International Journal of Early Childhood Environmental Education

Addressing Policy, Practice, and Research That Matters

ISSN 2331-0464 (online) | Volume 3, Number 1 | Winter 2015

naaee

North American Association
for Environmental Education

International Journal of Early Childhood Environmental Education

Addressing Issues, Policies, Practices, and Research That Matter
ISSN 2331-0464 (online)

International Journal of Early Childhood Environmental Education

ISSN 2331-0464 (online)
Volume 3, Number 1
Winter 2015

TABLE OF CONTENTS

International Journal of Early Childhood Environmental Education, 3(1)

ISSN: 2331-0464 (online)

naaee
North American Association for Environmental Education

NOTE OF REFLECTION

The Essence of Our Collective Work

Ruth Wilson
Consulting Editor

"Telos" may not be a word commonly used in daily conversations, but the idea behind it is something I think about almost every day. Telos – sometimes described as the essence of things – is what I had on my mind as a mule deer and I made eye contact during a hike in the Sandia Mountains yesterday. The deer seemed to be sizing me up – Who was I? Was I a threat? What was I doing in its territory? I, too, was asking questions – How does this deer survive in the desert? Where does it find water? Is it afraid of me? I was trying to get a better understanding of the deer, a glimpse into its telos. Perhaps it was trying to do the same of me. Today, I think about telos in relation to early childhood environmental education (ECEE). Who are we? What is our purpose?

I've been involved in ECEE for almost 25 years and sometimes still ask, "What's it all about?" That's where "telos" comes into the picture. Aristotle believed that everything has a purpose or final end. He called this its "telos" and said that if we want to understand what something is, it must be described or understood in terms of its end or purpose. I now ask, what is the telos of early childhood environmental education? Is it the wellbeing of children or the wellbeing of the natural world? It can be both, of course, but is that its telos?

As I see it, ECEE is more than the integration or intersection of early childhood education and environmental education. I'm not sure what that "more" is, but I think it's something that merits consideration.

My work in ECEE started in the early 1990's while teaching at Bowling Green State University in Ohio. I taught courses in early childhood special education. My focus was on enhancing the learning experiences and lives of young children with special needs. I felt positive interactions with nature were critical to the holistic development of children, yet I saw little opportunities for such interactions in early childhood education programs. I set out to change this.

My goal was to inspire and support teachers in connecting children with nature. I based my work on the understanding that nature-related experiences could foster a sense of wonder, and that wonder was a foundation for learning. I also believed that nature and the wonder it engendered were, as Rachel Carson said, "an unfailing antidote against the boredom and disenchantments of later years, the sterile preoccupation with things that are artificial, the alienation from the sources of our strength."

I looked to the Environmental Studies program at the university and the Ohio Environmental Education Fund for support in integrating early childhood education and environmental education. My ideas were met with some skepticism. The director of the Environmental Studies program asked about the content of what we would be teaching young children – "What can you teach little kids – the sources of energy?" And a reviewer of grants for the Ohio Environmental Education Fund commented, "I'm not sure we should be funding preschool projects. Isn't preschool just babysitting?" In spite of the skepticism, the project I proposed was funded.

Many of the early childhood teachers I worked with welcomed the idea of incorporating nature into their programs; others were more hesitant. Some teachers expressed concern about not knowing enough about nature themselves to teach it to children; others felt their curriculum was already full, with room for nothing else.

Funding for my project included the purchase and review of related print and non-print materials – curriculum guides, activity books, videos, etc. I found that there were very few such resources available. There was also a scarcity of other types of resources such as guidelines, professional networks, and related research. At the time, even the North American Association for Environmental Education (NAAEE) had no publications and offered few, if any, conference sessions or seminars focusing on young children. For those of us interested in ECEE, it was a lonely world. At one point, I did discover a network of early childhood educators in Australia focusing on environmental education for the very young. My contacts with them proved to be inspiring and helpful.

My focus, at first, was on working with teachers in early childhood education settings. I was soon contacted, however, by educators in nonformal settings (nature centers, zoos, and children's museums). Some of them were already working with preschoolers but were struggling with how to meet the needs of young children.

So what we had until recently was early childhood education without the environmental component and environmental education without the knowledge and skills needed for working with young children. I saw that integrating the two fields would offer advantages to both, so that became my focus.

I'm excited and pleased with the many developments in ECEE that have occurred over the past 20 – 25 years. There's no doubt that we've come a long way, and this is cause for celebration. Yet, I sometimes sense that there is more to come – that the "next big thing" may be right around the corner if we can keep the momentum going. We have guidelines, resources, model programs, and networks. We even have some impressive research supporting the positive impact of our work. But are we clear about the potential, the ultimate purpose, the telos?

We currently have two fields working together in a type of partnership, which includes a healthy sharing of information, ideas, and resources. One image that comes to mind is the holding of hands – suggesting a "we're in this together" approach. We also have the image of hands holding the Earth. This image suggests to me that the Earth – with all its beauty and wonder – is the focus of our efforts. This is a beautiful image, but I wonder, does the purpose of ECEE go beyond sustainability of the planet? Many of us have strong feelings about education for sustainability; but we also believe in education for peace and justice and respect for the rights of children. Is there a way to make these concerns a part of who we are?

A Code of Ethics developed by Early Childhood Australia (ECA) calls on early childhood educators to "work with children to help them understand that they are global citizens with shared responsibilities to the environment and humanity." This statement, I believe, can provide some guidance on how to expand our thinking about who we are and who we might become, especially in its emphasis on both the environment and humanity.

We often base our work in ECEE on the understanding that what we do is good for children and good for the Earth. The NAAEE *Early Childhood Environmental Education Programs: Guidelines for Excellence* reflects this dual focus, and related research supports our endeavors. Is it now time to ask where we go from here? Of course, we want more research on the effectiveness of what we do, more resources on how to best implement the guidelines we have in place, and more dissemination of information both within and without the field of education.

Perhaps we should consider going beyond what we sometimes accept as descriptions of environmental education (EE) and early childhood education (ECE)? EE, we sometimes say, is "education in, for, and about the environment." Today, we also use the term "education for sustainability" to emphasize the importance of building a sustainable society – that is, a society that meets the needs of the present without jeopardizing the ability of future generations to meet their needs.

Early childhood education – the other part of ECEE – is often described as education that promotes the holistic development of young children. Here, the focus is on the child and what the child needs now and in the future to achieve his or her potential. ECE is also about the development of identity. This includes individual identity, social identity, and cultural identity. Recently, we're recognizing the importance of promoting a positive ecological identity during the early years, as well.

It's not hard to see why EE and ECE needed to come together to meet the goals or purpose of each. We know that attitudes, habits, and dispositions formed during the early childhood years lay the foundation for the attitudes, habits, and dispositions we carry with us throughout life. The early childhood years, then, offer tremendous opportunities to foster the child's understanding and appreciation of the natural environment as the basis of a lifetime commitment to caring for the Earth. Tapping into the potential of these early years is perhaps our best chance of developing an environmentally-concerned citizenry that will have the knowledge and will to relate to the Earth in a sustainable way. For EE to be maximally effective, it needs to include the early childhood years and do so in developmentally appropriate ways.

But ECE also benefits from strong connections with EE. It's becoming increasingly clear that positive interactions with nature are essential to a young child's holistic development. Without close connections with nature, a child's cognitive, emotional, psychological, and spiritual development is at risk of being compromised. Resources of the EE community can be tremendously helpful to early childhood professionals in connecting young children with nature. Consider, for example, the contributions of such EE initiatives as nature play, natural playspaces, and nature preschools on early childhood education and the lives of many young children.

So now when asked what ECEE is all about, we can respond without hesitation that it's about working for an environmentally sustainable future and the wellbeing of young children. But is this the essence, the telos – or might there be more? Perhaps there is and perhaps it has to do with the making of beautiful people.

The idea of beautiful people emerged out of a professional forum focusing on the integration of peace, nature, and spirituality as a way to enhance or transform early childhood education. This forum – supported by the Biosophical Institute and hosted by the Schlitz Audubon Nature Center in Milwaukee – consisted primarily of professionals from both the early childhood and environmental education fields. We asked ourselves what we wanted as desired outcomes of our educational programs for young children. As a part of this discussion, we considered how we would like a child to finish the statement, "I am a person who . . ."

By the end of the day, we had a list of dispositions, attitudes, and inclinations we would like to see fostered in our programs. This list included empathy, respect, attention, quiet reflecting, appreciation of diversity, and the ability to adapt to different situations. These desired outcomes, we felt, would result in the making of beautiful people – that is people who live with a sense of wonder, sensitivity to beauty, respect and compassion for others, a deep appreciation of the natural world, and an interest in creating a more peaceful, just, and sustainable world.

Can the idea of making beautiful people help define the telos of ECEE? Doing so would expand the idea of what we do as being "good for children and good for the Earth" to include "good for society." And if we decide that our goal is the making of beautiful people, how do we go about doing this?

Should our emphasis be on empathy, compassion, wonder, or something else? What should we look to as the hub or heart of what we do? The Chicago Zoological Society is committed to fostering a "culture of empathy" and considers this as being critical to their conservation mission. Their goal is to be a vehicle for positive social change in a way that includes but extends beyond the realm of conservation. What about ECEE? Where should we set our sights? What do we want our telos to be?

As we stand and view the world around us, we sometimes ask "What's it all about? What keeps it going? Are there dimensions below the surface that we're only beginning to understand? Today, as we stand and view the emerging field of ECEE, we might use these same questions to set a course for the future. We might also consider how we would like to complete the sentence, "We're a network of people who . . ."

Giving serious consideration to these questions may help us define a telos for ECEE that is greater than the sum of its parts. Perhaps we'll discover alchemy at work moving us toward the shaping of a more beautiful future. We gave birth to ECEE; we can now nurture and support its growth to help it become all that it can be.

Ruth Wilson is Professor Emeritus at Bowling Green State University in Ohio and currently resides in Albuquerque, New Mexico. She may be contacted at wilson.rutha@gmail.com.

International Journal of Early Childhood Environmental Education, 3(1)

ISSN: 2331-0464 (online)

The green bean has to be longer than your thumb: An observational study of preschoolers' math and science experiences in a garden

Maureen Vandermaas-Peeler
Cara McClain
Elon University

Submitted April 27, 2015; accepted June 16, 2015

Acknowledgements

The authors would like to thank the participating preschool community, including the teachers, parents and children. Support for this project was provided by Elon University with a faculty research grant to the first author and undergraduate research funds to the second author. Permission to use photographs was granted by parents and the preschool.

Abstract

School gardening has become increasingly popular as a context for learning in which children construct new knowledge, learn cultural and societal values related to ecological awareness, and develop and practice authentic or real-world skills (Blair, 2009; Bowker & Tearle, 2007). The present research was a longitudinal case study of children's gardening experiences at a Reggio-inspired preschool in the United States. Eleven children and their teacher were observed over nine days in various activities such as preparing the garden beds, planting, and harvesting. Through sustained participation in a variety of gardening activities, preschoolers engaged in science-rich dialogue utilizing complex and abstract science process skills such as observing, predicting, evaluating, and comparing. Discussion of number-related concepts, spatial orientation, and size estimation and comparison was also recurrent during gardening activities. In addition, analyses of social interactions and dialogue related to gardening knowledge and ecological awareness indicated that working in the garden was an authentic context for enjoying, learning about, and valuing the natural world. The results of this study support the conclusion that with appropriate teacher guidance, a preschool garden affords myriad opportunities for young children to develop mathematical and scientific thinking, ecological awareness and positive affective responses to the natural world.

