, I invite you to watch a short video and focus on what engaged these four curious boys and how they interacted with the materials. Note how they had a rich sensory experience and explored the eggs by touching, smelling, tasting, and finally dumping all the broken eggshells in a bowl. Examine how without the teacher’s direct help, they discussed, described, and discovered different parts of an egg, such as the membrane, eggshell, and yolk using magnifiers, their senses and help from peers and books. Also, observe how the boy in the red shirt (with the words PLC AUTO on it) who is an English Language Learner, and I call him Tala, learned some new words by repeating after his peers.

[watch movie #1]
Engaging and rich sensory materials on the table invited the boys to get their hands on them without any teacher’s direction and direct supervision. Although, I was behind the camera taking videos and the children asked for my permission a few times, I did not direct or stop their exploration. This context offered them an opportunity to choose what they wanted to know and how they wanted to explore the materials. So, touching, stirring with fingers, smelling, and tasting the eggs became dominant. Each sensory experience led to some findings, “It’s slimy. Slimy yolk!” discussions, “What is it? Is it a boat? No, it’s like a spoon. A nice spoon!”, and further discoveries, “A yolk! I got a yolk! It has stripes too!” The children scientifically examined each piece using magnifiers or consulting with the books and their peers. The context offered Tala an opportunity to playfully practice some of the new words that he recently learned in a safe, friendly, and non-judgmental context. The children looked happy, excited, surprised, and highly engaged throughout their exploration.

A culture of collaborative learning: When a school engages in hatching chicken eggs.

The immediate benefits of collaboration for the two classroom teachers.

Both Mrs. Hansen and Mrs. Collins (pseudonym), the other kindergarten teacher, agreed that it would be better to plan and do the inquiry together considering the amount of work and responsibility as well as the emotional and physical burden on both the teachers and the children. They both had many things in common: they both had prior experiences hatching eggs with students, they believed in inquiry-based learning, and they often planned their teaching to offer the children opportunities to investigate the natural environment.

Their close collaboration proved to be essential when the chicken eggs arrived. For example, on the first day, when the eggs had to be put in the incubator, its temperature and
humidity had to be precisely controlled. For two hours, the two classroom teachers and the teacher assistant, who they shared, worked closely together to watch and record the temperature carefully and regularly. At the end of the day, Mrs. Hansen shared with me her feelings and the benefits of having her colleagues by her side, “I don’t think I could’ve done it without Miss Mara (the teacher assistant) and Mrs. Collins. They were so calm when I was worried and confused.”

The teachers often met after the class to share what they observed, how things went in their classrooms, and what became a challenge. As they got closer to the hatching day, these meetings and supports became very crucial when they regularly checked with each other to ensure they were both doing the same things. Finally, when the chicks started receiving a lot of attention from the rest of the school, both teachers took turns hosting the large number of classes wishing to visit and talk about the process.

**Why did the rest of the school become interested and involved?**

No other inquiry in Mrs. Hansen’s classroom created the same level of school collaboration and involvement. Many factors contributed to this collaboration. First, Mrs. Hansen, Mrs. Collins, and Miss Mara started talking about the inquiry in March and their excitement and collaboration attracted other teachers’ attention in the staff room or lobbies. The children’s conversations about the chicken eggs with their friends and other teachers also helped to spread the news in the school and pique curiosity.

Second, Mrs. Hansen’s welcoming approach and her commitment to offer other classes an opportunity to learn about the little chicks further increased the school’s involvement. Everyday, one or two classroom teachers with a group of about 20 children dropped by to visit. They were interested in observing the chicks as closely as possible asking when the chicks would hatch and if they could return to see the baby chicks.
Third, considering the theory of Biophilia, the delicate and extraordinary phenomena of observing and investigating how life grows in and then springs from those chicken eggs, by itself, was attractive enough to deeply engage adults as well as children (Wilson, 1997). This innate attraction and the unique opportunity to learn more about chicks motivated the whole school to develop cognitive and emotional connections with the chicks hoping to be a part of the project, wishing to be involved.

**Emergence of a meaningful and authentic collaboration in the school.**

The involvement of the entire school encouraged a meaningful and authentic collaboration among the classroom teachers and the classes and the office of the principal. For example, when on day 21, Mrs. Hansen had to leave early, Mrs. Smith (pseudonym), a Grade 3 teacher, offered to help. She said, “I stop in after school. I’m staying for that boot camp. If I see something I’ll call your cell number. You know, I did this about 15 years ago maybe.” Mrs. Hansen was curious to learn about her experience, “You did?! And how was it?” Mrs. Smith thought and said, “Oh, my God! I was so excited, I couldn’t even teach.” Mrs. Hansen smiled and confirmed, “I know!” Mrs. Smith added, “And as each chick started to hatch I was as oh my Gosh! I can’t take it.” A collaborative atmosphere was encouraged and strengthened over 21 days in which Mrs. Smith also developed a sense of responsibility to contribute her help. During their short conversation, the two teachers had a unique opportunity to share their personal feelings towards hatching chicks, which re-assured Mrs. Hansen that her worries were not unusual.

In another case, one Grade 2 teacher took on responsibility for the care of the new-born chicks for a few hours when Mrs. Hansen felt overwhelmed by the level of noise and excitement brought on by the large number of visitors. He volunteered to re-organize his whole classroom
setting to make a safe space for the chicks to stay for one night and willingly spent time the day after to clean up the wood chips and grains left behind (image 51).

Image 51. A large amount of time and commitment was required to make a bed for the chicks and to clean the classroom after in a Grade 2 classroom.

A connection also emerged between the office and the classroom when one of the children’s favourite chicks, Betty, became very weak and could not eat and drink. The children took her to the principal’s office for special care where the principal welcomed them and promised to give one-on-one attention to Betty. In her office, the principal fed the chick through a syringe and made a special quiet place for her (image 52). The connection between the classroom and the principal’s office was initiated spontaneously by the children who knew of the principal’s interests in animals and her support for their inquiry. Observing the children’s commitment and sense of responsibility towards the chicks inspired the principal to play an active role respecting their request and concerns.
The school-wide collaboration increased the children’s confidence in their knowledge.

The children started the inquiry with little knowledge of the subject, they gradually gained this knowledge and became experts. They demonstrated this growth by leading the conversations and sharing their expertise with visitors, who were often adults or older children in the school. The large number of visitors and the strong interest and appreciation from the teachers, other children, and the office helped the children to feel confident and proud of the important inquiry they were engaged in.
This school-wide collaboration also created a context within which the children from different classrooms learned more from and about each other. The children’s joy and excitement filled the lobbies of the school and prompted even more visits. Soon, the children had a mutual topic of interest to talk about everywhere in the school, in the playground, and on their way home.

**The process of the students’ engagement.**

In this section, I examine how the hatching chicken eggs fostered the children’s engagement by offering them many opportunities for exploration, cognitive engagement and for developing emotional bonds.

*The intersection among books, arts, and play.*

Book reading by the teacher, with peers, or individually often led to an engaging discussion followed by curiosity to check the incubator and observe the chicken eggs. The investigations also created a desire in the children to draw, tell stories, and play with imaginary personal connections and create imaginary characters, roles, and situations. In the following learning episode, I examine how reading a book engaged two children in a discussion that led to role playing, observing, more playing, and finally drawing, all in one afternoon.

Andrew, Julie, and I were reading and looking at a few books about how chicks grow inside eggs. We reached the part that explained why a hen turns eggs under her body while sitting on them. I asked, “Do you remember why we need to turn the chicken eggs in the incubator? Julie responded, “So the food and drink go to the other side too.” Andrew added, “Because they need to be warm.” Julie completed his idea, “Yes, because they need to be warm on the other side too.” I pretended to be a hen turning a pretend egg under
my body. Andrew and Julie laughed. Julie reminded me, “But if people sit on the eggs, they’re gonna crack.” I agreed, “Because we are very heavy.” Andrew added, “And we have bones.” I confirmed their suggestions, “Yes, we don’t have feathers.” Julie challenged me, “No! I have feathers.” She showed me her hair. I smiled and said, “That’s your hair! But they look like feathers!” At this time, Andrew left to bring some of the toy eggs from the home center. They pretended sitting on the eggs. I asked them, “Does it hurt? It’s hard to sit on an egg.” Julie laughed and said, “My egg cracked.” I asked her, “Are there any chicks inside?” Julie firmly said, “Yes!” Andrew surprised both of us, “I have a dinosaur!” He cracked a toy egg and a dinosaur popped out (image 53). We all laughed.

Image 53. Andrew surprised Julie and me when a dinasour popped out of his plastic egg.
The children did not want to continue reading the book. Andrew left to play with the toy eggs and chicks in the home center and Julie sat by the incubator to study the calendar on the blackboard and make her own calendar by carefully writing the days of the week and the important dates. After about 20 minutes, they both went to the writing table, where Andrew drew some chicken eggs and Julie worked with Nosheen to make a cut-out bird (images 54 and 55).

Image 54. Andrew drew some chicken eggs and chicks.
The above example illustrates the flow of two children’s investigation. First, the book reading and my question prompted Andrew and Julie to build upon each other’s knowledge of what they already knew about nesting. Then, my playfulness, pretending to sit on eggs, made them challenge the notion of humans sitting on eggs. We enjoyed the pretend play which invited the children to add some toy eggs to our play. Andrew surprised us by introducing another play script which was hatching ‘dinosaur eggs’! Our play inspired Andrew to individually continue his playful exploration in the home center and Julie, on the other hand, to make a calendar.
Finally, they both converged at the writing/art table where they further explored and represented their thoughts through other mediums such as drawing and crafts. Art, play, and reading books became the connecting bridge between the children’s various forms of investigation and expression. In their play, the children imagined playing and taking care of the chicks emphasizing their emotional and personal connections. In their art, they imagined the chicks after they hatched expressing their understanding of how they might appear.

Play and art “engage imagination, both require reflection, both profit from skills, both seek to generate new forms of experience, and both lead to invention” (Eisner, 1993, p. 55). In this inquiry, they became a medium for symbolic interaction with nature and offered the children a context to tell stories, explore their relationship and interconnectedness with the chicks, and develop feelings.

From initial curiosity to further investigation and a deeper sense of responsibility.

The children’s initial curiosity led them to further investigate the lives of the chicks, develop a deeper awareness, and negotiate responsibilities. Consider the following example,

While reading From Eggs to Chickens on the carpet, Mrs. Hansen and the children were discussing the needs of chicks growing inside the eggs. The teacher explained how the mother hen keeps the eggs warm under her body. Julie asked, “How about our chicks? They don’t have their mothers here.” Mrs. Hansen responded, “Yes, but we put them in the incubator to keep them warm and safe.” Kevin asked, “Can we pick them up sometimes?” Mrs. Hansen said, “No. We can’t touch them when they’re in the incubator. But when the chicks hatch, then sometimes you can pick them up and hold them.” Kevin seemed very excited, “Oh, really?! Ok then. I’ll be a good dad.”
Julie and Kevin’s questions allow us to learn about what they already knew and what they wanted to know more about. Julie was wondering how they could keep their chicken eggs warm and safe while their mothers were not with them. The teacher reminded her that the incubator would do this duty. After the carpet time, this initial curiosity encouraged Julie to further investigate the details of the incubator to ensure the well-being of the chicken eggs (image 56).

Image 56. Julie put her ears on the lid to hear the chicks. She asked John, “Do you hear anything?” John listened for a few minutes and said, “No, it’s a noisy machine.” Julie listened again and making a connection to the prior class discussions she suggested, “This is just like a nest. The eggs are sleeping there. We need to be quiet.”

For Kevin, it was important to be able to touch and feel the eggs; however, he was also curious to know if it was safe to pick up those delicate eggs. When the teacher informed them
that they could touch the chicks after they were born, the image and the desire of holding those little chicks excited Kevin who promised to be a “good dad.” When the chicks were born, Kevin spent long periods of time around the tub to observe, pet, draw, talk about, and take care of the growing chicks (image 57).

Image 57. Kevin was happy to be able to touch and pick up the chicks, “Touch him! He’s so soft.” Directly experiencing the softness and fragility of the little chick’s body, he constantly reminded the other children, “Be gentle! Don’t squeeze them. They don’t like it.”

Julie and Kevin’s examples are illustrative of how children’s initial curiosity often encouraged them to further investigate, which in turn, helped them to build a deeper sense of responsibility. The children felt satisfied and proud playing the roles of moms and dads. These new roles made them feel powerful, a departure from their real life roles as children. The duties became meaningful and they volunteered to turn the eggs, fill up the water bottle, feed the chicks or clean their bed. They even reminded the teacher of her duty when she once forgot to put on the music.
for the chicken eggs. The following two photos (images 58 and 59) show excited, responsible, and focused children who are deeply engaged in playing their roles in taking care of the chicks.

Image 58. On the due date, each child felt responsible for observing the incubator and reporting to the class any sign of hatching. They were curious and impatient to see the first chick.
The children volunteered to prepare the chicks’ bed in the tub. They talked about how excited they were knowing the chicks would hatch very soon.
From being curious and responsible to developing emotional bonding.

Children’s bonding and emotional engagement can be considered the building blocks for their cognitive engagement, as suggested by many scholars including Iozzi who argued, “Significant evidence [exists] that the affective domain is the key entry point to learning and teaching” (1989, p. 5). Bartel (2002) suggested, “Given that understanding will develop in complex relationship constructs, a critical pedagogical element is the facilitation of emotional engagement and the elimination of inhibitory forces” (p. 16).

Children often extend their own feelings and thinking to animals which encourage them to develop an even deeper emotional bond (Myers & Saunders, 2002; Kellert, 2005). For example, when Mrs. Hansen was reading a book about how some animals eat bird eggs, she said, “To get to the food inside, some animals bite and peck the eggshell.” Kevin quickly responded sounding worried, “Oh! That’s so sad. That chick dies and her mom will cry.” The teacher confirmed his comments and said, “Yes. Her mom would be sad.” Identifying with the little chick, Kevin extended his own mom’s feelings to the mother hen suggesting she would also cry to know her egg was eaten by another animal.

A sense of connection and belonging often fosters emotional bonding. For example, each child picked one chicken egg claiming “it’s mine” and promised to take care of the chicks when they hatched. The children often sat by the incubator singing and talking to the chicken eggs and when the chicks were born, they continued petting and talking to them which further strengthened their relationship and bond (images 60 and 62).
Image 60. Kevin asked Arshan, “Which one is yours?” Arshan smiled and responded while pride lit up his face and confidence boosted his voice, “Number 2. She’s gonna hatch first. You’ll see!” Kevin disagreed, “No! Mine hatch first.” Feeling the chicken eggs were theirs, the two boys became competitive connecting their own personal achievement to the hatching process!

When the chicks were born, the children’s fascination and bonding further increased, because compared to the eggs, the chicks were much more responsive and offered many opportunities for interaction and connection. Sitting and observing the chicks as well as petting and feeling their tiny moving bodies was joyful, playful, and often a source of curiosity and imagination. The children were wondering how the chicks move, eat, and drink and so engaged in talking, drawing, and taking pictures around the tub.
Riley sat for 20 minutes by the tub the first day the chicks returned to the classroom. She was fascinated watching these tiny babies pecking grains and drinking water. She observed the other children touching and petting them but she did not feel comfortable in doing so.
The children often liked to sit quietly to observe or touch the chicks. One could see their feelings of love and care. In their discussions with the visitors, they regularly declared their strong sense of ownership and bonding, “These are our chicks!” “This is Princess. She’s my favourite!” “You need to ask if you want to touch them.”
Emotional bonding, a sense of wonder, and engagement.

Gardner (1999) reminded us, “If one wants some thing to be attended to, mastered, and subsequently used, one must be sure to wrap it in a context that engages the emotions” (p. 77). Emotional connection between the children and the chicks contributed positively to their curiosity and sense of wonder. They were curious about how the fertilized eggs that the teacher brought from the farm would look like and how they fit in the incubator (image 63). They consulted with various books and drew many pictures to learn more about the growing lives of the chicks (image 64). They examined different parts of a regular and unfertilized egg to better understand and imagine a fertilized egg (image 65). And they crowded around the tub to observe the first chick attempting to crack his eggshell and hatch (image 66). Images 63 to 66 illustrate the children’s powerful sense of wonder and how this sense deeply engaged them in this inquiry.

Image 63. The teacher invited the children to sit by the incubator to observe her putting the fertilized eggs in the incubator. A strong sense of wonderment and joy filled the room and attracted all the children to the home center.
Image 64. Alma brought a few books about chicks and sat at a table in the home center to draw. She frequently checked with the books while drawing to ensure the accuracy of her drawing.
Image 65. Banu removed an egg membrane from the shell with the teacher’s help. She examined it with a magnifier, then rubbed it between her fingers and smelled it. She was fascinated by the texture and delicacy of the membrane.
The children were curious to see how the chick was kicking to crack her shell and hatch. They said with excitement, “Do you see?! It’s moving!”

Literature suggests engaged children often feel strongly connected and repeatedly revisit a subject with more questions and desires (Curtis, 2002; Falk & Dierking, 2002). In this inquiry, the children’s interest in the lives of the chicks did not stop when the chicks went back to the farm. On the contrary, they continued talking about the chicks, making artwork, playing, sharing feelings and their memories of the chicks, and asking the teacher to repeat the inquiry. Table 12 summarizes the central elements that engaged the children in this inquiry.
Table 12. The central elements that engaged the children.

<table>
<thead>
<tr>
<th>Engagement</th>
<th>Curiosity</th>
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<tbody>
<tr>
<td></td>
<td>Strong sense of responsibility</td>
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<td></td>
<td>Deep emotional bonding</td>
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<td></td>
<td>Cognitive engagement</td>
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<td></td>
<td>Rich sensory experiences</td>
</tr>
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Exploring and using tools.

To investigate the lives of the chicks, the children used a variety of tools such as magnifiers, standard and non-standard measuring tools, flashlights, and cameras. They used them for a variety of purposes such as exploring different parts of unfertilized eggs (embryo, yolk, albumin, membrane, air sac, and eggshell), calculating the days remaining until hatching, and examining if any egg was cracked. They imitated the adults, checking the incubator with a flashlight, writing the temperature, marking the calendar, and taking pictures. Their involvement in the prior inquiries throughout the year offered them many opportunities to develop and improve their skills in choosing, using, and modifying these tools based on their immediate needs. They learned to use tools both creatively and conventionally, playfully and seriously. They sometimes knew immediately how to use a tool, at other times, they explored until they developed the skills. Images 67 to 69 illustrate their exploration with cameras, magnifiers, and funnels.
Observing the teachers often taking pictures throughout an inquiry and noticing everybody’s interest in the chicken eggs, Banu and Nikki took pictures with toy cameras while their peers were exploring the raw eggs. They pretended they really took the pictures and so showed each other the camera laughing and saying, “Look at my picture! Oh, they’re cute!” In this inquiry, the children learned that they could revisit the pictures with their peers, display them on the wall, and save them for future reference and discussion.
Image 68. The children sometimes invented new uses for tools. Kevin experimented with a magnifier to hear the chicks’ peeping sounds. The teacher supported these experiments believing in the power of the children’s imagination and their ability to see things with fresh eyes, at the same time allowing them to learn from their own mistakes.
Image 69. Julie showed Banu how to use a magnifier to observe different parts of an egg. Feeling confident and curious, Banu asked, “Now, can I try?”

Writing and reading were meaningfully integrated throughout this inquiry too. To inform their peers and the visitors about the rules around the incubator, the children were involved in writing and making signs, messages, and calendars (image 70). The calendars invited the children to read, count down the days, and write notes for each other or the teachers. For example, Kevin asked Alma, “When are they cracking?” She guided him, “Look at the calendar.” Kevin went to read the class calendar and count down the days. Two other children joined him. When they
reached day 21, Kevin said, “Fifteen more days!” and wrote number 15 on a piece of paper which he then taped to the blackboard.

The children made signs, and calendars to inform the class and the visitors about the rules in the home center where the incubator was.

The significance of the children’s drawings.

Drawing was at the center of the children’s investigation in this inquiry. The rich variety of the art materials in all the learning centres, including the home center, often encouraged the children to self-initiate drawing. They used different materials such as color pencils, markers, and tempera paint and they drew at different centers in the classroom such as in the home center by the incubator, at the writing table, at the painting aisle, and finally by the new-born chicks in
the tub. The teacher offered some cut-out birds to color or trace to support the children who were less willing to draw because of the lack of confidence or interest. They chose to draw individually and in small groups and often offered each other help and tips on how to draw, what color to choose, and where to work. They also revisited the books that they read or been read to as resources to ensure the accuracy of their drawings.

The readings, classroom discussions, and extended observations were gradually influencing and enriching the children’s drawings. As the inquiry was developing, the children drew more details in their pictures and spent more time drawing. For example, the growing embryo or the details of the structure of nests was more visible in the children’s drawings. Drawing became a medium to express what the children were learning and also to further investigate the lives of the chicks. When the chicks went back to the farm, their interests and desire to draw did not stop but continued while books, photos, and their previous drawings became their sources of information, ideas, and inspirations.

Images 71 to 78 illustrate the children’s experiences with drawing.
Image 71. Aisha rarely self-initiated drawing. However, as this picture shows, her curiosity to learn more about the lives of the chicks encouraged her to draw on the first day that the chicken eggs arrived. After the teacher finished reading aloud a book about growing chicks, she took the book, turned to the page showing the eggs inside a nest, went to the home center, where the incubator was, and drew a picture of eggs inside a nest.
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Image 72. Andrew and Alisha were singing and talking to the eggs in the incubator when Alisha announces, “(Egg) Number 11 is mine.” She decided to draw but did not want to leave the incubator. She explained, “I can’t sing to my egg if I go to the art table?” So, she pulled a table close to the incubator and brought the markers to draw. Andrew joined her in drawing.

Image 73. Seeing them so engaged, Aisha and Tarn joined after a few minutes. They all sang while drawing. Alisha explained, “I sing to them and then they know me (when they are born).”
Image 74. This is Alisha’s drawing at the end. She explained, “That’s me and my chick. I’m jumping up and down.” In her drawing, she imagined herself and her chick outside on a sunny day. She showed her excitement and happiness by drawing herself jumping up and down. She emphasized that the chick was hers and the hearts in her drawing express her sense of love for her chick.
Image 75. John was often reluctant to draw or paint. Inspired by the bird cut-outs that the teacher put on the writing table and seeing a small group of children using them, he joined in, traced a bird, colored it, and wrote his name on the top.

Image 76. When the chicks were born, John was able to draw them without using any tracing. His confidence and interest as well as his skills in drawing were significantly improved.
Image 77. Extended time and the teacher’s encouragement to observe, discuss, and record, inspired many children to get involved in self-initiated or teacher-guided drawings.
The opportunities that this inquiry offered the children and the supportive context that the teacher co-constructed with the children significantly improved the quality of the children’s art work at the end of the inquiry (images 79 and 82). The children who already had advanced skills showed a considerable improvement in their attention to detail, colors, body shape, and the environment where the chicks were growing.
Image 79. Andrew drew Puffy and Fallalot and then added the music notes to represent their singing. He explained and read for the teacher, “Look! Ms. Hansen. She sings chirp ... chirp, chirp, ... chirp!”
The most significant changes, however, were in the drawings of those children who often chose not to draw and did not feel comfortable with their level of skills. They often rejected the teacher’s invitations saying, “I don’t know how to draw. I don’t like drawing.” In this picture, however, Arsh responded positively to the teacher’s invitation, sat by the tub and drew four chicks while observing them carefully.
Image 81. The desire and interest to draw chicks did not stop after the chicks went back to the farm. For many days the children continued to bring books (as a graphic and visual resource) to the writing table and ask their peers’ help to draw their favourite chicks.
Some of the children also responded to the teacher's invitation to revisit their drawings to add new detail and colors.

The children’s drawings illustrate the aesthetic dimensions of their learning experiences and the complexity and intensiveness of their engagement in this inquiry. With each drawing, they reconfirmed their ownership, attachment, and love for the chicks (image 83).
Image 83. With this colorful painting, Alisha re-claimed her ownership and attachment to the chick, “They are my chicks. And I love Betty.”
Table 13 summarizes the characteristics of this inquiry.

Table 13. The characteristics of the inquiry

<table>
<thead>
<tr>
<th>Characteristics of the inquiry</th>
<th>Some examples</th>
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</thead>
<tbody>
<tr>
<td>Pre-planned but not scripted</td>
<td>Teacher invites the children’s questions</td>
</tr>
<tr>
<td></td>
<td>Teacher offers the children a variety of engaging activities</td>
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<tr>
<td>Emotionally uplifting</td>
<td>Building self-esteem through responsibility for the chicks</td>
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<tr>
<td></td>
<td>Developing affection and caring relationship</td>
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<tr>
<td>Integrative learning experiences</td>
<td>Seamlessly incorporating personal and social development, language, mathematics, health activity, and arts in scientific exploration</td>
</tr>
<tr>
<td>Teacher’s facilitation</td>
<td>Initiating activities; offering time, space, tools, expertise</td>
</tr>
<tr>
<td>Social bonding</td>
<td>Collaboration among the school teachers, the principal, and the children</td>
</tr>
<tr>
<td>Engagement with nature</td>
<td>Sensory exploration, hands-on experiences</td>
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<tr>
<td></td>
<td>Joyful, playful</td>
</tr>
<tr>
<td></td>
<td>Biophilia and inherent attraction to animals</td>
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<tr>
<td>Children’s role in the process of the inquiry</td>
<td>Observing, asking questions; seeking answers</td>
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<tr>
<td></td>
<td>Rationalizing, hypothesizing</td>
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<tr>
<td></td>
<td>Collaborating</td>
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<td></td>
<td>Perseverance, spontaneity, self-learning, sustaining the engagement using different strategies and resources (drawing, reading books, collaborating with peers, playing, playful investigation)</td>
</tr>
<tr>
<td></td>
<td>Exploring tools</td>
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</table>

The end of the school year 2010.