Keywords: school gardens, Reggio Emilia, preschool, early childhood, mathematics, science

The present research was a longitudinal case study of children's interactions with a teacher in a garden at a Reggio-inspired preschool in the United States. The research utilized a social constructivist theoretical framework in which children's cognitive and social development is fostered through participation in meaningful social and cultural practices (Rogoff, 2003; Peterson, 2009). Everyday experiences that build knowledge and skills are critical for young children's early scientific and mathematical learning, two areas that have been understudied in preschool settings but are critical for subsequent school achievement (Duncan et al., 2007; Linder, Powers-Costello, & Stegelin, 2011; Peterson, 2009). Reggio Emilia is a social constructivist early childhood approach with a holistic view of learning and development, in which children are viewed as active agents or "researchers" who construct their own knowledge and teachers serve as co-learners and guides who help to facilitate children's discovery and learning in indoor and outdoor environments (Hewitt, 2001). The garden was selected as the research context for this observational study because growing, harvesting and eating the produce are authentic, engaging and meaningful experiences that provide numerous opportunities to practice and develop mathematical and scientific skills and reasoning, as well as to build ecological awareness and an affinity and respect for the natural world.

Early math and science experiences within a social constructivist perspective

Young children's developing knowledge and skills are constructed through participation in dynamic and reciprocal cultural practices and traditions (Kumpulainen & Renshaw, 2007; Rogoff, 1990; Vygotsky, 1978). Research on mathematics, for instance, has highlighted the diverse pathways through which authentic problems are solved in social situations in various cultural contexts, including the extensive measurement practices of the Kpelle in Liberia, arithmetic expertise of street vendors in Brazil and purchasing knowledge of elementary school African American students in an urban neighborhood (Nasir, Hand & Taylor, 2008). Findings from cross-cultural studies confirm the premise that these culturally relevant, routine experiences across contexts "both shape and constitute our learning" (Nasir et al., 2008, p. 193).

Scholars have emphasized the importance of young children's early math and science learning in the course of everyday activities, but there is a dearth of research on how much, and under what conditions, children incorporate mathematical and scientific understandings into the course of daily activities (Tudge & Doucet, 2004). More research examining young children's use of math and science concepts in daily activities is needed, especially considering that mathematical knowledge at school entry has been found to be the strongest predictor of subsequent school achievement (Duncan et al., 2007).

In early childhood educational settings, a social constructive approach to teaching math and science includes a curriculum with a diversity of engaging, meaningful activities and an inquiry-based approach in which teachers ask children open-ended questions designed to facilitate problem-solving and reasoning (Gelman & Brenneman, 2004; Linder et al., 2011). Recent research suggests that children need repeated exposure and practice using relevant math and science language in the context of interconnected, meaningful activities (Gelman & Brenneman, 2004). According to Clements (2001), high quality preschool approaches should "invite children to experience mathematics as they play in, describe and think about their world" (p. 270). In his view, based on extensive research and practice, preschool teachers should plan activities that simultaneously involve cognitive, socio-emotional and physical development, and build on children's informal knowledge and experiences. A holistic approach acknowledges and extends preschoolers' high levels of motivation and self-directed learning.

The Reggio Emilia Early Childhood Approach

Reggio Emilia is an internationally recognized holistic early childhood education approach, founded by Loris Malaguzzi after WWII as part of a post-war reconstruction effort in the Italian city of Reggio Emilia (Edwards, Gandini, & Forman, 2012). Researchers have increasingly turned to Reggio Emilia as an exemplar of a high-quality social constructivist approach (e.g., Clements, 2001; Edwards et al., 2012; Edwards & Willis, 2000; Hewitt, 2001; Inan et al., 2010; Kim & Darling, 2009; Linder et al., 2011). In the United States and elsewhere in the world, the term "Reggio-inspired" has come to symbolize early childhood educational approaches that incorporate many of the central tenets but also adapt the pedagogies to their own unique cultural context.

Reggio-inspired pedagogies feature a child-centered approach in which children create meaning from daily life experiences through planning, coordination of ideas and abstraction (Gandini, 2012). The teacher's role is to facilitate learning through listening and knowing when to intervene. Through a process of documentation, teachers capture ongoing learning processes in photographs and detailed transcripts of the children's activities. Long-term projects based on children's enthusiasm are co-constructed between adults and children (e.g., Ghirotto & Mazzoni, 2013). Foundational principles of Reggio Emilia include the following: the idea of multiple intelligences (known as *hundred languages* in Reggio Emilia); the importance of design and aesthetics in the physical environment; collaborative relationships between children and adults in the community; and attention to all aspects of diversity (Edwards et al., 2012).

The Reggio Emilia approach encourages children to engage with math and science in the course of daily events inside and outdoors. By engaging in inquiry, or the processes of observing, questioning, predicting and evaluating, children construct knowledge and learn to coordinate evidence and theory, particularly when guided and encouraged by adults (Bourne, 2000; Inan, Trundle, & Kantor, 2010). In a qualitative study of natural sciences

education in a Reggio-inspired preschool, Inan et al. (2010) found that children's inquiry was a high priority for the teachers because they believed it was the basis for children's abilities to make sense of the world. Inquiry was fostered through a science-rich culture, and the use of science terms such as "theory," "hypothesis" and "prediction" were often observed in teachers' and preschoolers' language. Questioning, searching, and investigating were valued and utilized rather than having teachers deliver facts (Inan et al., 2010). Thus, the emphasis was on science *process* skills utilized in the course of everyday experiences.

Another central theme of Reggio-inspired preschools is that the natural environment is a third educator (Torquati & Ernst, 2013). Educational spaces are designed to be welcoming, aesthetically pleasing and supportive of multiple ways of learning. Reggio educators utilize a diversity of materials and experiences that afford different possibilities for actions on the environment (Edwards & Willis, 2000). While outdoors children can explore natural phenomena such as changing seasons, the habitat of animals, or growing food crops. Extant research supports the conclusion that outdoor environments can foster holistic and integrated learning, particularly when teachers believe in the benefits and provide educational opportunities and guidance (Ernst & Tournabene, 2012; Maynard & Waters, 2007). Reggio-inspired schools utilize outdoor spaces to increase children's awareness of the natural world as they participate in ongoing projects and play outside throughout the seasons. Gardens are a prominent feature, teaching children about topics such as taking care of land and growing food (Thornton & Brunton, 2009).

Gardens as a context for learning

School gardening has become increasingly popular as a context for learning in which children construct new knowledge, learn cultural and societal values related to ecological awareness, and develop and practice authentic or real-world skills (Blair, 2009; Bowker & Tearle, 2007). Extant research on school gardens has focused on food systems ecology and nutrition education, the benefits of positive experiences with the natural world and environmental stewardship, and learning outcomes related to math and science-education opportunities (Blair, 2009; Chawla, 2007; Miller, 2007). In an international project investigating children's experiences in school gardens, Bowker and Tearle (2007) found that children developed complex conceptual maps linking their gardening experiences and knowledge with ecological awareness. Children in all three countries also had strong positive affective responses to gardening. Miller (2007) found that when participating in garden activities, young children developed important skills in a breadth of domains, including personal growth and academic learning. Research by Skelley and Bradley (2007) showed that third-grade students who participated in gardening activities had positive attitudes towards science, and that teachers reported using gardens to instill positive environmental attitudes. Parmer et al. (2009) found that gardening was associated with positive influences on children's vegetable consumption and preferences, as well as increased fruit and vegetable knowledge.

In the United States, the number of school gardens has increased considerably in recent years (Lekies & Sheavly, 2007; Skelley & Bradley, 2007). However, the majority of research on school gardening has been conducted in elementary school settings, and less is known about preschoolers' interactions in this context (Blair, 2009; Miller, 2007). In addition, little is known about how children's interests in gardening develop over time (Lekies & Sheavly, 2007). Preschool is an ideal time for learning about the environment, given children's interest in the natural environment and their developmental readiness for observation and hands-on learning (Witt & Kemple, 2007). Through their experiences in the natural world, children not only learn to enjoy their time outdoors but also prepare to become environmental stewards (Chawla & Cushing, 2007).

PURPOSE AND DESIGN OF THE STUDY

The present research was a longitudinal case study of children's interactions with a teacher in a garden at a Reggio-inspired preschool in the United States. The study was grounded in a social constructive, Reggio-inspired pedagogical approach. An observational design enabled the researchers to study naturally occurring behaviors and discourse as children and their teacher worked in the garden throughout the school year. Social relationships and communication are cornerstones of the Reggio approach, and analyzing discourse provides one way for researchers to understand the role of social interaction for children's learning processes (Kim & Darling, 2009).

The primary research questions were as follows: (1) What math and science experiences are afforded to young children while participating in gardening activities throughout the year with their teacher? (2) Does working in the school garden provide opportunities for preschoolers to develop gardening knowledge and ecological awareness? and (3) What were children's affective responses to gardening?

Method. The present study utilized a single-site case study design, with purposeful sampling of a Reggio-inspired preschool in the Southeastern United States that incorporates children's work and play in a garden into the regular curriculum throughout the year (Creswell, 2007). Children and the teacher's interactions in the garden were filmed by the second author as part of a study on outdoor contexts of learning at the participating preschool. She was a familiar but unobtrusive observer and the children were accustomed to her presence and to being recorded since she was related to one of the teachers, visited the school often and filmed throughout the year for several days each week. Additional sources of data included interviews with the children and the teacher. The research received approval by the University Institutional Review Board and parent permission was obtained for all participating children. All teacher and student names reported here are pseudonyms, and permission to include the photos was obtained from teachers and parents.

The Preschool. The preschool has mixed-age grouping with a total of 12 3- and 4-year-old children who attend the school for two or three years. The school is part-time with students attending four days a week from 8:30 a.m. until 1:30 p.m. In addition to a Reggio-inspired pedagogical approach, the preschool adopts a unique approach to outdoor education, with a seamless indoor-outdoor environment in which children can move between spaces at will. The school's garden is connected to an extensive outdoor playground, and is maintained throughout the year by the children and teachers (see Figure 1).

Figure 1: Photo documentation in the preschool garden

Participants. The participants were 11 mixed-aged preschoolers (5 males, 6 females) ranging in age from 33 to 59 months at the beginning of the study. Six of the children were Caucasian, two were African-American, two were Asian, and one was Latino. Based on a demographic survey administered to parents, average reported family income was greater than the U.S. average. Although both of the teachers participated in the larger study, only one of them was the focus of this observational study. Sharon was a 43-year-old Caucasian woman who had been a teacher at the school for six years. She developed and implemented all activities related to the garden.

Data Collection. The video-recordings were made over nine days between September 2012 and April 2013. There were five observations in the fall and four in the spring totaling 444 minutes, ranging from 23 to 72 minutes per day (see Table 1). For most activities, small groups of children came in turns to work in the designated garden bed.

Table 1
Description of garden activities

Day	Total Duration (minutes)	Description of activities	Season
Day 1	23	Harvesting first green beans; snipping herbs	Early Fall
Day 2	29	Digging for potatoes	Early Fall
Day 3	68	Planting broccoli, brussel sprouts, greens	Early Fall
Day 4	56	Harvesting green beans	Mid Fall
Day 5	44	Weeding garden beds	Late Fall
Day 6	72	Planting potatoes	Early Spring
Day 7	23	Planting sugar snap peas	Early Spring
Day 8	60	Planting lettuce, strawberries	Mid Spring
Day 9	24	Drawing the garden	Late Spring
Total time	**444**		

As part of the normally scheduled activities, the teachers conducted interviews with all children in October, February and May. Three questions were added to these interviews for the purpose of this study including what the child liked to do, found hard to do, and did not like to do in the garden. Children's responses were audio-recorded and transcribed by the teachers as part of their normal documentation.