The process of engagement with the natural environment offered the children in Mrs. Hansen’s classroom many opportunities to initiate activities, investigate, follow through with their interests, and make decisions, which all made them even more curious, engaged, and
interested. For these children, engaging with and experiencing nature developed their awareness of and attention to detail and trained their senses. They became skillful and curious observers investigating the life cycle of animals, their needs, and details on how they raise their young. They built conversational skills to discuss different topics, hypothesize, and co-construct knowledge and expertise.

The big window in the science center continued to be the bridge between the outside and the inside and the gathering place for the children’s hot discussions. The classroom teacher spent time exploring some of their questions with the children as well as providing them with resources to further investigate their own questions.

The many opportunities for non predetermined and spontaneous experiments allowed this group of children to include the elements of surprise, joy, and curiosity in their own learning developing a positive approach to learning in and with nature. I suggest the richness and diversity of their experiences with nature engaged them both cognitively and emotionally in observing and interpreting the environmental processes of caring for, feeding, and survival. Some environmentalists argue that developing a sense of affection for nature throughout childhood is crucial if we hope for citizens who care, feel responsible, and advocate for positive changes in the human-nature relationship (Palmer, 1998; Sobel, 2008).

This final inquiry brought together all the other learning experiences that I examined in chapters 5 to 7. At the beginning of the school year in October, the children had a unique but short opportunity to investigate nature in a real-life situation when they encountered a dead squirrel in the park behind their school playground. That experience helped them to better understand their competencies and abilities as well as to develop a trustful relationship with their teacher knowing she would support and respect their inquiries. With the teacher’s support, they
learned to take their questions seriously and to seek answers for them. By the middle of the school year in January, with the newly designed science learning center and their inquiry about birds, the children were ready and willing to generate more authentic and meaningful questions and investigate them in real contexts rather than in abstract irrelevant situations. To them, nature became a real and a relevant matter, something that they became curious about and interested in further exploring. Over the course of these learning experiences, a trustful relationship between the teacher and the children was emerging, developing, and deepening. So, when the classroom teacher decided in March to hatch 12 chicken eggs with her class, she felt confident that first, the children would be curious enough to invest their time, energy, and intellect. And second, they would be competent to invest in an extended and more structured and planned inquiry such as hatching chicken eggs.
Chapter 9  
Connection to the Ontario Early Learning-Kindergarten Program (2010)

Introduction

National and provincial curriculum documents, prepared and published by the Ministries of Education, are often the main resources in hands of teachers to plan, teach, and assess their program. These documents offer a helpful guide but prove to be challenging for many teachers who strive to interpret and translate them into their everyday teaching and learning with young children. They may find them too broad or specific, too demanding, and often disconnected from the current interests of children and teachers (Wien & Dudley-Marling, 1998). In this chapter, I do not attempt to analyze and critique the Ontario Early Learning–Kindergarten (EL-K) program (Ontario Ministry of Education, 2010) which is a draft and a work-in-progress for the implementation of full-day kindergarten for children ages 4 and 5 in all schools across the province of Ontario. My goal rather is to connect the findings of this study to the learning expectations and recommendations of this draft encouraging teachers to imagine the possibilities of inquiry-based learning in nature. The classroom teacher that participated in this study did not work with this document because she was teaching in a half-day kindergarten and had to use the previous Kindergarten Program (2006) which is still being used in schools offering half-day kindergarten programs in Ontario. However, as Ontario is gradually phasing in full-day kindergarten and by 2015 all the schools in Ontario will be offering this program, I believe it is important to situate the findings in the requirements of the EL-K program (Ontario Ministry of Education, 2010) rather than the old document which soon will not be used any more.
Research Question Number One: Within the Context of a Mandated Public Kindergarten Curriculum, What are the Possibilities and Challenges in Actively and Holistically Engaging Children with the Natural World?

The findings indicate that the Ontario Early Learning–Kindergarten (EL-K) program (Ontario Ministry of Education, 2010) can offer teachers many possibilities and examples of how to engage children with nature. First of all, Early Learning–Kindergarten (EL-K) program emphasizes the value of inquiry-based learning in kindergarten asserting “Children are more motivated to solve problems when the problems are the real-life problems of the classroom. Attempting to solve such problems engages children in posing their own questions and finding a variety of solutions” (p. 20). The program encourages the EL–K team members to support the process of children’s inquiry by observing, listening, and acting “as facilitators to guide children with thoughtful, open-ended questions” (p. 17). The team needs “to encourage children to observe and talk among themselves and to the team” and “to provide a rich variety of materials and resources, and strategically question and observe children to clarify, expand, or discover the children’s thinking” and more importantly, to listen to the children “to help them make connections between prior knowledge and new discoveries” (p. 17-19). The program also underlines the significance of keeping “a balance of exploration or investigation, guided instruction, and explicit instruction” (p. 12).

Second, the EL–K program (Ontario Ministry of Education, 2010) encouraged teachers to include the environmental education in their daily teaching and emphasizes, “The learning environments for early learning include the school yard, fields and trails in the vicinity of the school, and various other outdoor venues. Teaching children to appreciate and respect the environment is an integral part of being active in these spaces” (p. 34). The program encourages
the EL–K team “to take children out of the classroom and into the world beyond the school to help them observe, explore, and appreciate nature” (p. 34). The program aims to “increase their [children’s] capacity to make connections with the world around them and to become environmentally responsible citizens” (p. 44).

Third, a comparison between the Overall Expectations in the EL–K program and the findings of this study shows a close connection between the children’s learning experiences as documented in this study and the Overall Expectations across six areas of learning as required by this document. In the following sections, I examine these connections suggesting that teachers view learning as a process and evaluate children’s learning experiences through extended and meaningful inquiries initiated both by children and themselves.

The Structure of the Learning Areas and the Program Expectations

The Early Learning–Kindergarten (EL-K) program (Ontario Ministry of Education, 2010) consists of six areas of learning: Personal and Social Development, Language, Mathematics, Science and Technology, Health and Physical Activity, and the Arts. Seven broad Big Ideas are then given, emphasizing what children should retain from their participation in the Full-Day Early learning–Kindergarten program.

Next, two sets of expectations are listed for each area of learning: overall expectations and specific expectations. These learning expectations represent the first steps in a continuum of programming from the early years to Grade 8. Although these expectations are divided and listed in bullet points, the document clearly states, “Full-Day Early Learning–Kindergarten programs based on the learning expectations must take into consideration the widest possible range of children’s life experiences and situations. The expectations are not meant to be a set of discrete skills to be developed” (Ontario Ministry of Education, 2010, p. 23). The overall expectations
describe in general terms the knowledge and skills that children are expected to demonstrate by
the end of the kindergarten and the specific expectations describe each knowledge and skills in
more detail.

**Connecting the Findings of the Study to the Six Areas of Learning**

**Personal and social development.**

**Social development.**

The EL-K document (Ontario Ministry of Education, 2010) defines social development as “children’s growing abilities to empathize and get along with others” and asserts the role of
the classroom as “an environment in which children are affirmed as individuals and as members
of a diverse community of learners” (p. 51).

**Big Idea:** Children are connected to others and contribute to their world.

**Overall Expectations:**

By the end of the kindergarten, children will:

1. identify and use social skills in play and other contexts;
2. demonstrate an ability to use problem-solving skills in a variety of social contexts;
3. demonstrate a beginning understanding of the diversity in individuals, families, schools, and
the wider community. (p. 52)

The findings of this study illustrated the children had many opportunities to negotiate
various issues and problem solve during the process of each inquiry. They practiced to consider
their peers’ perspectives while discussing their own thoughts and feelings. They experienced the
value of peer-bonding and collaboration when investigating a question. They developed their
social skills while forming their own learning groups or entering their peers’ groups often
independently of the teacher. The process of engagement with nature offered them a real-life and
meaningful context to develop each of these social skills over an extended period of time. Their desire, curiosity, and interest in investigating in nature required/fostered cooperation and creation of deeper relationships to accomplish bigger goals. The classroom teacher supported them by creating an environment in which each child was respected both as an individual and a member of the class community.

*Emotional development.*

The document requires the EL–K team to “nurture children’s development of self-concept, self-reliance, and self-regulation by creating a warm and responsive environment, which contributes to children’s ability to experience success” (Ontario Ministry of Education, 2010, p. 59).

**Big Idea:** Children have a strong sense of identity and well-being.

**Overall Expectations:**

By the end of the kindergarten, children will:

1. demonstrate a sense of identity and a positive self-image;

2. demonstrate independence, self-regulation, and a willingness to take responsibility in learning and other activities;

3. demonstrate an awareness of their surroundings. (p. 60)

The findings of this study illustrated how emotional development is at the center of the children’s engagement with nature. The children demonstrated a deep awareness of their surrounding environment by emotionally responding and bonding with many aspects of the nature that they enquired about. For example, they developed compassion and felt responsible for the well-being of the dead squirrel that they found in the park. They also participated in the process of hatching chicken eggs and expressed a strong sense of care and emotional connection
with the chicks in each stage of the inquiry through their drawings, socio-dramatic play, and narratives.

The positive attitude of the classroom teacher and her constant support of the children’s inquiry assisted the children to develop a strong sense of confidence and self-esteem viewing themselves as independent, powerful, and competent learners. Their emotional maturation was often conveyed by their desires to ask questions, determination to take responsibility, high level of comfort to discuss their thoughts, and ability to respond to the feelings of their peers as well as the natural world. The children accomplished this not to comply with top-down instructions or authorities but to satisfy their innate curiosity and aspiration to explore their world, to make meaning, and to connect. This is an essential contribution to the children’s learning experiences considering the value of emotional self-regulation in their academic success in future years in school.

**Language**

The EL–K document (Ontario Ministry of Education, 2010) emphasizes building on children’s prior knowledge and experience in programs that “allow children to explore language and to communicate their thinking and learning in meaningful ways to both team members and their peers” (p. 68). The EL–K team is responsible to provide “rich and varied materials and hands-on experiences to encourage talking, reading, writing, and viewing media texts, and they organize the classroom to promote discussion” (p. 68).

**Big Idea:** Children are effective communicators.

**Overall Expectations:**

By the end of the Kindergarten, children will:
1. communicate by talking and by listening and speaking to others for a variety of purposes and in a variety of contexts;

2. demonstrate understanding and critical awareness of a variety of written materials that are read by and with the EL–K team;

3. use reading strategies that are appropriate for beginning readers in order to make sense of a variety of written materials;

4. communicate in writing, using strategies that are appropriate for beginners;

5. demonstrate a beginning understanding and critical awareness of media texts. (p. 72)

The findings of this study suggest it is important for young children to see themselves as individuals who talk, listen, read, write, and view various forms of texts in order to make sense of their world. While engaged with nature, the children had time to explore, to reflect, and to make connections between what they knew and what they were seeing and reading. As they participated in self-initiated as well as teacher-planned and purposeful inquiries, they used literacy materials in the science learning center, the home center, the writing and art tables, outside their classroom, and on the window sill to communicate their thoughts, pose questions, and investigate ideas. They learned to see reading and writing as integral aspects of their daily lives while literacy experiences were embedded throughout the day in authentic and meaningful ways.

They used clipboards and pencils to communicate their thoughts and photography to record their observations. They learned there are many resources that they could draw from to investigate their questions, so they often independently used books, charts, calendars, graphs, and photos to collect information and seek answers. The significance of these learning experiences is that they were integrated in the context of the inquiry, rather than being taught in
separate activities. The message to the children was that literacy is not an abstract isolated skill but it is meaningful and a part of their daily engagement with and investigation in the world.

Mathematics

The EL-K program (2010) establishes the significance of building on children’s prior knowledge and experience and requires teachers to consider children’s development and offer them “learning experiences that are within the range of things they can do with and without guidance” (p. 92).

Big Idea: Young children have a conceptual understanding of mathematics and of mathematical thinking and reasoning.

Overall Expectations:

By the end of the Kindergarten, children will:

1. demonstrate an understanding of numbers, using concrete materials to explore and investigate counting, quantity, and number relationships;
2. measure and compare length, mass, capacity, area, and temperature of objects /materials, and the passage of time, using non-standard and standard units, through free exploration, focused exploration, and guided activity;
3. explore, recognize, describe, and create patterns, using a variety of materials in different contexts;
4. sort, classify, and display a variety of concrete objects, collect data, begin to read and describe displays of data, and begin to explore the concept of probability in everyday contexts. (Ontario Ministry of Education, 2010, p. 97)

The classroom teacher planned for many focused activities to introduce the mathematical concepts such as measuring, sorting, comparing, and classifying. However, it is challenging to
find a one to one link between the findings and the overall expectations in mathematics. Instead, the findings focus on the children’s extended opportunities to explore the seven foundations of mathematical thinking as required by the EL-K program: problem solving, reasoning and proving, reflecting, selecting tools and strategies, connecting, representing, and communicating.

The findings showed each inquiry started with a question and followed by problems and issues that emerged from real-life situations. The children wondered why the squirrel had died. They planned to make bird feeders to attract birds to the window of their classroom. They discussed how much seed they needed to attract birds to the classroom window. And finally, in hatching chicken eggs, they carefully read and measured the temperature in the incubator, measured the water bottle, counted down the days to the hatching date, and discussed how much food the baby chicks would need on each day. They collected and analyzed the data to make sense of their observations and experiences. They used a few standard materials and tools such as a thermometer, rulers, calendars, magnifiers, and measuring cups. The teacher also introduced non-standard materials such as pencils, blocks, toy bowls, and spoons for measuring and comparing length and capacity.

Children’s use of mathematical skills may seem more visible in teacher-directed and guided activities, such as when children sort, classify, measure, and compare and contrast different objects and materials during an activity designed specifically to practice those skills. However, children are often sorting toys, classifying action cards, discussing probability in their car racing, exploring the concept of patterning in their drawings and sketches. I suggest teachers put mathematical processes into the relevant context of children’s everyday experiences and build on what children know, do, and need. It is challenging but important to take mathematical skills, thinking, and reasoning out of their abstract presentations in the textbooks to the real
world where children would need to explore mathematical concepts to cook their favorite cookie, build a sand castle, set the table for snack, and perform a puppet show.

The mathematical thinking processes are closely connected to the science and technology expectations and so I will further examine them in the following section.

Science and technology

The Early Learning–Kindergarten program (Ontario Ministry of Education, 2010) asserts that science and technology need to be built on young children’s curiosity and sense of wonder and “the learning environment must be active, hands-on, child-centred, and inquiry-based” (p. 112). The EL–K team plays a critical role by supporting children “through the problem-solving process, encouraging them to try something new, persist, and find alternative solutions” (p. 112).

The document emphasizes that

Children learn best from topics they can explore deeply and directly. Abstract topics (e.g., rainforests, penguins, planets) are difficult for children to conceptualize. The focus for any inquiry must be drawn from what is familiar to children in their daily lives. (p. 113)

Big Idea: Children are curious and connect prior knowledge to new contexts in order to understand the world around them.

Overall Expectations:

By the end of the Kindergarten, children will:

1. demonstrate an awareness of the natural and built environment through hands-on investigations, observations, questions, and representations of their findings;
2. conduct simple investigations through free exploration, focused exploration, and guided activity, using inquiry skills (questioning, planning, predicting, observing, communicating);
3. demonstrate an understanding of the natural world and the need to care for and respect the environment;

4. use technological problem-solving skills (questioning, planning, predicting, constructing, observing, communicating) in free exploration, focused exploration, and guided activity. (p. 114)

The findings showed inquiries are built on the children and the classroom teacher’s questions and curiosity. For example, the children wondered if the squirrel was dead and theorized the reasons for this death. They then poked and prodded to reason and prove that the squirrel was dead. They constantly connected what they observed and learned to what they already knew and experienced to reflect on his possible needs and explore ways they could help. They selected tools such as cameras and drawing materials to record and discuss their thoughts and predications.

The knowledge and inquiry skills that the children developed in that inquiry helped them to continue observing and thinking. So, many new questions emerged from the children’s engagement with nature. Why did birds migrate to south in winter? When would they come back? Why did all the birds go to the house across from the school instead of the classroom window? What was inside those chicken eggs and why were they different from eggs that we eat? When would the chicks hatch and what would they need to grow healthy? These relevant questions engaged the children in purposeful inquiries throughout the school year. This is the goal that the EL-K document (2010) strongly promotes, “Science and technology do not involve simply the rote memorization of facts; rather, they involve particular ways of thinking and learning about and constructing understanding of the world in which we live” (p. 113).
Health and Physical activity

The Early Learning-Kindergarten program (Ontario Ministry of Education, 2010) emphasizes,

Safety is an integral part of being healthy, so young children need to start learning how to identify safe and potentially unsafe situations, how to handle them, and when to ask for help. The expectations related to safety need to be integrated into all areas of learning rather than taught in isolation…. The focus should be on exploration and creativity, to allow children to develop individual skills and self-confidence. (p. 128)

Big Idea: Children make healthy choices and develop physical skills.

Overall Expectations:

By the end of the Kindergarten program, children will:

1. demonstrate an awareness of health and safety practices for themselves and others and a basic awareness of their own well-being;

2. develop control of large muscles (gross-motor control) in a variety of contexts;

3. develop control of small muscles (fine-motor control) in a variety of contexts. (130)

The findings showed the value of the children’s inquiry in the natural world where the real-life context offered them opportunities to identify safe and potentially unsafe situations. When they met the dead squirrel the desire to find out if he was alive encouraged the children to touch him but the teacher guided them to think about safe choices and use other tools. The spontaneous discussions about how the children could help the squirrel illustrated the significance of exploring safety and health in a real-life situation. For example, they suggested to take him to the hospital, call a doctor, find his mom, give him food, and keep him warm.
Later, similar interest and curiosity took the children to the window and up onto the bench in the science learning center where they needed to self-regulate to safely share the space on the bench and problem solve to include other peers. The teacher’s invitation was to climb up onto the bench and join the world beyond the classroom through the open window. The children responded positively by making safe choices and creatively using the newly designed space. In hatching chicken eggs, the children connected their own health and safety to those of the chicks. They explored how to play safely around chicks, how to help them to grow healthy, how to safely handle them, and what would happen when a chick becomes ill. The Early Learning-Kindergarten program (2010) strongly discourages teachers to approach safety and health in discrete lessons. Instead teachers are encouraged to consider discussing and exploring health and safety issues as components integrated into all the learning areas. Exploring and investigating the natural world provide many authentic ways to accomplish this goal.

The Arts

Early Learning–Kindergarten program (Ontario Ministry of Education, 2010) states, “Learning through the arts also fosters children’s imagination, helps to develop empathy, promotes the development of relationships, and builds self-esteem, while enabling children to experience a sense of accomplishment” (p. 140).

Big Idea: Young children have an innate openness to artistic activities.

Overall Expectations for the visual arts:

By the end of the Kindergarten program, children will:
1. demonstrate an awareness of themselves as artists through engaging in activities in visual arts;
2. demonstrate basic knowledge and skills gained through exposure to visual arts and activities in visual arts;
3. use problem-solving strategies when experimenting with the skills, materials, processes, and techniques used in visual arts both individually and with others;
4. communicate their ideas through various visual art forms. (Ontario Ministry of Education, p. 151)

The findings showed visual arts and socio-dramatic play offered the children opportunities to develop creative thinking, symbolic expression and communication, and sensory skills. The children explored visual arts materials to investigate the squirrel’s dead body. They used visual arts tools to express their feelings and communicate their imaginations while observing birds at the window. Next, art materials and processes encouraged creative thinking and offered the children opportunities to communicate their interpretation of the world inside the chicken eggs, to develop and express their empathy and caring feelings towards the chicks, and to build deeper relationships with the chicks. These are the essential expectations that the EL-K document assigns to the arts in kindergarten with an emphasis that all these expectations need to be integrated into the daily learning experiences of children and not to be taught in separate lessons.

Reflection

In my experience as a kindergarten teacher and a teacher-educator, when I talk to many teachers in kindergarten and primary grades, they often have challenges to read and interpret the curriculum documents. In these documents, learning is still divided into six, seven or more areas and hundreds of specific expectations are listed in bullet points throughout the curriculum. The language and the structure of these documents are confusing teachers about how to translate these discrete expectations, skills, and themes into an integrated teaching program where mathematical concepts are not separated from arts and thinking processes in science and
technology. They ask how to incorporate social emotional development across all these learning areas. This challenge increases when a highly detailed document such as the Early Learning-Kindergarten program (2010) with 156 pages is quickly introduced and mandated by the Ministry of Education without enough time and resources for teachers to explore it, believe in it, and meaningfully use it in their own teaching.

This study encourages teachers to distance themselves from the bullet points and the listed expectations but examine the Big Ideas and the Overall Expectations of the mandated curriculums. Engagement with and inquiry in the natural world are full of opportunities for children and teachers to explore these big ideas and develop knowledge, attitude, awareness, emotions, and skills across all the learning areas. The key for the teacher is to imagine and plan for children’s big ideas to bloom and flourish rather than allowing them to become controlled by the list of isolated activities and outcomes.

In this study, I attempted to make children’s learning experiences visible by narrating stories that a class of 20 young children and their teacher lived and communicated via their choices and determinations, passionate discussions, colourful drawings, and thoughtful play.
Chapter Ten

Discussion and Implications

Putting the Pieces of the Puzzle Together

I conducted this study to understand how the process of engagement with nature can contribute to the children’s learning experiences in and about nature. Nevertheless, considering the research questions, I was most interested in studying the process of the children’s sustained engagement with nature, when they were willing to develop authentic questions and hypotheses and then investigate their questions to seek answers. During my classroom visits, I observed the teacher offering the children various experiences in nature; for example, she asked them to collect and bring fall leaves and twigs to the class and then put them for further investigation in the science learning center. She also invited them to make collages using colored sands, shells, bark, and dried flowers. However, I noticed that these experiences were often short and remained as isolated activities. The findings of this study illustrate that the children were most engaged when they were interacting with and inquiring about animals. Other research also illustrates children’s high level of interest in taking care of animals and developing emotional connections with them (Katcher, 2002; Kellert, 2005; Myers & Saunders, 2002). Therefore, I deliberately chose to focus on the children’s richest inquiries which were often developed through their encounters with animals.

From my experience as an early childhood educator and from my reading of the literature, I knew that opportunities for children to have direct experience with nature are decreasing. Recently, however, an international movement is growing to re-connect children to nature and to advocate for the positive effects of nature on children’s physical and emotional
health and well-being and cognitive abilities (Faber & Taylor, 2001; Hilgers, Haynes & Olson, 2008; Louv, 2006; Sobel, 1993; Wells & Evans, 2003).

This research study contributes to this growing body of knowledge by investigating ways children encounter and engage with nature in an urban school setting, their learning experiences, and the significant role of teachers and pedagogy in mediating their engagement with nature. As examined in the data analysis chapters (chapters 5 to 8), there are many opportunities to engage with nature in an urban school when children’s experiences are not limited to learning facts and numbers about the natural world. If learning is inquiry-based, children can practice to become sharp observers, critical thinkers, theory-builders/producers, and problem solvers. They employ and integrate these competencies in all learning areas such as social and emotional development, science, mathematics, language, and the arts. Children’s encounters with nature can be unexpected and natural or they can be planned by the classroom teacher. Based on the findings presented in this dissertation, it is clear that teachers play a key role in facilitating and prioritizing these experiences. Supportive pedagogical programs and curriculum guidelines are also resources for teachers to plan for such experiences to regularly happen and to advocate for children’s rights to be re-connected to nature.

In this chapter I summarize the main findings of this study to answer the two research questions with respect to the factors that encourage and sustain the children’s engagement with nature and the role of the classroom teacher. At the end of this chapter, I identify implications and offer recommendations for theory and practice.
Research Question Number One: What factors in a Kindergarten Classroom Can Facilitate and Sustain Children’s Engagement with Nature?

In a free-choice learning model, Falk and Dierking (2002) suggested that there are many different ways, places, and moments in which children learn. However, children learn best when they are interested, curious, and engaged. A comparative analysis of the five learning episodes demonstrated four major factors that when all woven together encouraged and sustained the children’s engagement with nature. These factors are: investigating children’s meaningful and autotelic questions, encountering and experiencing nature in familiar contexts, developing emotional bonding, and having sufficient time.

**When learning starts with children’s relevant autotelic questions.**

An inquiry starts with a question and a desire to seek answers for it. Children are born with a sense of wonder, and a strong disposition to make sense of the world around them (Helm & Katz, 2011; Orr, 2005). When learning is relevant and meaningful, the power of children’s questions is a strong driving force of their inquiry (Edwards, Gandini, & Forman, 1998). The findings of this study showed that when children asked their own questions which emerged from their real-life experience and so were relevant and meaningful to them, they became most engaged in investigating over and over again without feeling bored or exhausted.

In the first episode, when the children encountered a squirrel, they spontaneously started asking many important questions which were all relevant to them. Their innate curiosity about the life of squirrels that they could frequently see and chase on their way to school played a positive role in immersing them in a “flow” experience encouraging them to poke and prod, wonder, and look again with very serious commitment to finding out what the condition of the squirrel really was (Csikszentmihalyi, 1975).
The children’s curiosity could have ended if the learning context had not been supportive of their exploration and experimentation. The children’s engagement remained sustained because they could choose what to learn and had some control over where, when, how, and with whom to learn. As the literature review in chapter two suggests, when children have control they are more willing to explore and investigate (Burke, 2005; Fjørtoft, 2004; Payler, 2007; Waters & Maynard, 2010). The findings indicate that this control can create a sense of ownership to encourage the children to develop an agentive role as the producers and the creators of their own learning experiences.