The participating teacher was interviewed in August and May using a semi-structured approach. She was asked about the role of outdoor environments and specifically about the garden as a context for preschoolers' development, and her role in supporting these experiences. The interviews were audio-recorded and transcribed verbatim.

Data coding and analysis. Recording of each day was continuous, and each video recording was transcribed verbatim. Coding was conducted by simultaneously watching the video recording and consulting the written transcript. Video-recordings were coded in entirety and independently for each coding scheme. Coding schemes were developed a priori based on extant research, and revised during subsequent coding sessions. Videos were watched multiple times, with careful scrutiny of the written transcripts and researchers' notes. Reliability was assessed in the development of each coding scheme and coders had to attain a minimum of 75% agreement on 20% of the sample. Using a constant comparative method, relevant comments from the teacher and children's interviews were also included in the analyses (Flick, 2006).

Math experiences. Developmentally appropriate mathematical concepts were selected from *Big Math for Little Kids*, a mathematics program for pre-kindergarten and kindergarten children developed by Ginsburg and colleagues based on their extensive research in early childhood settings (Greenes, Ginsburg & Balfanz, 2004). There were five primary categories of mathematical discourse observed in the present study, including *number concepts* (number word labels, counting), *number operations* (addition and subtraction, fractions), *shape*, *size estimation and comparison*, and *spatial orientation*. Definitions and examples of each code are presented in Table 2. In the development of the coding manual, codes that were ambiguous or not observed in the data were dropped. One utterance could be coded for multiple math concepts, as in the statement, "Those are the tall collards and then there is that spiral" which was coded for size estimation (tall) and shape identification (a spiral). Math concepts were coded separately for usage by the teacher and the children. Each category was coded at the

utterance level, and repeated comments were not double-coded unless the conversational partners changed (e.g., the teacher asked a different child the same question).

Table 2: *Math experiences*[1]

CONCEPTS	DEFINITION	EXAMPLES	FREQUENCY[2]
Number concepts: Number word labels 1-1 Correspondence Counting	Using a number word to refer to quantity of objects; Matching each member of a set to one number when counting; saying one number for each object	"I found 3 green beans." "12, there's one for each kid." "How many did we get? 1, 2, 3, 4, 5, 6 …"	Teacher: 134 Children: 77
Number Operations: Addition & Subtraction Fractions	Understanding properties of groups of objects; Putting together and taking apart operations; Understanding parts of a whole	"We'll plant 3 and 3 and 3 to make 9." "Break it in half, like bending it in two."	Teacher: 20 Children: 4
Shape	Recognizing shapes and their properties	"That's a heart-shaped leaf."	Teacher: 16 Children: 5
Size Estimation and/or Comparison	Comparing the size and/or length of objects	"Oh look at that huge sunflower, it's bigger than the one over there."	Teacher: 236 Children: 105
Spatial Orientation	Relative location and size of objects, often in relation to self and others	"Bend it so the seam is going up towards the sky."	Teacher: 336 Children: 38

[1] Based on Greenes et al. (2004).
[2] Total number of codes observed over nine activities for a total of 444 minutes in the garden.

Science experiences. This coding scheme was developed based on prior research on science education in early childhood settings with a focus on science process skills (French, 2004; Gelman & Brenneman, 2004; Gerde, et al., 2013; Inan et al., 2007). They included the following: observing and questioning, predicting and evaluating, comparing, and classifying. The observing and questioning code was applied only to children's comments but the remaining codes were applied to discourse by the children and the teacher. As with math concepts, each category was coded at the utterance level, and repeated comments were not double-coded unless the conversational partners changed (e.g., the teacher asked a different child the same question). Definitions and examples of each code are provided in Table 3.

Table 3
Science process skills

CONCEPTS	DEFINITION	EXAMPLES	FREQUENCY[1]
Observing & questioning	Noticing and wondering	"I see something on the ground." "What are those flowers called?"	Children: 148
Predicting & evaluating	Making a guess and using evidence to check	"It looks like there's been caterpillars on here 'cause there's little tiny holes on it." "Look at this picture, and tell me what you think is going to grow there?" "Why do you think so?"	Teacher: 69 Children Predicting: 68 Children Predicting & Evaluating: 22
Comparing	Pointing out similarities and differences between objects and events	"See that little tiny seed, it looks like the big seeds down at the creek." "This is thicker, like a broccoli stalk."	Teacher: 86 Children: 29
Classifying	Organizing information into categories or meaningful units	"So all these herbs we put in, oregano, thyme, parsley, and that might be a different kind of parsley."	Teacher: 14 Children: 3

[1] Total number of codes observed over nine activities for a total of 444 minutes in the garden.

Gardening knowledge and ecological awareness. The coding scheme was based partially on research by Bowker and Tearle (2007) and modified for the context of the present research. Communications between the teacher and children were coded in the following categories: strategies for gardening; identification of plants and animals; the life cycle of plants; growing plants for food; use of gardening tools; protecting animals in the garden; climate and weather; composting and recycling. Only one code was assigned to each conversation about a particular concept, but dialogue ranged from one utterance to multiple exchanges between the teacher and children on the topic. Examples of each code are depicted in Table 4.

Table 4
Communications related to gardening knowledge and ecological awareness[1]

CONCEPTS	EXAMPLES	FREQUENCY[2]
Strategies for gardening	Navigating the garden beds (e.g., stepping where there are no plants and reaching through the trellis to pick beans); Estimating number and width of holes for planting	358
Identifying plants & animals	"There's an onion." "I see a cricket in the bucket." "Those are brussel sprouts and collard greens."	Children Plant ID: 36 Children Animal ID: 16 Teacher Plant ID: 130 Teacher Animal ID: 10
Life cycle of plants	Growing plants from seed; Leaving small beans on the vine to grow; Pulling out dead plants	119
Plants as a food source	Harvesting green beans and eating them; Distinguishing edible and inedible flowers	45
Knowledge and use of tools	Using spades for planting and larger shovels for digging; Mounding the dirt around the plants with hands	62
Protection of animals	Avoiding caterpillars when snipping parsley; Putting worms back in the dirt; Leaving a bee alone	18
Climate and weather	Knowing sun and rain are important for plant growth	13
Composting and recycling	Using leaves for compost; Using collected rainwater in garden	19

[1] Although the teacher most often provided guidance and information related to gardening knowledge and ecological awareness, occasionally children communicated these concepts with each as well. This was most frequently observed with plant and animal identification, as noted here.
[2] Total number of codes observed over nine activities for a total of 444 minutes in the garden.

Affective responses. Multiple viewings of each video segment afforded the opportunity to assess the affective responses of the children. Positive and negative affective statements were noted, and the overall tone of each day was assessed based on the predominant mood of the majority of children. In addition, singing and playing were added to the coding scheme post-hoc. The frequency of these events was noted for each observation. In addition, children's interview comments reflected their affective responses to the garden and representative quotes were included in the analyses to illustrate themes (Creswell, 2007).

RESULTS

Math experiences. The frequencies of math-related talk by mathematical category and speaker (teacher or child) are portrayed in Table 2. Analyses are presented with transcript examples below.

Spatial orientation, size estimation and comparison, and shape identification. Spatial orientation was the most frequent mathematical concept observed in the teacher's discourse across all the observations, with a total of 336 instances across 9 observation days. Teacher guidance for spatial orientation often occurred in the context of planting, as she talked about covering stems, pushing the dirt in pathways, and getting the plants to stand up by

"carefully pushing the soil up around the stem of the plant to see if you can make it stand up tall," (see Figure 2). In the transcript example below, Sharon (the teacher) used extensive guidance for spatial orientation as she helped two children plant broccoli, brussel sprouts and lettuce.

Sharon: *So Brian, how about you do the hole right there? Anthony, you do the hole right here. See if you can spread them out enough. So the idea for planting is if you go straight down and kinda do like a corkscrew. Can I demonstrate once and then you guys can try it? I'll try it on this hole over here. So check it out Brian, if you go down, give it a little twist and then just take that dirt straight out, and put it on the soil.*

Anthony: *I can do that.*

Sharon: *That way you're going down and back out, instead of making a big wide hole you're making a straight-down hole. Wanna try it? How about right here Anthony so then we're on this sort of imaginary line we made? Can you come over here and dig?"*

In this example, children were reminded about their own position in the garden and the spacing of the plants in rows ("this sort of imaginary line we made"). Connections between their actions and the physical space were also established, with instructions on how to "dig down" with tools to make "big wide" or "straight down" holes, and make the plant "stand up" by moving the dirt with their hands. During each gardening activity, Sharon provided numerous opportunities for children to consider the position of their own bodies relative to the garden spaces. For instance, she guided children's navigational skills as they maneuvered through an arched trellis to pick green beans, telling one young girl:

> *"There's some on this side, Olivia. Remember sometimes you can go on the outside of the tunnel. I think it would be okay to step into the bed right here (pointing). See where there's nothing growing on that dirt? So if you want to step in there you can."*

Figure 2: Teacher guidance emphasized spatial orientation during planting

Children initiated talk related to spatial orientation 38 times. Although their references to spatial positioning were less frequent and less complex than the teacher's, their talk reflected basic understandings of location and space.

For example, one child told Sharon as they planted corn seeds, "It's deep in there. And it's trapped in a big hole." Repeated engagement in gardening experiences throughout the school year fostered opportunities for deeper understanding. In a late spring planting Sharon consulted with the children on where to plant lettuces and strawberries, and they helped her consider factors such as amount of sun, depth of planting and distance from each other: "We don't want them so close that if they're neighbors, they bump into each other." Some of the more sophisticated references to spatial orientation were observed on the last day, as the children drew the garden. Sharon brought stools, a drawing pad and pens to the garden and asked the children to sketch "the way the garden looks to you, right now." She provided extensive guidance that encouraged children to consider different perspectives and symbolic representations in their drawings, asking what they noticed and pointing out features of the plants (e.g., "look at the way that stem is curved"). On this day she told one young child, "You navigated that space very well!" as she found a spot to draw next to her friend. In the excerpt below, another child noted his position relative to the garden beds he was drawing, and used size estimation and spatial orientation in describing his view to the teacher:

> *"Now I'm drawing those, those big yellow flowers in the bed diagonal to that bed there with those, just that tiny group of those flowers."*

Size estimation was the next most frequent category of math talk, with 236 instances for the teacher and 105 initiated by children. The teacher and children referred often to the size of plants, the holes they were digging, and the tools they were using (e.g., big shovels versus small spades). Sharon often combined talk about size with spatial orientation in her guidance, as in the first example below where they were planting potatoes and in the second example when they were picking green beans. Each type of math code is identified in italics in parentheses, with *SO* signifying spatial orientation and *SE* size estimation.

> "And then put the potato down there, yeah, put it with the eyes facing up (*SO*). And then make a new, make that mound back again, so both of you guys put lots of dirt so it makes a nice big pile here (*SE*). "

> "In this space there are green beans, however you must climb into the bed to find them (*SO*). Some of them are too little, like … look at these little things Olivia (showing small beans on a plant hanging overhead). Find some nice big ones like those (*SE*). You just gotta go on a search, a hunt of sorts. Going in the green bean forest. … Keep going around this way you'll find a bunch (*SO*)."

As they picked green beans, the children referred to the "skinny beans" that still needed to grow and the "big ones" that were ripe for picking. They navigated the locations of the beans, the trellis and their bodies as they reached up, around and through in order to pick the beans. They also demonstrated understanding of size comparisons in their social interactions with each other. As they were harvesting green beans, one boy told his peer "Remember they have to be longer than a thumb" and held up his thumb to demonstrate (see Figure 3). Another girl reminded a younger child of this same rule, telling her "Rachel, you need to have one as long as your thumb," and showing her the long bean compared to her thumb. The teacher indicated that the older children were remembering this rule from a previous harvest. Although the children discussed the size and appearance of the physical features in the garden, they rarely named specific shapes. Four of the five references to specific shapes occurred while children were drawing the garden (e.g., "I'm making a big circle").

Figure 3: Two children demonstrate the rule that "the beans must be longer than your thumb" to be harvested

Number concepts and operations. The use of number concepts and operations was most prevalent during planting days. The most commonly observed number concept was use of number word labels, with 119 instances by the teacher and 56 by children. Children's use of number words often indicated their developing knowledge number sense. In the following example, the use of a number word implied that the child had counted as he snapped green beans, "I cut 3 pieces of green bean." Use of number words also conveyed implicit understandings of quantity. One child estimated the large harvest as "maybe 175" beans. Although he didn't count, he generated a high number as a guess.

The third day had the most frequent use of number words by the teacher (53), as she provided extensive scaffolding of children's planting (e.g., "use your two hands to push the dirt like a bulldozer" or "put it in the third row"). The example below demonstrates the integrated and connected nature of the math-related conversations. This transcript example includes number word labels (*NW*), counting (*C*), addition and subtraction (*A/S*), as well as predictions of the size and space needed for the plants as they grow (*SE* and *SO*).

Sharon: How can we figure out where nine plants could go in here? (*NW*; *SO*)

Anthony: Like six, five, four, three, two. How, I know (counting on his fingers) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10! (*C*)

Sharon: Nine altogether. Yeah, I noticed that they're in these little rows (referring to the plastic containers the seedlings are in). So it goes, one, two, three. So we could do one, two, three and the second row, one, two, three could go in here somewhere (showing them where plants could go in the garden bed). (*SE; C; NW; SO*)

Anthony: I'm I'm I'm counting my hand and see how much we could do! 1, 2, 3, 4, (counting on fingers) (*C*)

Sharon: Do you have enough fingers for it?

Anthony: 1, 2, 3, 4, 5, 6, 7, 8, 9 10. (*C*)

Sharon: So Brian what do you think? So three …

Anthony: (very excited) how 'bout we how 'bout we could dig a little … how 'bout we could dig a *big* hole to put them in? (*SE*)

Sharon: So if we put them all in one hole I'm worried that they would be too crowded because I think every plant can grow a big ol' head of broccoli if it has enough space. So does that make sense to have three and three and three? Would that give us nine? (*NW*; *SO; SE; A/S)*

Anthony: Oh man that's a lot!

As they planted the teacher noted "There's so much counting, so many numbers in gardening!"

Complex number operations like addition and subtraction and fractions were infrequent compared with talk about number concepts, possibly due to the difficulty of the concepts as well as the demand characteristics of the activities themselves. Math talk about fractions happened only on one occasion. After the green bean harvest, the children helped Sharon snap off the ends of the beans in preparation for cooking them for snack. She guided them to "snap it in half and drop them in the pan" and "snap in half, just go to the middle and snap." She and the children discussed the size of the beans and observed that they only needed to break the large beans in half; the tiny, skinny ones could go right in the pot.

***Science experiences*.** The frequencies of use and guidance of science process skills are portrayed in Table 3. Children initiated 148 comments and questions. The high frequency of codes indicated children's curiosity and interest in their surroundings. Observations are the first step in the scientific process and serve as a foundation for more advanced conceptual thinking such as predicting and evaluating (Gerde et al., 2013). As noted by French (2004), the "cycle of inquiry begins with questions" (p. 143).

By adopting an inquiry style of guidance, the teacher encouraged children to make predictions about the natural world based on their observations. Responding to their observations and questions with "I wonder," or "What's your theory?" provided the impetus for the children to take their initial observations a step further and make a guess about what was happening or what they saw. Sharon also initiated children's predictions by pointing out interesting developments in the garden. For example, one day she showed children the developing onion bulbs on the plants and asked, "What do you think is happening inside of there?" The children took turns guessing, as in Daniel's prediction, "The onion is so strong it just pushes all the way up" and Olivia's hypothesis, "I think that the onion is coming from here all the way down here" (pointing to the stem). While digging for potatoes, Sharon offered the children a strategy for discerning the difference between the small hard potatoes and rocks, facilitating the science process skills of observing, predicting and evaluating, and comparing. She showed them how to tap each object against their rake in order to detect the differences in the sounds each made. As they dug, they often asked her advice about whether they had found a potato or a rock. She replied with questions such as, "What do you think?" and "How could we tell?" before reminding them of the tapping strategy. Subsequently the children made predictions and tested them, and also compared the features of potatoes and rocks. This was challenging, as noted by Michael in his first interview in response to the question, "What's hard to do in the garden?" He replied, "Picking potatoes, because some look like potatoes and some are really just rocks." Through these experiences, the children demonstrated emerging conceptual understandings of the value of using evidence to solve problems and the value of comparing features of different objects in order to identify them.

Occasionally children developed hypotheses without prompting, especially as they gained experience in the garden. In an early spring observation when the children were planting potatoes, Anthony commented, "I hope the ants are much more cozy underground." Sharon agreed, "I haven't seen any ants on top of the ground since it's been cold." He hypothesized, "Maybe bugs don't like it when it's cold. Well, polar bears like it when it's really really cold!" The preschooler drew on his past experiences in the garden and realized that unlike in warmer conditions, the ants weren't on the surface and therefore he predicted they must be underground. He also contrasted this with the habitats of polar bears. This example illustrates the integration of science process skills and the sophistication of scientific thinking that can be achieved by preschoolers in authentic activities.

As noted above, comparing was a science process skill encouraged frequently by the teacher. Throughout the year she prompted children to observe the changes in the garden, such comparing the features and size of the plants as they grew. In Sharon's final interview, she commented on the children's observations of changes in the garden throughout the year.

> *"I think through the year, and I think this year in particular just because we were just a lot more intentional about going to the garden and looking and looking for changes, I think they – as a group – got*

so much better at that than kids have in previous years ... Just their noticing and interest in wanting to know how are the onions different today. Or how much bigger is the corn, where's that one I planted. So … the scientist and looking for changes was … a lot more acute... And while they were there, then they would notice bugs or dewdrops or the way the dirt looked different or something. I think it kind of awakened them, having the plants as the catalyst to look for something different. It sort of made them more aware of everything in there."

Sharon's reflections included the importance of intentional planning and the children's sustained engagement in the gardening activities. On the last observation day, a particularly high number of teacher-initiated comparisons were observed. Children came to the garden in pairs to draw the garden, "as it looks to you right now." Sharon walked through the garden beds and pointed out how certain plants had changed. She talked about the different vegetables and how they looked and tasted, comparing the flavors (e.g., the chive flowers are "very oniony" and "a little like garlic") and shapes (e.g., "this one looks sort of like a heart"). As they drew, she helped the children construct symbolic representations of what they were seeing, as illustrated in the transcript example below. Emma was an older child with more experience in the garden and Rachel was in her first year at the school.

Sharon: Did you draw the way the potatoes are looking today?
Emma: Potatoes. I'm gonna draw potatoes. I'm only gonna draw one potato.
Sharon: But can you see the actual potato that's stuck in the ground?
Emma: No.
Sharon: Yep, you just see that little green part. So you look at the leaf and figure out the way it's shaped and how you wanna draw it. How it looks on this day. What's next, Rachel?
Emma: I just did a big mountain.
Sharon: Yeah, cause they're each on their own little mountain (referring to the potato mounds).
Rachel: Right now leafs are on the mountain.
Sharon: I know, it's got leaves on mountains. See, it looks like a little seed the way it's got the stalk coming up and then the leaves are coming straight off of this? What's that part, Rachel? Hmm, yeah, it looks like a little straight line coming up and then the leaves go off of it.
Emma: One straight line coming up!

After Sharon urged another child to show "what was happening" in the garden as he drew, he told her, "But you can't show how fast they're growing!" She laughed and then wondered, "How could you try to show that?" The last day also yielded the majority of classifications, as Sharon compared features across groups of plants while the children made their drawings. Although children rarely initiated comments in this category, they participated in joint conversations with the teacher and her guidance provided opportunities for them to consider abstract concepts such as categorization into meaningful units.

***Gardening knowledge and ecological awareness*.** Frequencies of codes related to gardening knowledge and ecological awareness are presented in Table 4. The teacher frequently offered strategies for gardening that enabled children to navigate and position their bodies as they worked, with careful attention to the plants and the garden beds. The transcript example below illustrates the extensive guidance provided during complex and challenging gardening activities, and the integrated nature of the teacher's communications about the life cycle of plants, plant and animal identification, the use of tools, and strategies for gardening. Sharon introduced the activity to a small group of children who then began digging for potatoes until it began to rain steadily. They went inside but soon came back wearing raincoats. The children had decided to don protective gear and keep working (see Figure 4).

Sharon: Come under the bridge … through the tunnel of sunflowers. Let's see, this is where the corn has grown also but it just went in too early. We had that funny early spring. It's too early for us to harvest them. Alright, so these plants are actually potato plants and they're growing, I think, from the potatoes that we grew. So we planted potatoes, the plants grew up, they made more potatoes, and those potatoes have been there long enough to make more plants … We are just gonna start digging and see what we find. Kind of like a treasure hunt. So Sophie you can come on through,

and then you can just start digging anywhere in here (pointing in the bed). So whoever is ready can just put a shovel in there... it works pretty well if you push it down along the edge cause you know you don't want to end up chopping right through a potato. So Michelle if you go on the very edge and Olivia you can go there or at the end. Sophie you can go on the end. (*She then provided more detailed instruction on the available tools and the children began digging with shovels*.)

Sharon: Anything yet? And then what you do with your hands or with your shovel, sort of poke some dirt … Shovels are good for the edges but forks may be good for the middle.

Michelle: (pointing to something in the dirt) See?

Sharon: Did you find something?

Michelle: A worm.

Sharon: A worm, I did see that.

Figure 4: Digging for potatoes in the rain

As illustrated in Figure 5, children were encouraged to establish a physical connection with nature by digging in the dirt with their hands as they found potatoes or planted seeds. In the final interview Sharon remarked on the progress of two children who were initially uncomfortable putting their hands into the dirt and encountering bugs.

> *"I always called them the tool-lovers because they would always want a tool when they did stuff in the garden, and they got a lot – Daniel especially – got a lot more interested in just reaching in with his hand and just suddenly finding himself holding a potato and that was okay. Or moving something or moving the dirt with his hand or pushing it with his hand, which he wouldn't have done the previous year. So just having all that experience and realizing what to expect from the dirt, realizing the bugs are not really that fast, knowing that you can get cleaned up. So having that practice in that space. There was a time where I saw him at (name of a neighborhood elementary school); we were putting down a whole bunch of compost and new dirt in the Peace Garden, which is this huge space, and he was in there just with his two bare hands, just pushing the dirt, massing the compost into the dirt. And he did it for half an hour, that's a really different boy. That repeated exposure. And the same thing, I think, for Matthew for bugs. He used to just always flinch at any sign of anything flying that wasn't a bird. So just being able to say, like when the carpenter bees came out this year, just saying "It's a bee. It wants to eat wood. It doesn't want me. You're right. Exactly right." All those things. And just feeling safe being in that place, "I've had that experience, it's happening again, I'm okay."*

Through their work in the garden children gained opportunities to value many aspects of the natural world. As Sharon's interview quote illustrates, children were encouraged to appreciate the value of insects in the garden through their ongoing experiences (e.g., "there's a bumble bee on there and we're just kind of letting it do its thing"), and the value of re-using materials such as pouring collected rainwater onto the plants and creating and using compost for the garden. Sharon helped the children realize the fragile nature of young plants, for example as she handed a seedling to the child: "This stem, Brian, is so skinny that if it gets bent or pinched the whole plant might not survive. You have to be really careful with it. So let me put this in your hands… ready? And you're just gonna nestle it down into that little hole you made." The children also noticed when plants were dying and needed to be pulled out of the garden. These rich, personal experiences, guided by their teacher, facilitated children's understanding of the complex nature of the life cycle of plants and their own interactions in the natural world.