In contrast, in the visit to the farm, the findings illustrated that the children were not offered enough opportunity to develop their own relevant questions prior to the visit. When at the farm, they were guided by the farmers’ questions and interests rather than their own. Although the field trip was enjoyable and valuable, the children did not engage in any in-depth inquiry about the life on a farm.

In the third learning episode, the children first did not show any sustained interest in the materials and tools that the classroom teacher had provided them in the science learning center. However, when the teacher redesigned the center, a bench and an open window offered the children an authentic context to interact with nature and develop their own questions from direct observations. They became even more engaged to explore the natural world, when a question about whether birds had returned to their city was raised by two children at the carpet time. They collaborated to create a space for observation and dialogue at the window where they could spot birds and discuss ideas. They became deeply engaged in a continuous process of constructing and reconstructing new knowledge based on their prior experiences. The force of their questions and interests challenged them to self-initiate strategies to also engage their friends. They brought
various resources to the window sill and turned the bench to a stage for drawing, reading, feeding birds and squirrels, and playing the roles of hunters and spies.

In the fourth learning episode in which the teacher made the initial decision to hatch chicken eggs, creating a context to invite the children to develop their own questions became even more crucial. Reading fiction and non-fiction books in small or whole-class groups and the follow up discussions gradually raised the children’s curiosity and encouraged them to ask questions about their roles, the process, and the challenges they might face in hatching and caring for chicks in their classroom. Engagement in hands-on activities such as role playing with toy chicks and plastic eggs, cracking real eggs, drawings, and examining photos of the chicks’ growing inside eggs motivated the children to carefully observe, think, ask questions, and seek answers.

**Encountering nature in a meaningful context.**

Kellert (2005) described a complex picture of the various modes that children may experience nature. Research suggests that the familiarity of children with an ordinary and nearby natural setting plays an important role in engaging them to build intimate and meaningful relationship with nature (Nabhan & Trimble, 1994; Pyle, 2002; Sobel, 1993; Waters & Maynard, 2010).

The findings of this study illustrated that the context in which the children experienced and interacted with nature played a vital role in the quality of their engagement and learning experiences. For example, seeing and chasing squirrels everyday, the children were already curious and interested in knowing more about them. So, when they encountered a dead squirrel in the local park behind their school playground, they quickly engaged in a unique investigation without any initial request from the teacher. The encounter was unexpected, but it happened in
the familiar and nearby environment of their own neighborhood. In contrast, the visit to the farm did not intrigue the same level of engagement in the children as they encountered nature in a distant and unfamiliar context. With no in-depth prior discussion in the classroom, the children started their visit without genuine questions. While at the farm, the structure of the visit also failed to increase their level of interests and engagement.

The value of experiencing nature in a meaningful context is also significant in the third learning episode in which, although the teacher had provided interesting natural materials and tools such as bird’s nests, shells, and magnifiers, the children did not show interest in spending a sustained amount of time in the science learning center. The materials, mainly collected and displayed by the teacher, were representing nature out of the context. However, as soon as the teacher offered the children access to the world outside and opened the window, the children’s interaction with nature became meaningful and in context. The children engaged in observing and feeding real squirrels and using binoculars to spot flying birds.

With my above suggestion about the value of exploring nature in its meaningful context, it is surprising to observe the children’s deep engagement in the process of hatching 12 chicken eggs that appeared in their classroom on a Monday morning. Those chicken eggs came from a distant farm unknown to the children and represented a piece of nature out of its real-life context, because normally, chicken eggs would not be hatched in a classroom. None of the children had a previous experience in hatching eggs; and more importantly, the project was not initiated by the children. It was the classroom teacher who made the decision to introduce the experience to her classroom. So, why and how did the children become interested in this inquiry?

The findings illustrated that the teacher and the children were able to create a context in which the chicks became a meaningful part of the classroom. For example, the extended
classroom discussions and the diverse opportunities to explore the life of chicks through role playing, drawing, and reading helped the children to develop a strong sense of responsibility and ownership and involved them cognitively and emotionally. They developed meaningful connections with the chicks, which in return, raised their curiosity and engagement.

In general, the findings suggested that the children were most engaged when they experienced nature in authentic real-life contexts. The teacher also played a significant role to offer them access to nature-in-context as well as to develop strategies to make the context and the experience meaningful.

**Emotional bonding.**

Gardner (1999) argued, “The integration of emotional realm into a cognitive perspective remains an ongoing challenge” (p. 77). Bartel (2002) also suggested, “We are afraid of emotion—it does not appear to be rationale; it pops up at the oddest times” (p. 14). Yet, in this study, emotional bonding and genuine connection with nature proved to be one of the major elements in engaging the children, sustaining their interests, and deepening the level of their involvement. In investigating the complex cycle of ‘life and death’ in nature, the mystery of bird’s migration, and the magical process of chicks’ birth and growth, the children became emotionally engaged and showed feelings of like, dislike, admiration, fear, responsibility, compassion, surprise, and joy. In return, their emotional experiences and affective relationships created stronger desires and determination to further explore and imagine (Carson, 1956; Chawla, 2006).

In the first learning episode, the children became emotionally involved feeling worried that the squirrel might be sick, scared, and hungry and they felt responsible to help him. In
contrast, the children did not develop the same affective connection with nature in their visit to the farm, which in return made them seem less concerned and engaged.

In the third inquiry, the children also developed some emotional connections with the birds and felt responsible to put seeds for them on the window sill while often confirming that they loved birds. However, their emotional bonding was not as strong as the first and the fourth inquiries. The difference can be because of the proximity as no birds came close to the window and the opportunities to build affective relationships did not happen.

In contrast, in the fourth learning episode, the proximity, the variety of hands-on activities, and the kind of discoveries that the children were able to make through caring for chicks for about one month offered them an opportunity to develop a strong emotional connection with the chicks. The children felt responsible for the health and safety of the chicken eggs in the incubator, playing quietly and gently in the home center. They helped the teacher to prepare the classroom for the birth of the baby chicks and took care of them for about five days before they went back to the farm.

The findings illustrated the children’s particular interest in animals. Kellert (2005) suggested that animals can stimulate strong emotional responses from children because of their visible resemblances as well as their responsiveness and willingness to interact with children. In many ways, animals that the children explored in their inquiries looked, moved, and felt like children prompted them to extend their own feelings and thoughts to the animals. For example, they suggested the squirrel felt lonely, the birds were shy, and the chicks needed moms and dad.

With animals or other components of the natural world, Sobel (1996) believed that developing an affective relationship should be at the heart of young children’s interaction with
nature because it can shape their values and attitudes and eventually influence the kinds of relationship they would build with nature as adults.

**Time is a key.**

In a highly structured, standardized, and outcome-based curriculum the pressure of time and the issue of accountability often challenge teachers who plan to explore the possibilities of inquiry-based learning. The rushed children often are denied a context to relate, experience, and construct meaning in and about nature (Curtis, 2002). Gandini (1997) argued learning by doing requires time to discuss ideas and to revisit experiences and thoughts to gain a better understanding (p. 7).

The findings illustrated that the children needed sustained and quality time to develop genuine interest and become curious to engage cognitively, emotionally, and aesthetically. In each learning episode, the extended and flexible time enabled the children to integrate their prior knowledge and skills in meaningful ways and learn by discovering. When encountered with the squirrel, the children had five days to go to the park and investigate his real situation. On each visit, they sought answers for their old questions and through detailed discussions and observations were able to develop new ones. Back to the classroom, they also had time to revisit and analyze their experience through further drawing and talking.

The extended time at the window in the science learning center also created a context where the children could engage in observing, generating questions, and theorizing about the natural world. Each day, during the activity time, they chose the amount of time they needed to use tools, draw their observations, develop strategies to attract birds to the window, role play, and interact with the world outside their classroom. Finally, in hatching chicken eggs, the children had over one month to learn about the life and needs of chicks and deeply investigate
the process of their incubation, hatching, and growing. In the process of an inquiry and with a socio-constructivist approach to learning, “there is no such thing as wasted time” (Rinaldi, 1998, p. 115). Time creates a context in which teaching with learning becomes possible.

Table 14. Comparing four themes across the learning episodes.

<table>
<thead>
<tr>
<th>Learning episode</th>
<th>Themes across the episodes</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Autotelic questions</td>
</tr>
<tr>
<td>Meeting a dead squirrel</td>
<td>child-initiated, meaningful, in the context</td>
</tr>
<tr>
<td>Visit to a farm</td>
<td>adult-initiated, fixed, relevant to the visit but not to the children</td>
</tr>
<tr>
<td>Engaging with nature through an open window</td>
<td>child-initiated, meaningful, gradually developed</td>
</tr>
<tr>
<td>Observing birds</td>
<td>child-initiated and teacher-supported, gradually developed</td>
</tr>
<tr>
<td>Hatching chicken eggs</td>
<td>teacher-initiated but gradually changed to child-initiated and teacher-supported</td>
</tr>
</tbody>
</table>
Research Question Number Two: What is the Role of the Classroom Teacher in Facilitating Children’s Learning Experiences?

Creating the context and conditions for the children’s engagement.

The literature review shows the crucial role of the teacher in offering children time and a supportive context to engage with the natural world (Colburn, 2006; Katz & Helm, 2011). I particularly draw on Cambourne’s (1988) conditions of learning to examine the essential role of the classroom teacher in creating five main conditions to engage the children in the process of each inquiry.

Use.

In this study, the teacher fostered the children’s active participation in their own learning and offered them an extended time and different tools and resources to observe, communicate, think, discuss, and problem solve often in a meaningful real-life context. In response to their teacher’s strong respect for their competencies and abilities, the children were motivated to invest their time, energy, and thoughts with passion and excitement.

Responsibility.

When children are responsible and can exercise a great amount of control over the direction and modes of their learning, they are more willing to explore and investigate and often choose what is meaningful and relevant to them (Burke, 2005; Fjørtoft, 2004; Payler, 2007; Waters & Maynard, 2010). Choice is one of the most important variables in facilitating children’s engagement in a learning situation (Cambourne, 1988). The findings demonstrated the teacher’s pedagogical commitment to offer the children many opportunities to feel responsible to ask their own questions, be motivated to investigate for the possible answers, and exercise a high level of control over the process of their own learning. The message to the children was that they
were responsible to find resources, including people and materials, and to make decisions about when, how, and what to investigate. This did not deny the teacher’s professional responsibility in guiding and facilitating the children’s learning. Rather, it meant that the teacher shared and negotiated the responsibility and control with the children. In return, children saw themselves as potential doers and became doers and owners of their own inquiry (Cambourne, 1988). Children feel more powerful when they can view themselves as authors, designers, composers, inventors, and inquirers (Eady, 2008; Katz & Chard, 2000).

**Response.**

The findings illustrated how the classroom teacher frequently responded positively by role modeling, demonstrating, offering time and rich resources, and setting up an engaging environment to foster the children’s exploration of nature. She celebrated, participated in, and showed enthusiasm for what the children were accomplishing. Within this supportive context, the teacher was able to gradually connect and build a trustful relationship with each child based on mutual respect and reciprocity (Rinaldi, 2006). Her positive attitude and responses became significant external rewards to support and sustain the children’s engagement in each inquiry (Cambourne, 1988). In schools, these external rewards are in contrast with other rewards which are often limited to stickers, good marks, and ‘empty’ comments by adults, which either have very short effect or no effect at all (Falk & Dierking, 2002).

**Expectations.**

When there is a trustful and bonding relationship between teachers and children, teacher’s expectations play a crucial role in deeply engaging children in what they are learning (Bartel, 2002; Cambourne, 1988; Dietze, 2006). In this study, the classroom teacher
communicated her strong confidence in the children’s competencies and set very high expectations by offering them a lot of control over the directing each inquiry.

**Approximation.**

Cambourne (1988) reminded us, “When learning is looked at as a form of hypothesis testing, it becomes obvious that approximations (errors) are absolutely essential to the whole process” (p. 67). In this study, the teacher was able to create a positive tone in her classroom environment by allowing experimentation and approximation. The findings showed learning in Mrs. Hansen’s classroom was not approached as an isolated, separable, and singular event; instead, the children were expected to question, hypothesize, and test their thoughts through a series of successive approximations. The process of the children’s meaning making endeavours were respected while ‘mistakes’ and ‘errors’ were accepted as well as the final ‘correct’ answer or product. This is an important approach to learning considering that “Children monitor adults’ reactions to their actions. When adults communicate that an approach or answer is “right” or “wrong”, they can cut off children’s thinking” (Ontario Ministry of Education, 2010, p. 112).

**Taking informed pedagogical risks.**

It is not always easy to define risk and risk taking behaviors of teachers. Our definitions are often socio-culturally as well as individually constructed. Ponticell (2003) suggested schools as workplaces are generally highly resistant to risk taking and change. Literature on teacher education and school reform often juxtaposes the terms risk-taking, change, and innovation. From a psychological perspective, Yates and Stone (1992) suggested three essential elements of risk are: a) loss, b) significance of loss, and c) uncertainty. Ponticell (2003) contended that loss is the foundational element of risk taking and an action or situation is considered a risk when the involved individual believes that there is a potential for losing something that he or she already
Losses can be financial, performance related, physical, psychological, social, or aspiration related. Losses can have various significances or values for different individuals; therefore, each individual decides on the significance of what is lost (Ponticell, 2003). Risk also requires uncertainty, which is when one is uncertain about the outcomes of an action or the potential losses as well as the value and significance of the loss (Ponticell, 2003). Risk taking is not necessarily always negative. In contrast, in our fast changing societies, people need to know how and when to take appropriate risks in their social, professional, personal, and academic lives (Hamburg, 1991; Miller & Byrnes, 1997).

Teachers often take pedagogical risks through the choices that they have to make everyday. For example, everyday, teachers need to decide if they should read books about sensitive topics, allow children to work with tools that may involve some injuries, or go for a walk in the neighbourhood considering the car traffic. Choices that may seem involving many risks for some teachers can be a part of the regular practice for some other teachers. In this section, I examine the teacher’s pedagogical risks based on my interpretation of what may be considered as a risk in the culture of our current schooling. The classroom teacher may not necessarily agree with me about risk being involved in these practices. I categorized the pedagogical risks that the teacher took into three kinds: physical, emotional, and social.

I suggest that when the children encountered the squirrel in the park, the teacher took physical risks to allow the children to investigate a dead animal in nature, which could have carried germs and considered potentially a health hazard to the children. She took a social risk facing the possibility of being questioned and challenged by the families and the school principal about allowing the children to closely examine the squirrel for five days. An emotional risk was
also involved considering some children might have fear of dead animals and also death is a sensitive concept to explore with young children.

In the visit to the farm, the teacher also took some physical risks leaving the familiar and comfortable space of the school to introduce the life in a farm to her class. Although field trips are common and recommended practices, some teachers still feel uncomfortable about taking a large number of children to a field trip on a bus where they may not be able to exercise the same level of supervision on young children.

The teacher took physical risks putting a bench under the window inviting the children to climb up and observe the world from an open window. Considering the mandated curriculum, the teacher also took a risk when she offered the children a higher level of control to investigate and discover answers for their own question of if any bird is back from south. She allowed the children to leave with unanswered questions focusing on children’s practicing to be inquirers, rather than producing ‘right’ answers. The amount of time and space that the teacher offered the children could have been challenged by an educational system which is highly predetermined and scripted.

The teacher took a risk to allow the children to become emotionally engaged and attached to the chicks for about one month. It became difficult for the children to observe not all the eggs hatched, to bury one of the chicks who died after two days, and to say goodbye to the chicks when they had to go back to the farm.

Taking into account the above-mentioned potential risks, the risk for the teacher was performance related considering the potential loss of her status as a teacher. However, the findings illustrated that in general, the children became involved in and introduced to topics that they could have not explored if the teacher was not willing to take those risks. The phrase
‘informed pedagogical risk’ is reflected in the relationship between the teacher and the children, to the extent that the teacher was reflective of her own practice while being mindful and attune to the possibilities and challenges of teaching in a public school. The teacher’s informed risk taking practice can also be a positive example for the children helping them to develop a positive attitude towards a more balanced approach to risk in a fear-filled and “risk-averse” culture that “restricts children’s play, limits their freedom of movement, corrodes their relationships with adults and constrains their exploration of physical, social and virtual worlds” (Gill, 2007, p. 35). Gill (2007) rather advocated for “a philosophy of resilience that strikes a better balance between protecting children from genuine threats and giving them rich, challenging opportunities through which to learn and grow” (p. 56). This is a strong argument for a de-pathologized childhood (Heydon & Luigi Iannacci, 2008).

**Implications of the Study**

**Teachers and practitioners.**

Today, many children are entertained often with information and visual messages being constantly presented to them rather than constructed by them. In particular, children’s free time for imagining and wondering is constantly decreasing. The findings of this study invite teachers and practitioners to reconsider their significant role in prioritizing and fostering a sense of wonder in their classroom by creating a supportive context in which children’s engagement in inquiry-based learning to develop a positive attitude towards nature is an integral part of their everyday teaching. Nature is full of wonder and it is this potential that encourages children to invest emotionally and cognitively to enquire and to dig until they find answers for their questions. The opportunities to explore nature with children are not limited in an urban school if teachers choose to give these experiences a priority.
The findings encourage teachers to view children as competent meaning makers and respect and encourage their questions and desires to connect with nature. The focus of teaching then can be beyond what a pre-determined lesson plan can offer, but consider what sense children are making from each experience and how that can be connected to their prior experience and knowledge.

This study invites teachers to examine ways to assist children to develop a sense of belonging and responsibility and demonstrate a caring relationship towards nature. Teachers may then question if focusing on facts and numbers about nature can elicit the same changes in children’s awareness, attitudes, values, and beliefs.

It is important that teachers be aware of the value of various modes of experience with nature and resist and question the dominance of symbolic and abstract experiences in the children’s lives. Children show the highest level of engagement when they directly experience nature in a familiar and meaningful context.

*The socio-cultural construct of nature: Man-made versus natural.*

The literature suggests that nature is a socio-cultural construct (Castree & Braun, 1998; Demeritt, 2002; Proctor, 1998; Soper, 1995). This study challenges us to view the relationship between children and nature as reciprocal in the sense that children’s learning experiences shape and are shaped by the socio-cultural construct of nature in their school and the larger society. For example, in the school culture, life on a farm and growing chicks are considered important aspects of nature to learn more about. However, the children in this study also pushed the boundaries of what nature is claiming their roles as co-constructors of the school culture. For example, when they showed interest in further investigating a dead squirrel, they reshaped the school’s definition of what nature is or what parts of nature are worth studying. They attempted
to develop new cultural values and practices in their school system while challenging and questioning what nature has already been defined for him or her (Ogbu, 1995).

Bonnet (2004, 2007) argued although different concepts of nature are constructed within the human practices, our experience of nature can be socially mediated but not socially produced. The participants of this study experienced nature as ‘self-arising’” (Bonnet, 2007, p. 712) in the sense that it existed beyond their intentions. Although their actions affected it, they could not ultimately determine it. For example, in their inquiry of the lives of birds, the children observed, took pictures of, sang to, chased, and fed the birds. They both affected and became affected by the lives of birds.

Nevertheless, the dominant role of human beings in nature challenges the argument that we are not the “authors” of the natural world (Bonnet, 2007; Chawla, 2002). When the participants of this study hatched 12 chicken eggs in their classroom and took care of four chicks for five days, to some extent, they were the authors of those lives. The close interactions illustrated interdependency between the lives of the children and the chickens. The role of the human beings as the authors of the natural world is then arguable and perhaps a matter of degree. It is not clear-cut where to draw the line between what is man-made or natural; our definition of nature always remains influenced by our socio-cultural practices and individual choices.

In this study, the many meaningful and relevant experiences helped the children to understand the interconnectedness between their lives and the other parts of the natural world. The literature argues that this understanding can create a stronger desire and determination to seek deeper knowledge and develop an authentic sense of compassion and responsibility, which can then give fundamental direction to the kind of life these children may choose to live (Carson, 1956; Iozzi, 1989; Palmer, 1997; Wilson, 1997). In this study, I am not attempting to over-
generalize that interactions with nature are always positive for all children regardless of the socio-cultural contexts of their experiences. More research is needed to explore in what ways encounters with the natural world may fail to create positive learning experiences for children in a school setting.

**Policy makers.**

The language and the structure of the teachers’ resources, such as national and provincial curriculum documents, have to be clear in supporting children’s interaction with nature across all the learning areas, in particular, arts and personal and social development. The Report of the Writing Group (Bondar, 2007) argued that the language of most of the guidelines and documents of the Ministry is open to different interpretations by teachers and school boards. For example, in the Ontario Kindergarten program (Ministry of Education, 2006) children’s connection with nature is articulated in few bullet points only in two subject areas of Science and Technology and Health and Physical Activity. In the classroom that I observed, the teacher chose to bring those few ‘learning expectations’ to the forefront of her practice. In other classrooms, they may become disappeared among 140 other learning expectations in the documents.

When curriculum resources and guidelines are developed, policy makers need to consider the rights of children and teachers to make the final decisions about the what, when, where, and why of their own learning. Schools policies and program documents need to be clear on children and teachers’ agency in co-constructing learning experiences in their day-to-day life at school. An outcome-based and highly predetermined curriculum often does not offer teachers and children opportunity to claim this ownership and responsibility.

An educational program for young children needs to recognize teachers’ needs to have sustained time, rich resources, and administrative supports to be able to offer children
meaningful and relevant experiences in and with nature. This is important if the goal is to help children to connect emotionally, ethically, and cognitively with nature to develop a caring, loving, and responsible relationship.

**Parents.**

The findings invite parents to make their children’s connection with the natural world a priority, especially in urban settings. Children are innately interested and curious about nature but this needs to be encouraged, supported, and deepened; otherwise, these connections may gradually fade away in a culture of negative, fearful, and careless attitude towards nature.

Parents might consider the main five conditions of learning to foster their children’s engagement with nature. They should demonstrate a positive attitude towards nature and join their children with excitement to interact with and play in nature. Parents need to offer their children plenty of time to sustain their engagement with nature. Through various activities, such as walking in a natural trail or gardening, children can not only develop skills and knowledge but also actively and meaningfully use them when in nature. And more importantly, children need to directly experience the joy, pleasure, and solitude in nature through having lots of free time and calming moments in nature.

**The Journey of My Engagement in This Study**

I started my journey with a question meaningful to me and a deep desire to discover answers. Is nature important in the lives of young children and why? I walked into a world that was unknown to me in many ways: the world of the academic study of children’s encounters with the natural world. I took the risk to ask many open-ended questions while I was not sure if I would ever be able to find answers. However, as the findings in this study illustrate, when the
questions are meaningful and the desire is strong, the learner would often embrace the opportunities to explore.

In exploring my research questions, I acknowledge that I had to conform to the academic requirements of a dissertation study, the socio-cultural and political context of a public kindergarten classroom where I collected my data, and the personal interests of my research participants. However, I had sufficient control to decide where, how, and when to study the phenomenon of the children’s engagement with nature and I was most engaged when I could exercise this control over my investigation. The affective relationship that gradually developed between me and the research participants as well as the personal connections that I was often able to make with the topic of my study were the strong driving forces of this inquiry. I am aware that these connections motivated and informed my data collection and analysis, but they also put a limitation on them. I often inquired further and most effectively collected the data when and where I was most cognitively and emotionally involved. This often happened when I was challenged to see the unexpected and out-of-the-box teaching and learning opportunities and experiences. Examples include when the class encountered a dead squirrel or when the classroom teacher put a bench under a window and invited the children to explore the world outside the walls of their classroom.

I was engaged when I was able to investigate my questions in their authentic context; that was when I was visiting the classroom, talking, and planning with the classroom teacher, and documenting or playing with the children. In the process of writing and analyzing my data, I was also involved when I was revisiting my field notes, photos, and videos and listening to my conversations with the teacher and the children. The time flew by fast and I was able to write and be creative.(Csikszentmihalyi, 1975).
Through reflecting on my own journey of asking questions and seeking answers— or what in academia is called conducting a PhD dissertation – I became more aware of what is involved in the process of learning. I experienced how learning can be full of desires, joy, excitement, and energy, and satisfy the learner’s constant need for self-efficacy and success. Nevertheless, I experienced how strong motivation and hard work are also involved in learning. In writing this dissertation, I learned about learning.

Throughout this journey, I constantly re-considered my definition of nature while constructing a new connection and relationship with it. Because of this, I am now more hopeful about the possibilities of connecting children with nature in the school setting if we believe it is one of our main goals in educating our young children. The impact on me as a parent, teacher educator, and citizen is remarkable considering my plans to continue advocating for children’s rights to be re-connected to nature.

**Further Research**

The following suggestions are not exhaustive but can be considered as a starting point for further research into the learning experiences of children in about nature through inquiry-based learning.

**Outside school experiences.**

It would be interesting to learn more about how the children’s learning experiences in and about nature in the school setting have contributed to their interaction with nature outside the school time and in the larger community. For example, a follow-up survey of families or home visits could have further informed this study.
Older children.

This study can be conducted with older children in upper grades in order to better understand in what ways they engage with nature and how this engagement can contribute to their learning experiences in and about nature.

Is there any gender difference?

Recently gender difference has been a hot topic in educational research and discussions. Do boys and girls experience and interact with nature the same or differently? What are the possible similarities and differences? What this may mean for school-based learning?

Families’ engagement.

Further research needs to be conducted to understand how the involvement of families may contribute to the children’s learning experiences. In what ways can schools support and encourage this involvement? What are the possible challenges considering the linguistic, cultural, social, ethical, and political complexities of family’s lives in the multicultural context of metropolitan cities?

Follow-up study.