Figure 5: Using her hands to dig for potatoes

In her first interview, Sharon described her beliefs about the importance of spending time in nature and facing the challenges afforded by spending time outdoors, as well as her role in supporting nature experiences at the preschool.

> *"… being in nature just helps improve your mood and your general wellbeing and outlook. I think just being outside with trees and nature and sky and breezes and being able to be out in the world … to have it as a place to learn and to discover and watch how changes come and go, and notice when new things are happening on the playground or in the gardens … all of that is just such a rich place to learn and be exposed and … open children's minds and imaginations to the possibility of how things are not just one way."*

> *"I'm technically the garden teacher so helping them to plant and water and weed and harvest in the garden and to just use that place as an outdoor classroom. There's so much that happens there for them to see from growing their own food that they get to eat to what the animals and the insects are doing out there, so using that as kind of a window on the outdoors a whole…. so much can happen in just that little space …and then just offering all kinds of play experiences outside for them that we offer inside as well so just kind of facilitating the outdoors as a place to work and play."*

Affective experiences. Many of the transcript examples above illustrated children's excitement as they made discoveries and observations in the garden. Even when the weather presented challenges (e.g., in the pouring rain) the children chose to return to the garden rather than play inside. They seemed to take pride in their work and despite ongoing physical challenges (e.g., digging in hard soil) their demeanor was almost always positive and enthusiastic. There were 29 overt statements expressing positive affect (e.g., "I love green beans") and only 2 negative affective responses recorded during the observations (e.g., "I don't like spiders"). There were 31 instances of children singing and engaging in overtly playful behavior in the garden. For instance, on the day they harvested green beans, Michael began singing, "Hakuna metata, what a wonderful phrase!" and the children danced around the garden.

There were particularly high levels of excitement during the second green bean harvest in mid-fall; the vines were covered in beans, which the children enjoyed picking, and afterwards they helped Sharon prepare the beans for snack. In their interviews, children often cited this as their favorite part of the garden work. When asked, "What do you like to do in the garden?" in the fall interview, Olivia noted, "I like picking green beans and then washing them and eating them!" Michael concurred with his statement, "Pick snap peas. 'Cause sometimes I like to pop some in my mouth and then put 'em in the bucket, pop in my mouth, put in bucket." The children often ate the raw beans as they picked and commented on how delicious they were. They were surprised and delighted with the knowledge that some flowers could be eaten, and most of them tried the edible flowers and reported liking them (see Figure 6). In her final interview, when asked if there was anything in particular she wanted to emphasize in the garden work, Sharon noted that she wanted the children "…to grow an appreciation of the food that they're growing and to be able to try them and taste them. From an idea that if they grow their own food, they're more likely to eat it."

Figure 6: Enjoying the edible flowers

In her mid-year interview, Emma affirmed her enjoyment of gardening in response to the question, "What do you not like about being in the garden?" with the reply "I don't not like anything about being in the garden. I really like

the garden." Michael also gave an affirmative response to this question, " I just always like it" as did Daniel, "I like everything." However, in her third interview Olivia responded, "I don't like to be in the garden 'cause I don't like holding dirty, slimy slugs." When asked what was hard to do in the garden, children talked about digging and planting. Daniel expressed this sentiment in his third interview in May, "Like when you have to dig the hole to plant stuff, sometimes when there's hard soil it's hard." Maya summed it up, "Like digging. Like my hands get tired!" In the first interview Olivia commented, "Hard to do is find a green bean. They are hiding from me in the garden!" As these observations and quotes demonstrate, the garden provided a rich context for establishing physical, cognitive and socio-emotional connections to nature.

DISCUSSION

This was a case study of a Reggio-inspired preschool that incorporated children's work and play in a garden into the regular curriculum throughout the year. The results suggest that children were afforded a diversity of engaging math and science experiences over the course of a year of working in their preschool garden. Through sustained participation in a wide variety of gardening activities with a teacher, preschoolers engaged in science-rich dialogue utilizing complex and abstract science process skills such as observing, predicting and evaluating, and comparing. In accordance with a Reggio-inspired pedagogy, the teacher often employed an inquiry-based style of guidance characterized by questioning, hypothesizing and enthusiastically supporting children's interests. Researchers have suggested that children's scientific thinking and reasoning skills develop within real-world contexts as they participate in meaningful, goal-directed activities (Anderson & Gold, 2006; Gauvain, 1993; Lindner et al., 2011; Saxe & Posner, 1983), and the results of this study indicate that sustained participation in gardening activities with their teacher fostered numerous opportunities for preschool children's to practice these skills.

Participating in a diversity of gardening activities throughout the year also enabled children to encounter a variety of math concepts in relation to the work they were doing. Spatial orientation was the most prevalent category of math talk employed by the teacher, as she guided children's placement of the plants and their own bodies with respect to the physical features of the environment. The observations of teacher guidance for spatial orientation support prior research by Franzén (2014), who found that teachers emphasized young children's bodily learning in the context of mathematical activities. In this study, the teacher supported children's learning through frequent reminders about the connections between their bodies, their actions and the physical environment, fostering their awareness of space and spatial surroundings within a small but well-provisioned outdoor environment. Size estimation and comparison were also frequently mentioned concepts by both children and the teacher as they worked in the garden. These experiences and the teacher's guidance contribute to young children's developing awareness that size, position and direction are relative to one's own point of view (Greenes et al., 2004). During early childhood, children develop number sense or an awareness ranging from a basic understanding of the meaning of numbers to more complex and abstract number operations (Skwarchuk, 2008). Some basic elements of number sense include comparing number quantities and magnitudes, estimating and counting. In the garden, children often used number words as they communicated their work in progress. Comments such as "I found three!" indicated their developing sense of the use of numbers in real-world contexts. Children also counted spontaneously as they planted or harvested crops, occasionally using their fingers to reach higher numbers. The teacher offered contextual opportunities to develop complex understanding of numbers, such as asking children to problem-solve how many holes were needed for three rows of three plants or how to fit three plants to a row.
In accordance with a Reggio-inspired pedagogy, the teacher's approach was holistic and integrated, in that she provided support for the preschoolers' physical, cognitive and social development during the gardening activities. In the garden, learning was embedded in meaningful activities and the observed social interactions between children and the teacher conveyed a shared sense of purpose, excitement and curiosity. There were common goals and shared meaning in each activity, ranging from preparing the garden beds to planting and eventually harvesting and eating the vegetables.

Supporting prior research by Bowker and Tearle (2007), findings from the observations and interviews confirmed that children had a developing sense of "eco-literacy" or conceptual knowledge of gardening and heightened ecological awareness, and also that they overwhelmingly showed enthusiasm for gardening activities. The children exhibited joyful behavior such as singing and laughing, and rarely complained about the work. Even when the

tasks were physically challenging, such as digging for potatoes in the hard dirt, children embraced the challenge and celebrated their work. No overtly negative interactions were observed throughout the nine days and only a few negative comments by a child in response to a particular feature of the environment were recorded. For example, one child was dismayed to find an insect in her bucket while picking green beans, and the teacher elicited the help of a peer to move it to another spot in the garden. This response was indicative of the atmosphere of respect for the natural environment that was cultivated as children spent time outdoors. Throughout the year children were reminded to return worms to the dirt or leave the bees alone as they landed on flowers in the garden. Thus, the affective context on each observation day was positive, and an atmosphere of respect and dedication to the ongoing work was prevalent. The findings also corroborated those of Parmer et al. (2009), who conducted an experimental study with second-graders and found that a nutrition education and gardening program positively influenced children's vegetable consumption. Children in this study were particularly excited about opportunities to eat their harvest, often consuming the vegetables and herbs as they picked them and helping prepare them for snack. Humberstone and Stan (2012) emphasized the importance of authenticity for children's learning in outdoor environments in the context of participating in daily routines with adult guidance. Authentic nature experiences are believed to shape life-long values, attitudes and behavior patterns toward the natural environment, and foster environmental stewardship (Chawla, 2007; Sobel, 1995; Wilson, 1996). Preschool gardens offer children the opportunity to participate in the authentic experience of growing their own food, and to develop an appreciation and respect for the natural world.

The research design was an observational study of a small group of preschoolers and their teacher, and all of the interactions and discourse observed occurred naturally in the context of working in a school garden. Given the descriptive nature of this research, no causal explanations for the findings can be drawn. In addition, the preschool adopts a unique pedagogical approach in which children are free to move indoors and outdoors throughout each day, and the school's mission includes a strong emphasis on the importance of outdoor experiences for children's well-being and development. Thus, it cannot be considered a representative early childhood educational setting in the United States. Despite the limited generalizability, however, the results have implications for early childhood educators.

The findings suggest the potential of a richly provisioned garden as an environment in which learning can be fostered through a holistic and integrated approach. For preschool teachers with adequate resources, planning a garden in which children can work throughout the year affords diverse learning opportunities. Regardless of resources, all early childhood teachers can utilize guidance strategies supporting early math and science learning in the context of sustained, meaningful activities with a shared sense of purpose and enjoyment (Gelman & Brenneman, 2004; Ginsburg & Golbeck, 2004). Further research with diverse populations and a variety of engaging activities in everyday contexts of learning is needed, and particularly in outdoor environments which offer a multitude of opportunities for holistic and integrated learning. Within a social constructivist framework, preschool teachers should work to provide rich experiences that offer authentic opportunities for development of the whole child, or in the words of Reggio Emilia, the *hundred languages* (Edwards et al., 2012; Gerde et al, 2013). The results of this study support the conclusion that with appropriate teacher guidance, a preschool garden affords myriad opportunities for young children to develop mathematical and scientific thinking, ecological awareness and positive affective responses to the natural world.

References

Anderson, D.D. & Gold, E. (2006). Home to school: Numeracy practices and mathematical identities. *Mathematical Thinking and Learning, 8*, 261-286.

Blair, D. (2009). The child in the garden: An evaluative review of the benefits of school gardening. *The Journal of Environmental Education*, *40:2*, 15-38, DOI: 10.3200/JOEE.40.2.15-38

Bourne, B. (2000). *Taking inquiry outdoors. Reading, writing, and science beyond the classroom walls*. Portland, MA: Stenhouse Publishers.

Bowker, R. & Tearle, P. (2007). Gardening as a learning environment: A study of children's perceptions and understanding of school gardens as part of an international project. *Learning Environment Research*, *10*, 83 – 100, DOI 10.1007/s10984-007-9025-0

Chawla, L. (2007). Childhood experiences associated with care for the natural world: A theoretical framework for empirical results. *Children, Youth and Environments*, *17 (4)*, 144-170.

Chawla, L., & Cushing, D. F. (2007). Education for strategic environmental behavior. *Environmental Education Research, 13*(4), 437-452.