Moreover, an important addition to this study would be to conduct a follow-up study to examine the children’s attitudes, awareness, and interests in nature one year after this study finished. The following questions can be examined: Would the children show the same level of interest, excitement, and comfort exploring the natural world? How do they connect their learning experiences from this year to their new experiences in Grade one?
Conclusion

Our theories, however incomplete, provide a common language (set of concepts) through which research participants, professionals, and others can come together to discuss ideas and find solutions to problems.

(Strauss & Corbin, 1998, p. 56)

This study and its findings do not hope to be final and absolute but strive to create a context for further inquiries and dialogues. The conclusion, for me, is that learning in nature is a complex process but children’s innate curiosity in nature and their desires to make connections are enough powerful to encourage them to live and learn. As an educator, my passion is to learn how to hold their hands and walk this journey with them.
Epilogue

When Outside
When outside
They laugh louder
They run faster
Their hands are curious

and

Bodies search
Big eyes meet

tiny ants
When outside

A stick

is a tool for scientific exploration

and

Taking risks

is a part of the curriculum
When outside

Screaming is appropriate

when suddenly

a caterpillar shows up on the sidewalk
When outside

writing with shoes
and
drawing with bodies
are art activities
When outside

Friendship embraces nature

with a bouquet of flowers
And

A world is waiting
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Appendix A: Letter of Introduction to Principal

ONTARIO INSTITUTE FOR STUDIES IN EDUCATION OF THE UNIVERSITY OF TORONTO

January 2009

Dear ________________:

I am writing as a Ph.D. candidate at the Ontario Institute for Studies in Education of the University of Toronto (OISE/UT) to invite your school to participate in an upcoming research project. The aim of this project is to examine the influence of engagement with the natural world on the learning experiences of an urban kindergarten classroom. This research study is part of a doctoral thesis program in the Department of Curriculum, Teaching and Learning at OISE/UT, and will be supervised by Dr. Linda Cameron. The proposed study has undergone an ethical review process and has been judged to meet the institutional ethical standards of the University of Toronto. The External Research Review Committee of the TDSB has also granted approval for this study. I now seek your permission and consent to conduct this research in your school, and invite one of your kindergarten teachers, families, and children to be partners in this research.

The purpose of this study is to observe and analyze children’s engagement with the natural world in a kindergarten classroom, considering the role and value of direct connection with nature in childhood and the many complex ways that children may experience the natural world in an urban classroom. This work will contribute to the on-going discussion of when, how, and what unstructured time with the natural world may contribute to children’s learning experiences. Having volunteered in your school and considering its philosophy, ___________ has been suggested as an excellent site for this research. Particularly, this project would be well supported by the provision of emergent curriculum and the extended periods of child-initiated time in your kindergarten program, and the emphasis on ‘learning environment’ that is highlighted in your school’s profile and plan. As you are aware, I have been volunteering in Mrs. Halls Kindergarten classroom and would like to invite her, her students, and their parents/guardians to participate in this study in the Winter/Spring Term 2010.

The project will be initiated by a meeting with the classroom teacher to offer information and to gain her consent and consultation. I will then organize a meeting with the parents/guardians to offer information about the study and to gain their consent and input. I will be requesting parents to complete a 15-minute questionnaire regarding their family’s experiences with the natural world, which will be kept confidential. With parents/guardians’ consent and teacher’s support and input, the children will also be informed of the project in age-appropriate ways, and periodically invited to offer questions, perspectives, and input.
This study includes two classroom visits per week for two and half hours each time over a period of 3 months and data will be collected through the use of documentation – note-taking, digital photography and videotaping, as well as collection of photocopies of children’s artifacts. Overall the classroom environment will be observed, with observations focusing on the emergent, first-hand, and self-initiated experiences of children with the natural world inside their classroom at different learning centers, as well as, at outdoor time in the playground, during the neighborhood walk, or in the field trips. Classroom teacher’s pedagogical strategies to respond to children’s experiences will also be observed and recorded. During the classroom observation, data can be made available to the classroom teacher for the purpose of curriculum planning. The teacher will be interviewed on two occasions for approximately 30 minutes, at times convenient to him/her, regarding his/her teaching philosophy and overall understanding and definition of nature and “the natural world”; as well, I will invite the teacher’s response to my analysis of the observational data. I will audio-record the interviews. The teacher will have the opportunity to make amendments or deletions to transcribed interview text.

Upon completion of the data collection, a summary report will be offered to families by way of a ‘celebration’ to be planned in consultation with the teachers and children.

Participation in this research project is voluntary. There will be no negative consequences attached to either declining to participate or withdrawing from participation in the study at any time. In addition to being used as thesis research, the results of the data may be used in future presentations and publications in education. I will seek participants consent before using their data in academic publications other than my doctoral thesis. In order to protect confidentiality, names of the school, teacher, families, and children will not be listed in any part of the report. After completion of my thesis, all data will be transferred into a password protected hard disk drive and will be kept locked in a file cabinet for 2 years for subsequent analysis and/or use. After that, all data will be erased. My supervisor, Dr. Linda Cameron and I will be the only two people with access to the raw data.

If you agree to allow your teacher to participate, please sign the attached consent form. If you have any questions, please contact me at 416-987-2706 or farveh.ghafouri@utoronto.ca, or my thesis supervisor, Dr. Linda Cameron, at 416 978-0321. Further, the Ethics Review Office of the University of Toronto may be contacted at ethics.review@utoronto.ca or 416-946-3273 for questions regarding the rights of participants.

Thank you very much for your consideration,

Farveh Ghafouri

PhD candidate

Ontario Institute for Studies in Education

University of Toronto

416-987-2706

farveh.ghafouri@utoronto.ca
Appendix B: Consent Form for Principal

ONTARIO INSTITUTE FOR STUDIES IN EDUCATION OF
THE UNIVERSITY OF TORONTO

Consent Form

Attention Farveh Ghafouri, Ph.D. Candidate, OISE/UT:

I have read your letter describing the thesis research you intend to undertake in my school. I understand that additional permission to collect data will be obtained from teachers and families, and that assent will be requested from the children. I give Farveh Ghafouri, Ph.D. Candidate from OISE/UT, permission to use the following methods to collect research data (please check the following):

_____ Participatory observation and note-taking within the regular hours of the kindergarten classroom.

_____ Audio-recording during the regular hours of the kindergarten classroom.

_____ Digital photography during the regular hours of the kindergarten classroom.

_____ Videotaping during the regular hours of the kindergarten classroom.

_____ Collection of photocopies of artifacts (e.g., children’s drawing, sketching, writing samples).

_____ Audio-recording during two interviews with the classroom teacher, at convenient times (approximately 30 minutes each).

_____ Collection of data from parents/guardians using a 15-minute questionnaire.
I understand that:

- This research project is part of your doctoral thesis at OISE/UT.
- The research focus is designed to observe and analyze a kindergarten classroom, considering how children’s engagement with the natural world may influence their learning experiences.
- The time required for this research project is from February 2010 to May 2010.
- Participation in the study is voluntary and participants can withdraw at any time.
- At the end of the study, all data will be transferred into a password protected hard disk drive and will be kept locked in a file cabinet for 2 years. After that, all data will be erased.

____________________________
School Name

____________________________
Principal’s Name (Please print)

____________________________  _______________
Principal’s Signature  Date

Please keep one copy of this form for your own reference, and return the second copy in the enclosed envelope. I thank you for your support.
Appendix C: Information Letter and Consent Forms for Teacher

Dear __________:

I am writing to invite you and your classroom to participate in an upcoming research project. As you are aware, I am a PhD student in the Department of Curriculum, Teaching and Learning at the Ontario Institute for Studies in Education of the University of Toronto. I am also a teacher educator as well as a former kindergarten teacher. I am conducting a research study on *children’s engagement with the natural world and its impact on their learning experiences*. The proposed study will be supervised by Dr. Linda Cameron and has been judged to meet the institutional ethical standards at the University of Toronto. Having already received permission from the University of Toronto, the External Research Review Committee of the TDSB, and your principal, I now seek your formal permission and consent to conduct this research in your classroom and to work collaboratively with you as my partner in this research.

The purpose of this study is to observe and analyze children’s engagement with the natural world in an urban kindergarten classroom and will consider the role and value of direct connection with nature in childhood and the many complex ways that children may experience nature. This work will contribute to our on-going discussion and professional reflection on when, what, and how time with the natural world may contribute to children’s learning. Research conducted in your classroom could help to better understand the effective ways to integrate nature experiences into early childhood education on a daily basis. Particularly, this project would be well supported by your commitment to the emergent curriculum, the extended periods of child-initiated time that you offer to your students, and the emphasis on nature experiences in your kindergarten program.

As a teacher participant in this research, your input, insight and inquiry are most welcome as the study is planned and proceeds. Your knowledge of the children, the quality of the teaching and learning environment you provide at __________, and your experience in the matters of nature-based learning during the early years of schooling is valuable in informing the research process. This includes, but is not limited to, consulting with you as to the most appropriate times and ways in which to collect data, so as to be the least disruptive to classroom routine; how best to consult and communicate with you and other helpers/adults in the classroom so as to positively contribute to the classroom learning community; and ‘checking in’ with you for your insights/feedback regarding the trends and patterns of your instruction and your interactions with students which are being recorded and analyzed within the
study data. With your input and consultation, I hope to conduct this study over the Winter/Spring term of 2010 and suggest that participation in this research would involve the following:

- A 15-minute questionnaire for parents/guardians regarding their family’s experiences with the natural world, which will be kept confidential.
- With parents/guardians’ consent and your support and input, the children will also be informed of the project in age-appropriate ways, and periodically invited to offer questions, perspectives and input.
- Two classroom visits per week for two and a half hours each time over a period of 3 months which will take place between February 2010 and May 2010. Overall classroom environment will be observed, with observations focusing on the emergent, first-hand, and self-initiated experiences of children with the natural world, inside their classroom at different learning centers, as well as, at outdoor time in the playground, during the neighborhood walk, or in the field trips. Your pedagogical strategies to respond to and facilitate children’s experiences will also be observed and recorded. I will collect data through the use of documentation – note-taking, audio-recording, digital photography, videotaping, as well as collection of copies of children’s artifacts.
- Two interviews with you. Each interview will be approximately 30 minutes in length, regarding your classroom teaching philosophy and approaches; as well, I will invite your response to my analysis of the observational data; you will have the opportunity to make amendments or deletions to transcribed interview text. Each interview will take place after school, or at a time that is most convenient for you and will be digitally recorded and transcribed.

Upon completion of the data collection, a summary report will be offered to families and you. All data will be stored in a locked file cabinet. At the end of the study, all data will be transferred into a password protected hard disk drive and will be kept locked in a file cabinet for 2 years for subsequent analysis and/or use. After that, all data will be erased. My supervisor, Dr. Linda Cameron and I will be the only two people with access to the raw data.

Participation in this research project is voluntary. There will be no negative consequences attached to either declining to participate or withdrawing from participation in the study at any time. In addition to being used as thesis research, the results of the data may be used in future presentations and publications in education. I will seek your consent before using your data in academic publications other than my doctoral thesis. In order to protect confidentiality, names of the school, teachers, and children will not be listed in any part of the report.

If you agree to participate, please sign the attached consent form. If you have any questions, please contact me at 416-987-2706 or farveh.ghafouri@utoronto.ca, or my thesis supervisor, Dr. Linda Cameron, at 416-978-0321. Further, the Ethics Review Office of the University of Toronto may be contacted at ethics.review@utoronto.ca or 416-946-3273 for questions regarding the rights of participants.

Thank you very much for your consideration,

Farveh Ghafouri

PhD candidate
Title of Research: Understanding the Process of Children’s Engagement with Nature and the Possible Learning Experiences in an Urban Kindergarten Classroom

Name of Researcher: Farveh Ghafouri

Institutional Affiliation: Ontario Institute for Studies in Education of the University of Toronto

I have read your letter, describing the thesis research you intend to undertake in my classroom. I agree to participate in the research project. (Please check the following:)

_____ Participatory observation and note-taking within the regular hours of the kindergarten classroom.

_____ Audio-recording during the regular hours of the kindergarten classroom.

_____ Digital photography during the regular hours of the kindergarten classroom.

_____ Videotaping during the regular hours of the kindergarten classroom.

_____ Collection of photocopies of artifacts (e.g., children’s drawing, sketching, writing samples).
Audio-recording during two interviews at your convenient times (approximately 30 minutes each).

Collection of data from parents/guardians using a 15-minute questionnaire.

I understand that:

- This research project is part of your doctoral thesis at OISE/UT.
- The research focus is designed to observe and analyze a kindergarten classroom, considering how children’s engagement with the natural world may influence their learning experiences.
- The time required for this research project is from February 2010 to May 2010.
- Participation in the study is voluntary and participants can withdraw at any time.
- At the end of the study, all data will be transferred into a password protected hard disk drive and will be kept locked in a file cabinet for 2 years. After that, all data will be erased.