Clements, D. (2001). Mathematics in the preschool. *Teaching Children Mathematics*, *7(5)*, 270-275.

Creswell, J.W. (2007). *Qualitative inquiry and research design* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Duncan, G. J., Dowsett, C.J., Claessens, A., Magnuson, K., Huston, A.C., Klebanov, P., & Japel, C., (2007). School readiness and later achievement. *Developmental Psychology, 43*, 1428-1446.

Edwards, C., Gandini, L. & Forman, G. (2012). *The hundred languages of children: The Reggio-Emilia experience in transformation*, 3rd ed. Santa Barbara, CA: Praeger.

Edwards, C. & Willis, L.M. (2000). Integrating visual and verbal literacies in the early childhood classroom. *Early Childhood Education Journal, 27 (4)*, 259- 265.

Ernst, J. & Tornabene, L. (2012). Preservice early childhood educators' perceptions of outdoor settings as learning environments. *Environmental Education Research*, *18 (5)*, 643-664.

Flick, U. (2006). Constant comparative method. In V. Jupp (Ed.), *The Sage dictionary of social research methods* (37-38). London: Sage.

Franzén, K. (2014). Under-threes' mathematical learning – teachers' perspectives. *Early Years: An International Research Journal, 34:3*, 241-254, DOI: 10.1080/09575146.2014.898615

French, L. (2004). Science as the center of a coherent, integrated early childhood curriculum. *Early Childhood Research Quarterly*, *19*, 138-149.

Gandini, L. (2012). History, ideas and basic principles: An interview with Loris Malaguzzi. In C. Edwards, L. Gandini & G. Forman (Eds.), *The hundred languages of children: The Reggio-Emilia experience in transformation*, 3rd ed (pp. 27-71). Santa Barbara, CA: Praeger.

Gauvain, M. (1983). The development of spatial thinking in everyday activity. *Developmental Review*, *13*, 92-121.

Gelman, R. & Brenneman, K. (2004). Science learning pathways for young children. *Early Childhood Research Quarterly, 19*, 150-158.

Gerde, H. K., Schachter, R.E. & Wasik, B. A. (2013). Using the scientific method to guide learning: An integrated approach to childhood curriculum. *Early Childhood Education Journal*, *41*, 315-323, DOI 10.1007/s10643-013-0579-4

Ginsburg, H.P. & Golbeck, S.L. (2004). Thoughts on the future of research on mathematics and science learning and education. *Early Childhood Research Quarterly*, *19*, 190-200.

Ghirotto, L. & Mazzoni, V. (2013). Being part, being involved: The adult's role and child participation in an early childhood learning context. *International Journal of Early Years Education*, *21*, 300-308, DOI: 10.1080/09669760.2013.867166

Greenes, C., Ginsburg, H.P. & Balfanz, R. (2004). Big math for little kids. *Early Childhood Research Quarterly, 19*, 159-166.

Hewett, V.M. (2001). Examining the Reggio Emilia approach to early childhood education. *Early Childhood Education Journal*, *29 (2),* 95-100.

Humberstone, B. & Stan, I. (2012). Nature and well-being in outdoor learning: authenticity or performativity. *Journal of Adventure Education & Outdoor Learning*, *12*, 183-197, DOI: 10.1080/14729679.2012.699803

Inan, H. Z., Trundle, K. C., & Kantor, R. (2010). Understanding natural sciences education in a Reggio Emilia-inspired preschool. *Journal of Research in Science Teaching, 47*, 1186-1208. DOI: 10.1002/tea.20375

Kim, B.S. & Darling, L.F. (2009). Monet, Malaguzzi and the constructive conversations of preschoolers in a Reggio-inspired classroom. *Early Childhood Education Journal*, *37*, 137-145.

Kumpulainen, K. & Renshaw, P. (2007). Cultures of learning. *International Journal of Educational Research*, *46*, 109-115.

Lekies, K.S. & Sheavly, M. E. (2007). Fostering children's interests in gardening. *Applied Environmental Education and Communication*, *6*, 67-75.

Lindner, S.M., Powers-Costello, & Stegelin, D. A. (2011). Mathematics in early childhood: Research-based rational and practical strategies. *Early Childhood Education Journal*, *39*, 29-37.

Maynard, T. & Waters, J. (2007). Learning in the outdoor environment: A missed opportunity? *Early Years: An International Journal of Research and Development, 27:3*, 255-265, DOI: 10.1080/09575140701594400.

Miller, D. P. (2007). The seeds of learning: Young children develop important skills through their gardening activities at a midwestern early education program. *Applied Environmental Education & Communication, 6*, 49-66.

Nasir, N.S., Hand, V. & Taylor, E.V. (2008). Culture and mathematics in school: Boundaries between "cultural" and "domain" knowledge in the mathematics classroom and beyond. *Review of Research in Education, 32*, 187-240.

Ness, D. & Farenga, S. J. (2007). *Knowledge under construction. The importance of play in developing children's spatial and geometric thinking*. Lanham, MD: Rowman & Littlefield Publishers, Inc.

Newcomb, N.S., & Frick, A. (2010). Early education for spatial intelligence: Why, what and how. *Mind, Brain, and Education*, *4*, 102-111.

Parmer, S. M., Salisbury-Glennon, J., Shannon, D. and Struempler, B. (2009). School gardens: An experiential learning approach for a nutrition education program to increase fruit and vegetable knowledge, preference and consumption among second-grade students. *Journal of Nutrition Education and Behavior*, *41*, 212-217.

Peterson, S. M. (2009). Narrative and paradigmatic explanations in preschool science discourse. *Discourse Processes*, *46*, 369-399.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York, NY: Oxford University Press.

Rogoff, B. (2003). *The cultural nature of human development.* New York: Oxford University Press.

Saxe, G.B. & Posner, J. (1983). The development of numerical cognition: Cross-cultural perspectives. In H.P. Ginsburg (Ed.), *The development of mathematical thinking* (pp. 291-317). London: Academic Press.

Skelley, S.M. & Bradley, J.C. (2007). The growing phenomenon of school gardens: Measuring their variation and their affect on students' sense of responsibility and attitudes toward science and the environment. *Applied Environmental Education & Communication, 6:1*, 97-104.

Skwarchuk, S.L. (2008). Look who's counting! The 123s of children's mathematical development during the early school years. *Encyclopedia of Language and Literacy Development* (pp. 1-9). London, ON: Canadian Language and Literacy Research Network. http://www.literacyencyclopedia.ca/pdfs/topic.php?topId=243

Sobel, D. (1995). *Beyond ecophobia: Reclaiming the heart in nature education.* Great Barrington, Massachusetts: Orion.

Thornton, L. & Brunton, P. (2009). *Understanding the Reggio Approach: Early years education in practice*, 2nd ed. London and New York: Routledge.

Torquati, J. & Ernst, J.A. (2013). Beyond the walls: Conceptualizing natural environments as "third educators." *Journal of Early Childhood Teacher Education, 34 (2)*, 191-208.

Tudge, J. R. H. & Doucet, F. (2004). Everyday mathematical experiences: Observing young Black and White children's everyday activities. *Early Childhood Research Quarterly*, *19*, 21-39.

Vygotsky, L. S. (1978). *Mind in society. The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Wilson, R. A. (1996). Starting early: Environmental education during the early childhood years. *ERIC Clearinghouse for Science, Mathematics, and Environmental Education*, 1-4.

Witt, S. D. & Kimple, K. P. (2008). "How does your garden grow?" Teaching preschool children about the environment. *Early Child Development and Care*, *178*, 41-18.

Maureen Vandermaas-Peeler is a Professor of Psychology and Director of the Center for Research on Global Engagement at Elon University. She can be reached at vanderma@elon.edu.

Cara McClain is a graduate of Elon University and is current working with City Year in Boston, MA. She can be reached at cmcclain@elon.edu.

International Journal of Early Childhood Environmental Education, 3(1)

ISSN: 2331-0464 (online)

Betwixt the Wild, Unknown and the Safe: Play and the Affordances of Nature within an Early Childhood Education and Care Institution in Norway

Gjertrud Stordal
Queen Maud University College of Early Childhood Education, Norway

Gro Follo
Centre for Rural Research, Norway

Ingar Pareliussen
Queen Maud University College of Early Childhood Education, Norway

Submitted August 21, 2015; accepted October 2, 2015

Abstract

This article deals with the opportunities for children to experience nature within an Early Childhood Education and Care Institution in Norway, drawing on a case study of a day care institution that, among other things, focuses on nature and outdoor life. The results of the study show that the children and staff of the ECEC institution are creating outdoor practices that focus on physical activity, play and friendship among the children. Through play, the children explore and learn the affordances of nature. The staff plays an important role in facilitating the nature play of children, drawing on a view that nature is a sanctuary and an alternative to the hustle and the bustle to regular day care life. Simultaneously, the staff plays an important role in balancing the different concerns of the institution, like the question of security and safety while outdoor in nature, the available resources and personal situation and the cultural and pedagogical ideals of children's free and self-initiated play in nature. The article argues that attention has to be directed towards the opportunity of the staff to create and negotiate the institutional space that ensures the opportunities for children to experience nature on their own terms through play.

Key words: children, nature, play, ECEC institution, affordance

Children's use of nature and the time spent in natural environments in the Western world are changing (Fjørtoft & Reiten, 2003; Muños, 2009; Tordsson & Vale, 2013; Waller et al., 2010). Everyday life constraints and an increasing adult organization of children's lives are contributing to a reduction in the amount of time spent outdoors, in particular when it comes to unsupervised, self-initiated play in natural environments. This concern has attracted much attention among academics, professionals and laypeople, and a fear has been raised that a lack of experience with nature is contributing to a number of different problems concerning the future relationship between humans and nature. Efforts to reengage children with natural settings to increase their experiences in- and of nature have developed as a response to these changes, and childhood institutions and educators have been called upon to take action (Rosenow & Bailie, 2014).

This article focuses on children's experiences of and with nature in an early childhood education and care institution (ECEC institution) in Norway. Early childhood education and care institutions in Norway are a governmental responsibility, and are framed by the national, "Framework plan for the Content and Tasks of Kindergarten" (Norwegian Ministry of Education and Research, 2011). Among the purposes, values and tasks listed in the plan are the importance of outdoor play and the experiencing of nature. ECEC institutions shall help to ensure that children experience the joy of being in the natural world, develop a love of nature and as

well as gain a fundamental understanding of nature, conservation and interaction in the natural world. (Ibid, 2011)

Playing outside is an intrinsic value to the ECEC institution tradition in Norway (Korsvold, 2005), and today, hiking in a local natural environment is an integrated part of everyday life in many ECEC institutions. In general, there is a rising interest for nature pedagogies within Norwegian ECEC institutions. As the number of forest schools and outdoor nurseries expands (Lysklett, 2013) and increases, attention is directed towards the importance of outdoor, environmental pedagogies within the ECEC institutions. This development is welcomed by both professionals and laypeople, as for different reasons the opportunities for children's play in nature near home in everyday life seems to be diminishing and disappearing. However, the consequences of this institutionalization of children's play in nature are to a large degree unexplored, thereby still remaining to be fully understood (Tordsson & Vale, 2013). Much research has highlighted the positive values of play in natural environments to children, in addition to the many aspects of benefits embedded in this play (Gill 2014). In particular, research highlights that outdoor life has a positive effect on the motor development, coordination, balance and muscularity of children (Fjørtoft, 2000, 2004; Grahn et al., 1997; Vigsø & Nielsen, 2006), as well as increased mental health, concentration, imagination and creativity (Mårtensson, 2004; Vigsø & Nielsen, 2006). Even so, there is a lack of studies looking into the different ways children experience nature from the various perspectives of social background, gender, ethnicity, physical ability and so on, though with a few exceptions of studies looking into the importance of gender (Ärlemalm-Hagsér, 2008; Änggård, 2011).

There is a need for research on how nature is experienced by children within the ECEC institutions, especially in relation to how an adult adjustment and presence influence upon- and create conditions for the nature experiences of children (Gill, 2014; Kernan, 2010). According to Stephenson (2002), research has to look into the conditions and constraints within the organization that contribute to the experiences of outdoor play and nature for children. The aim of this article is to explore the conditions for children's play in nature within the setting of the ECEC institutions. It asks how children and the ECEC institutions' staff practices outdoor life and interacts with each other and with nature, as groups of children and staff go hiking into the nearby forest, paying particular attention to the condition for children to influence and shape their experience of nature within the context of ECEC institutions. Going hiking in this context refers to a variety of practices where children and staff together leave the home base of the EC-institution to spend time in nearby nature areas. Sometimes a few of the children, together with one of the staff members, can go for short, spontaneous walks just outside the fenced area. However, the hikes are often a part of the everyday schedule where trips in nature areas are planned ahead and organised by the staff, and the groups walk into nature areas in order to spend their day outside. The children often carry their own backpacks with food and drinks, as well as their personal belongings and some warm clothes. The empirical findings are based on interviews and participant observations from a case study of an ECEC institution in Norway. The methodological design will be presented more in depth, following an initial presentation of the theoretical underpinnings. The results of the fieldwork will then be accounted for and discussed in the last section of this article.

Analytical and Theoretical Approach

The choice of the theoretical-analytical approach stems from the empirical data and the data collection. The central importance of play in the hikes was identified from both the staff and the children early in the observations. Within the play theme, both the interaction with the natural environment and the social processes surrounding the play showed themselves to be interesting aspects of the hikes. We therefore chose the theoretical concept and related theory of affordance as a lens for our analysis, mainly based on Gibson (1986), but supplemented with some later additions on the theory of affordance by Michael and Still (1992) and Costall (1995).

The term "affordance" Gibson derives from "to afford" and the concept refers to both the environment and the animal in a certain complementarity (1986, p. 127). The affordance of the environments, according to Gibson, is what it provides or offers for the animal. Gibson coins the term to point out the relational aspects of the environment and the animal /human: Nature affords something in relation to the capacities of the specific animal/human and what it recognises. However, the term can also be used for how the environment and the animal/human together can construct and constrict the possibilities that the environment can have for a given animal/human. The environment affords different possibilities to a dog than a sparrow, even if they live within the same environment. We focus on children as social agents and actors in relation to the natural environment,

as they develop and learn to respond to the affordances of nature. Humans have to learn the affordance of things: "To perceive the world is to coperceive oneself. […] The awareness of the world and of one's complementary relations to the world is not separable" (Gibson, 1986, p.141).

Michael and Still (1992) make an extension to the affordances term, which is especially important in our empirical setting: A possible resistance to control by power-knowledge – the power-knowledge of the self-evident. Gibson's ecological theory of perception leads to a model of resources for resistance, and Michael and Still elaborate:

> There is a resource for resistance that stems from the constitutive interlocking of physical environment and organism, and the transgressive act is grounded in the affordances that are intrinsic to the relation of organism and environment. […] There is a latitude, a collection of affordances, that inheres in the ecology of the situation and that outstrips the more or less meagre possibilities demarcated by power-knowledge. (Michael & Still 1992, p. 881)

Play plays a part in an exploration of the latent affordances of the environment, and the range of the organism-environment relationship extends beyond power-knowledge.

Drawing on Gibson's ecological theory, Costall (1995) develops and argues for an understanding of the social aspects of affordance. We are surrounded by artefacts: things and surfaces, but also animals and plants, which have been shaped by human intervention for generations. People experience objects in relation to the community, and within this community they have meaning. Learning the functions of a natural object can be done in different ways, both deliberately and through other people, without explicit instruction. A path tells us that this part of the ground affords a good walk without bushes to climb over, bogs to sink into and so on. Other people are important in learning the affordance of things, and things may afford something to some and nothing to others. Human activity itself is socially and culturally transformed. Humans have the possibilities to change the environment, and even more important for our study humans have the possibility of creating a belief. We can change the affordance the environment gives us in play on a whim.

In this study, the ECEC institution is the setting for learning the affordance of nature. As an institution, it represents an everyday domain for children that has increased dramatically over the past 20 years in Scandinavia, and which is often associated with an increasing societal control and interest in the lives of children aged 1-6 (Kampmann, 2004). Halldén et al. (2011) describe ECEC institutions as an "intermediate domain," i.e. as a place in the intersection between the private and the public. As an intermediate domain, the ECEC institutions are characterized by the public, pedagogical and professional actions on the one hand, and the concrete and individual actions of the agents, negotiations and participation in the socialization processes on the other. At every ECEC institution, there is an ongoing negotiation between the public and the private domain, which together create the symbolic spaces of the ECEC institutions (p. 172). These negotiations also take place when hiking into the woods, as the various participators contribute, create and recreate the outdoor life of the ECEC institutions. In this way, one can study how different agents participate in the process of constructing the outdoor life of the ECEC institutions, and to be more specific, how children, through their doings, actions and negotiations within the ECEC institution setting, are responding to the affordances of nature and how the staff interacts and relates to the children.

EMPIRICAL APPROACH AND DATA

This paper is part of a larger study of children's nature experiences within different contexts and situations in Norway, funded by the Research Council of Norway. The study has an ethnographic approach, using data from participant observations and interviews with children and staff about their experiences and practices of hiking into nearby forest during preschool hours. The fieldwork was conducted over a period of six months from January-June 2013. Data consists of observation notes from 26 hiking trips into the nearby forest, from the time of the children's arrival in the morning to when the group returned to the ECEC institution in the afternoon. The staff also participated in two focus group interviews. Among other things, the ECEC institution focuses on outdoor activities, but is not a specialized forest/outdoor preschool. The institution practices outdoor life as part of their everyday life, with the children spending at least two days every week outside in the nearby forest. The ECEC institution is a typical medium-sized preschool, located on the outskirts of a medium-sized city in Norway. The nearby forest is approximately 28,000 square meters, and the institution is

located on the fringe of the forest. The forest is open to everyone, and in some places the municipality has set up campsites, tables and benches. In the forest, the preschool has access to these different installations, although the ECEC staff has also arranged a natural playground for the preschool some 200 meters into the woods, where they often spend their outdoor days. The nature area itself has no fences and anybody can enter and leave the forest with no difficulty. Moreover, several of the staff members have an education in being outdoors in nature with preschool children.

Field notes from the participant observation were written immediately after the fieldwork, focusing on play, the organization of the outdoor days and the interaction between the staff and the children during the hikes. This was done in two stages: In the first stage the observation notes were coded using NVivo, identifying different themes concerning the relationships between the actions of the children and the staff, particularly regarding children's play, the affordances of the natural environment and the organizational framework. In the second stage, a closer reading of transcriptions focused on elaborating and broadening the interpretations, as well as highlighting the institutional-, cultural- and legal context of the outdoor hikes. The focus group interviews investigated the pedagogical concerns and reasons given by the staff, and were conducted at the beginning and the end of the fieldwork period. They were transcribed according to the themes relevant to the observations.

RESULTS

The results of the analyses show that there is a close connection between the children's experiences of nature, the adjustment and the facilitation provided by the ECEC staff and the organizational conditions of the Early Childhood institution itself. Hence, the nature experiences of the children and the opportunities to shape and experience nature is conditioned by these different aspects of the institutional framework, interacting with each other and constituting the foundation upon which children experience nature within the institution. As will be elaborated in the following section, the children themselves are actively participating in negotiating and exerting an influence upon the institutional framework through which the nature experience is created.

Transforming the affordance of nature through play

Play is important in how children make use of nature while hiking in the forest. In the forest, the children participate in a wide variety of self-initiated play activities: physical play, animal play, family play, fantasy play, hero play, etc. The children continuously move in and out of different play activities, in an ongoing creation of new play themes and play partners. In this play, the children are actively negotiating the affordance of nature and the natural elements, in relation to each other, to the play themes and partners involved in the play. There is a reciprocal relationship between nature and children in this ongoing play. The children are shaping the meaning of nature around them, as they utilize and respond to the negotiated affordances provided by the natural environment:

> *Four boys (Axel, Emil, Filip and Oskar, all five years old) meet under the climbing frame. "Shall we play mother and father and child?", Axel asks. "I'm the dad." "Can we be two dads?", Emil asks back. "No, you can be the big brother, I'm the dad," Axel says. "Filip is the baby." They start playing under the climbing fence. "I will make a fire," Axwl says, picking up a few sticks that he balances toward each other. The other three continue the negotiation of roles, and in the end they figure out that they can all be three big brothers. "This is our house, and now we shall make a fire," Emil says. Filip comes back after a walk with a snail in his hand. "This can be his house," Oskar says, pointing at the fire the other two are making. All four continue picking moss, leaves and small pieces of bark while talking to each other: "This can be a couch," "This is the tv, and this is a duvet." Axel, now handling the snail, puts it on the sofa and they all close the door with a few sticks. (field notes)*

The family play theme, established by the children themselves, frames the interaction between the children and the natural environment. As new materials are introduced into the play, the children change the theme and the meaning of the natural environment and materials. The sticks afford a variety of things, in this play however they are prescribed a meaning as wood for making a fire for this family of four. There is a reciprocal relationship between the children's play and the natural environment, as new affordances change old affordances and new interpretations are provided. When Filip brings a snail to the play, the meaning of the

sticks is changed into building material, and the play changes into making a home for the snail. As illustrated by this observation, the process of defining and prescribing the sticks with meaning is a social process that involves the children together in a defined relationship to each other through the family theme.

Throughout the hikes in the forest, there are numerous examples of how this reciprocal relationship between the children and the natural environments develops through ongoing play. A log is transformed into a plane that takes a group of children on holiday with leaves and small stones as tickets, whereas a few spruces or a little bush is transformed into a shelter that houses a little family of cats, a tree is transformed into the ship of an evil king that has to be fought and carefully outwitted by the captains of a nearby ship, using cleverness and sticks transformed into swords. Through the play, the children are actively engaged in a transformation process of the natural environment, as new elements are brought into the play and the play proceeds. The affordance of nature is continually changed by the children, and it keeps changing as new interpretations and new meanings are provided. This transformation is embedded in a social process among the children, in creating and negotiating the play in relation to each other and to the affordance provided by the natural elements. Taken together, they shape the meaning of the nature in an ongoing negotiation, transferring it to a level where they themselves are the agents or providers of meaning. The affordance of nature is complex, continuously changing and shaped by the play interactions between the children. The children are using cultural narratives from their everyday experiences, as well as commercialized and media-created play themes inspired from television or commercial channels (cf. Änggård, 2011).

During the hikes, the staff occupies themselves with practices that in different ways facilitate, prepare and support the play activities of the children. The adults rarely involve themselves directly in the play, but provide support by encouraging the children to be actively engaged in relation to the environment and by responding to the needs of the children. The staff's actions and motives are pivotal to understand how nature is experienced by the children. The next section elaborates and deals with the staff, and the views that underpin their actions during the hikes and play.