Name (please print):______________________________

Signature:______________________________________ Date:____________________________

**Consent Form for Publication**

I, (print name) ______________________________ agree to allow photographic and/or digital video images of me and my classroom to be used for the purposes of academic publication. These publications may include printed or electronic publications, as well as academic conference presentation.
I have seen and reviewed the materials to be published and/or presented. I have discussed this consent form with Farveh Ghafouri and Dr. Linda Cameron, who are authors of this publication.

My name will not be published, and as far as possible all identifying features will be removed.

________________________________________
Date

________________________________________
Signature

________________________________________
Address

________________________________________
City, Province, Postal Code

*Please keep one copy of this form for your own reference, and return the second copy in the enclosed envelope.*
Appendix D: Semi-Structured Interview Guide for Teacher

A) Background Information

1) Tell me about:
   - Your teaching background and your philosophy of education
   - Your image/definition of the child
   - Your definition of your role as a classroom teacher

B) Classroom Context

1) Which values do you wish the environment of your classroom to communicate to children, families, and community? I mean environment in its broad definition: physical, social, psychological environment, and so on?

2) How have these values influenced your classroom organization, for example, arrangement of space and materials; structure and use of time; curriculum planning; interactions and relationships? Is there anything that you wish/plan to improve or change?

3) You know my research is about the connection between children’s engagement with nature and their learning experiences, in general what does ‘nature’ mean to you? How do you define nature in your specific school context?

4) How much do you think the elements of nature are present in your classroom environment and curriculum (e.g., sun light, water, wind, natural sensory materials), including your classroom’s outdoor experiences?

5) How important is it for children to have various experiences with nature? Is there anything that you are planning to improve/change in order to offer more opportunities to children to experience nature?

6) What do you anticipate as challenges?

C) Ontario Kindergarten Program

How do you assess/view the Ontario Kindergarten Program in terms of valuing/emphasizing children’s experiences in and with nature?
Appendix E: Follow-up Semi-structured Interview Guide for Teacher

1) Describe your overall feeling and thoughts on:

➢ The possible impacts of this 3-month study in your classroom: What have you learned from our work together?
➢ Your experience of being my agentive partner in this research project
➢ The focus of our research together and the possible impacts on the experiences of your classroom with nature, including possible changes in your classroom environment, teaching strategies, curriculum planning

2) What’s your plan from now on? What do you see as the implications of our research?

3) How do the findings from our work fit with the full day kindergarten model?
Appendix F: Parent/Guardian Information Letter

ONTARIO INSTITUTE FOR STUDIES IN EDUCATION OF THE UNIVERSITY OF TORONTO

January 2009

Dear Parent/Guardian:

I am writing as a doctoral student at the Ontario Institute for Studies in Education of the University of Toronto (OISE/UT) to invite you to participate in my research project. In this research, I will study the possible impacts of children’s engagement with nature on their learning experiences. This study is part of a doctoral thesis program in the Department of Curriculum, Teaching and Learning at OISE/UT. This study has been judged to meet the ethical standards of the University of Toronto. The External Research Review Committee of the TDSB has also granted approval for this study. As well, your school principal, (Principal’s name) and your son’s/daughter’s teacher, (Kindergarten teacher’s name) have given permission for this project to be done in your child’s classroom. I am writing for your approval of your child’s participation in this study. As well, I am inviting your participation in this research because as your child’s ‘first teacher’, your ideas and input are very important. I would greatly appreciate if you and your child could participate in this study over the Winter/Spring term of 2010.

The purpose of this study is to observe children’s exploration with nature. Research has shown that direct connection with nature has many benefits for children, such as emotional, social, and academic gain. I am interested in learning about children’s self-initiated experiences with the natural world during class time. This study is important in helping teachers to better understand how and when time with the natural world may contribute to children’s learning experiences in an urban kindergarten classroom.

I will also be requesting you to complete a 15-minute questionnaire regarding your family’s experiences with the natural world, which will be kept confidential. With your consent and teacher’s support and input, the children will also be informed of the project in age-appropriate ways, and periodically invited to offer questions, perspectives and input. I will observe the kindergarten classroom two times per week for two and half hours each time over a period of 3 months which will take place between February 2010 and May 2010. I will take notes, photos, and videos, as well as collect copies of children’s work samples. Overall my observation focuses on the emergent, first-hand, and self-initiated experiences of children and teachers with the natural world, inside their classroom at different learning
centers, as well as, at outdoor time in the playground, during the neighborhood walk, and in the field trips. During these weeks of observation, the documentation will be available to the classroom teacher for the purpose of curriculum planning. Upon completion of the data collection, a summary report will be offered to families.

Participation in this research project is voluntary. There will be no negative consequences attached to either declining to participate or withdrawing from participation in the study at any time. Your family may withdraw from this project at any time and your data will be immediately withdrawn from the record. The results of the data may be used in future presentations and publications in education. I will seek your consent before using your data in any academic publications other than my doctoral thesis. In order to protect confidentiality, names of the school, teachers, families, and children will not be listed in any part of the thesis report. All data will be stored in a locked file cabinet and at the end of the study, will be transferred into a password protected hard disk drive and will be kept locked in a file cabinet for 2 years. After that, all data will be erased. My supervisor, Dr. Linda Cameron, and I will be the only two people with access to the raw data.

If you agree to have your son/daughter participate in this study, please complete the consent form and return it to your child’s classroom teacher. Your cooperation will be very much appreciated. If you have any questions, please contact me at 416-987-2706 or farveh.ghafouri@utoronto.ca, or my thesis supervisor, Dr. Linda Cameron of OISE/UT at 416 978-0321. Further, the Ethics Review Office of the University of Toronto may be contacted at ethics.review@utoronto.ca or 416-946-3273 for questions regarding the rights of participants.

Sincerely,

Farveh Ghafouri
PhD candidate
Ontario Institute for Studies in Education
University of Toronto
416-987-2706
farveh.ghafouri@utoronto.ca
Appendix G: Consent Form for Parent/Guardian

ONTARIO INSTITUTE FOR STUDIES IN EDUCATION OF
THE UNIVERSITY OF TORONTO

I have read your letter, describing the thesis research you intend to do in my child’s school. I agree to allow my child, _____________________, to participate in the research project.

(Child’s name)

Please check the following:

____ Participatory observation and note-taking within the regular hours of the kindergarten classroom.

____ Audio-recording during the regular hours of the kindergarten classroom.

____ Digital photography within the regular hours of the kindergarten classroom.

____ Videotaping within the regular hours of the kindergarten classroom.

____ Collection of photocopies of work samples (e.g., children’s drawing, sketching, writing samples)

I, _____________________, also agree to complete a 15-minute questionnaire regarding my family’s experiences.
(Your name)
with the natural world.

I understand that:

- This research project is part of your doctoral thesis at OISE/UT.
- The research focus is designed to observe and analyze a kindergarten classroom, considering how children’s engagement with the natural world may influence their learning experiences.
- The time required for this research project is from February 2010 to May 2010.
- Participation in the study is voluntary and participants can withdraw at any time.
- At the end of the study, all data will be transferred into a password protected hard disk drive and will be kept locked in a file cabinet for 2 years. After that, all data will be erased.

____________________________
School Name

____________________________
Name (please print)

____________________________  ________________
Signature                  Date
Consent Form for Publication

I, (print name) _______________________________, parent/guardian of (child’s name) ______________________________, agree to allow photographic and/or digital video images of my child to be used for the purposes of academic publication. These publications may include printed or electronic publications, as well as academic conference presentation.

I have seen and reviewed the material to be published and/or presented. I have discussed this consent form with Farveh Ghafouri and Dr. Linda Cameron, who are authors of this publication.

My child’s name will not be published, and as far as possible all identifying features will be removed.

________________________________________________________________________

Date

________________________________________________________________________

Signature of Parent/Guardian

________________________________________________________________________

Address

________________________________________________________________________

City, Province, Postal Code

Please keep one copy of this form for your own reference, and return the second copy in the enclosed envelope.
The questions below are about your family’s experiences with the natural world. All information you provide will remain confidential. For each question please check or fill in your answer.

**Part 1: Questions about yourself and your household:**

1) Your name: ___________________________________________________

2) Your child’s name: ___________________________________________

3) Your relationship to child:
   _____ Mother/stepmother
   _____ Father/stepfather
   _____ Other ________________________________

**Part 2: Questions about you and your child’s activities during weekdays and weekends**
1) On the regular school days, what time does your child wake up in the morning?
   ___ 7:00-8:30 a.m.  ___ 8:30-9:30 a.m.  ___ 9:30-10:30 a.m.  ___ after 10:30 a.m.

2) What does your child do in a typical day before going to school or after coming back home?
   Check as many as apply.
   _____ Help with home chores
   _____ Read (books, magazines, online materials, and so on)
   _____ Do school work
   _____ Play with siblings or friends at home
   _____ Play with toys at home
   _____ Play at the computer
   _____ Play video games
   _____ Watch TV/Video/DVD
   _____ Visit friends or relatives
   _____ Play in the home yard
   _____ Play in a park
   _____ Do shopping (grocery and so on) with you
   _____ Go to a physical activity class, such as sports, dance, martial arts, yoga, etc
   _____ Others (explain) ____________________________________________________________

3) What does your child do on a typical weekend? Check as many as apply. Please write in front of each item the amount of time your child may spend on each activity.
   _____ Help with home chores ____________________
___ Read (books, magazines, on-line materials, and so on) ___________________

___ Do school work ___________________

___ Play with siblings or friends at home ___________________

___ Play with toys at home ___________________

___ Play at the computer ___________________

___ Play video games ___________________

___ Watch TV/Video/DVD ___________________

___ Visit friends or relatives ___________________

___ Play in the home yard ___________________

___ Play in a park ___________________

___ Do shopping (grocery and so on) with you ___________________

___ Go to an organized physical activity class, such as sports, dance, martial arts, yoga, etc

_________________

___ Others (explain) ________________________________

4) How much does your child like to spend time outdoor (home yard, park, field trips)?
   ____ Very much       ____ somewhat       ____ not at all

5) What are some of your child’s favorite activities outdoor? Check as many as apply.
   ____ Play in the park

   ____ Walk around and watch trees, flowers, and so on

   ____ Collect rocks, leaves, flowers, and so on

   ____ Chase animals
6) How much time do you spend to read (books, magazines, on-line materials) to your child about nature (animals, plants, water, soil, wind, sky, seasons, and so on) on a typical day?

____ None
____ less than 30 minutes
____ 30 minutes to 1 hour
____ 1 hour to 1½ hours
____ 1½ hours to 2 hours
____ more than 2 hours

7) How much time does your child spend to read (books, magazines, on-line materials) about nature (animals, plants, water, soil, wind, sky, seasons, and so on) on a typical day?

____ None
8) How much does your child watch movies, cartoons, documentaries about nature (animals, plants, water, soil, wind, sky, seasons, and so on) on a typical day?

___ None
___ less than 30 minutes
___ 30 minutes to 1 hour
___ 1 hour to 1½ hours
___ 1½ hours to 2 hours
___ more than 2 hours

9) Overall, how much time does your child spend outdoors on a typical school day?

___ None
___ less than 30 minutes
___ 30 minutes to 1 hour
___ 1 hour to 1½ hours
___ 1½ hours to 2 hours
___ more than 2 hours
10) Overall, how much time does your child spend outdoors on weekends?

___ None

___ less than 30 minutes

___ 30 minutes to 1 hour

___ 1 hour to 1½ hours

___ 1½ hours to 2 hours

___ more than 2 hours

11) Do you like to spend time outdoors?

___ Very much

___ somewhat

___ not at all

12) What are your favorite activities outdoor? Check as many as apply.

___ Walk around and watch trees and so on

___ Play with my child(ren)

___ Play sports

___ Bike

___ Play games (for example, hide and seek)

___ Collect rocks, leaves, flowers and so on

___ Sit and relax

___ Read books

___ Do gardening
13) During last year, how many times did you visit any of these places with your child(ren)? Please write in front of each item.

Farm ________

Local Garden ________

Zoo ________

Conservatory

Nature center ________

Museum of natural history ________

Others (explain) ________________________________________________

Thank you for your time. Please seal and return your questionnaire in the provided envelop to me or Ms. _____ after completion.
Appendix I: Child Assent Script

ONTARIO INSTITUTE FOR STUDIES IN EDUCATION OF THE UNIVERSITY OF TORONTO

(Note: Children are 4 and 5 years old)

I’m going to be in your classroom with you and your teacher to learn about your exploration of nature. For example, what you like to do at the science center, who you like to play with at the sand or water table, what really interests you outside in the playground or during a walk with your class. I am interested in your questions, drawings, writings, reading, play, or investigation. I hope I can join in your nature exploration.

To remember what happens, I’ll be writing in a notebook, and would also like to videotape and take photos during your class-times. Sometimes, I will talk with you about what I’m noticing in your play or work and check with you about what you think is important. We can watch the videotapes and look at the photos to think and talk about what your plans, stories, questions, and ideas are, and what you remember. I think it will be fun to “research” your experiences in nature together. Is this okay with you?