Nature as a sanctuary

The staff prefers nature hikes as an alternative to the predefined and crowded spaces in the ECEC institution. It is perceived as an escape from the limitations and stress of everyday life, and to provide the children with richer opportunities to play in a better and more suitable environment. Hence, the nature hikes are constructed as a sanctuary from the bustle of institutional activity, in addition to a place for play, the positive experiences of physical activity, freedom and friendship. It is valued by the staff for the perceived affordance it offers children: a rich play environment with natural challenges suited to the capability and physical/developmental level of any child. These ideas about the benefits to the children correspond to the values of nature and outdoor life in contemporary Norway, as can be seen in this quote from one of the focus interviews:

> *...and then I believe that in the forest there are so many alternatives, right, whereas on a playground, there are fewer opportunities. If you don't reach the first step of a climbing wall, well, there is nothing you can do about it. If you can't get upon a rocking horse, so well…. But in the forest, there is something for everybody. For some children, it's enough to simply just wonder about the small creepy-crawlies, whereas others are climbing the trees higher and higher, or they have the courage to walk a little bit higher up on the sledge hill, or they… well yes. (pedagogical leader, focus group interview)*

Underlying the ideas about the benefits of play in natural environments are beliefs of what constitutes a good childhood and the needs of children. Play in nature is considered valuable for the development of the children, to their health and to their bodily-physical growth and development, since it provides them with the opportunities to reach higher, to push their abilities and limits and to increase and improve their bodily skills. However, nature is also valued by the staff for the benefits they perceive nature provides for the children here and now. The staff expresses that play takes on a different character in nature, as it is more enjoyable to the children and more creative than indoor play. In nature play, there are fewer conflicts between the children: "There isn't a spade to argue about, there are enough sticks for everyone and enough trees," one of the assistants says, "they don't need toys, as nature makes them more creative and self-starting." Also, nature is

considered a safe place for children to play, because there are less wounds and small damage while spending the day in nature, with far more dangers considered to be inside the kindergarten than out in nature.

Although nature in itself is considered a good place to be, making sure that nature is accessible and that all children feel safe is important to the staff. The staff highlights the difference in the children, and that they come from different backgrounds. Some children are confident and have spent time in nature together with their families, whereas others have no experience and need time and help to figure out how to play in the forest. The staff ensures that all children learn how to interact with nature. "There are always some children who don't know how to behave outside the kindergarten fence," one pedagogical leader says, "and it is really important that they have the opportunity to feel safe." This is an important consideration for the staff, and supporting the children who are unfamiliar with nature and providing them with the support needed to feel safe and confident in nature is considered an important task by the staff.

Underpinning the actions and motives of the staff are beliefs about the positive values that play gives to the nature experience of children within the everyday life of ECEC institutions. Their support and encouragement are important in order to provide each and every child with the necessary prerequisites to act upon, experience nature and take part in the social explorations afforded by nature. Another aspect of the hikes influencing the nature experiences of the children is the question of safety outside the fences.

Invisible fences

Safety and security are important when hiking outside the fenced area of the institutions. Because ECEC institutions are governed by public authorities, it is required to prevent damage and accidents (HOD 1995). When hiking, it is the responsibility of the staff to ensure the safety of the children in every situation during the day, and there are many practices at the hikes for maintaining security and control. The children wear yellow signal vests, with their names and contact information for the ECEC institution, to help ensure visibility in the forest and signal where they belong. Before the hike, the children line up by the gate and wait for each other and the staff before they walk as a group towards the destination. There are usually three adults supervising a group of 17-18 children, and the outdoor hikes are regulated by a set of disciplinary rules that the children are expected to comply with in order to accomplish the hikes. The staff spends quite a bit of time imposing these hiking rules, particularly in the early months of the ECEC institution year; however, as the children learn the rules they are expected to comply with them as they become more self-regulated.

One way for the staff to supervise the children without controlling each child is by imposing what the staff calls *invisible borders*. The staff defines the area where the children can move freely and the perimeter borders. The staff knows where the children are and makes sure they do not move outside the permitted area. Children who move beyond the borders are met with warnings or sanctions such as having to stay closer to the staff. In order to achieve independence and the benefits of being trusted, children will have to learn to incorporate or internalize these rules and borders. The children contribute to the maintenance of the invisible borders by disciplining among themselves when someone is not complying. Nonetheless, the children are exercising influence upon these borders by negotiating them through exploration and play:

> *A boy (four years old) has located a bog just outside the area. The bog is soft and wet, and when he tries to walk in it, his foot easily slips into it and the water runs over his shoes. He calls a group of children playing nearby for attention and they come over to look. After testing it for a while, they all line up on the height along the ditch, and taking turns they run over the bog. Eøias (staff) comes over to watch them, and says to Mathias when he comes running: "Mathias, you just have your training shoes on." The game goes on for about 15 minutes until Elias, who has been standing on the side watching them, calls the game off: "Now you have to stop this game, look at the bog, it's being destroyed; we have to leave it alone to mend now." (field notes)*

In this observation, the children cross the invisible border in their fascination for the bog. The staff, being attentive to their interest and the play of crossing the bog, silently accepts the discovery of the bog and the play for as long as they find it acceptable. In so doing, the invisible borders imposed and set by the staff are flexible to some degree, and open up an opportunity for the children to influence, adjust and negotiate. The staff accepts and allows the children to discover and experience nature, and the children are provided with an

opportunity to go beyond the invisible borders and to negotiate their placement. Even if the staff sees the nature as a sanctuary from the everyday bustle of institutional life and vocalizes the importance of the freedom of the nature, it has limits. The fences of the institutions have been transported from the institution out into nature as invisible borders, and the staff invests a lot of time to teach the rules and practices of invisible fences throughout the year.

There is a fine line between the staff being able to pay attention to the children and the inattentive, more authoritarian adult. In our observations there was a lack of staff, and in many cases the hikes were cut short or disrupted due to the lack of staff. The staff themselves finds this dissatisfying, and talk about how they feel stressed and how it influences their ability to pay attention and support the children. With a lack of adults, there are few opportunities to be attentive to the children's needs and interests, as the few who remain are busy counting and keeping the children under surveillance. Furthermore, the group often has to hurry back to the ECEC institution, as the staff has tasks waiting at the institution or other considerations.

DISCUSSION

Play is central to the outdoor practices of the ECEC institution, especially initiated by the children themselves. The staff facilitates and supports the children's play when hiking, and expresses the view that playing is important in order to realize their aims, thus forwarding the ideals of nature as a rich and good place for children. They also express that hiking is an important supplement to the life inside the fences. The children's play during hikes is associated with exploring the affordances in nature as a social process, in which they themselves can be agents and decide the rules. Based on these observations, we will discuss the implications of the institutionalization of play during hikes as a process in which cultural, legal and institutional conditions are involved and negotiated.

The outdoor living practice in ECEC institutions in Norway is embedded in a complex framework of cultural, institutional and legal conditions, which influence and shape the outdoor living and nature experiences of the children and staff. Despite the view expressed that nature represents an alternative to indoor life, and the symbols used by the staff to indicate the difference to the children, the framework from the institutions is continued and expressed during hikes. Culturally, these practices draw upon, and deeply reflect, the Scandinavian outdoor-living tradition and view of nature as a place intrinsic to physical and mental health. Nature hikes also have other values such as recreation and positive nature experiences that are considered beautiful, healthy and good (Sandell & Sörlin, 2008; Tordsson, 2003). The cultural context is interpreted within the institutional framework and coupled with the insight and acknowledgment of the importance of play to children. The idea of the value of play is central to the tradition in Norwegian ECEC institutions, as well as containing a permeating knowledge in the institutions (Lillemyr, 2009). The Norwegian outdoor-living tradition and the institutional tradition form a powerful ideological platform upon which the practice of hikes in the ECEC institutions is built. On this platform, the practices shaped through the space for children's play during hikes are negotiated at different levels within each specific institution.

No matter how powerful this ideological platform might seem, the outdoor living practices in ECEC institutions cannot be understood as a set of simple or coherent practices. Instead, it represents a cluster of ambiguous meanings and reasons that have to be balanced and compromised in each specific case. The staff negotiates and weighs different types of considerations in order to respond to the framework of cultural values and ideas, pedagogical aspirations, given options and feasible possibilities in an institutional structure, as well as juridical responsibilities and potential penal sanctions. There is a tension between these different considerations, which is reflected in several ongoing trade-offs during the hikes. We will present the trade-offs we find the most prevailing. Firstly, there is a trade-off between the cultural demand for children to freely experience nature on their own terms, with risks and self-determination, which is balanced with the legal demand that they have to ensure the safety of the children and avoid injuries. The view that nature is a better place for children to grow up, where they can experience freedom, self-determination and the "real life," is balanced against the demand for control by continual observations and reactions toward children who violate or challenge the expectations of the adults. Secondly, there is a trade-off between nature as a place where children become better and healthier persons by the rich and varied environment that challenges every child at just the right stage of their physical and emotional development. This consideration is traded against the fact that not all children have rich experiences of nature, are familiar with nature or feel safe. Nature, which is considered as an intrinsically good place for children, needs to be adjusted and facilitated in order to support certain children. The last trade-off

includes aspects from some of the ones above: The need to keep an eye on the children and to (re-)produce their understanding of the invisible fences requires a minimum of number of staff being in the woods together with the children, as does the need for an adjustment of nature and extra support. This has to be balanced against the total number of staff and their other tasks. The staff's negotiations between the different trade-offs bridge and balance the different concerns, shaping the practices and allowing children to freely play during hikes. This ongoing negotiation is an important aspect of the institutional context, both facilitating and hindering children's play during hikes.

It is within the ECEC institutional context, negotiated and balanced by the staff, that the children shape their nature experience and their play. Play is central to the way the children experience nature in Norwegian ECEC institutions. Through play, children utilize, discover and act upon the natural environment, with the transcending character of play being central to the way children explore affordances in the environment. In play, the natural environment's affordances are constantly transforming as the children together give them new meanings according to the ongoing and changing play situations. In this way, the children are exploring the latent affordances of the environment and the wide range of possible relationships to the environment that they prefer according to- and constrained by the logic of the play itself (Michael &Still, 1992). By defining the situation as play, the children are free to respond differently than in an activity defined or led by an adult. Adults could intend to teach a knowledge- or curriculum-based aspect of the nature experience. For the children a tree could represent a variety of affordances, and serves a wide range of functions in play, such as a ship, a train, a bridge, an airplane, etc. Thus, the transcending potential is present in the play act that is emancipatory in relation to the defined institutional context and the defining power of the staff (Michael & Still, 1992).

The institutionalization of children's play in nature can hence be described in terms of an adult influence and presence, as well as the question about control and freedom in the play. The staff structures play into the ECEC institutions; however, the children are expected to manage and explore nature themselves, so the play situations are therefore not primarily adult led or managed. Children's nature experience in ECEC institutions is set within an institutional context that maximizes the potential of experience given its institutional, cultural and legal conditions, and the limits imposed by these. The space for children's agency in shaping their own experiences of nature is negotiated with the staff, and conditioned by the expectations and the rules provided by the adults. The question of control is a matter of trust, and the children have to comply with the adult's expectations, in addition to the institutional conditions and limitations framing the hiking in the forest. Failing to stay within these limits is associated with a withdrawal of the right to unsupervised, self-regulated play. This shows that the question of freedom versus control is a matter of a continuum rather than a dichotomy.

Facing increased governmental regulation in Norway, there is a risk that the opportunities of children to play in natural environments in ECEC institutions are challenged. Consequently, the conditions and opportunities for children and staff to negotiate the space for play in nature is decreasing and eroding. In order to ensure the agency of children to shape their own nature experience, and for the ECEC institutions to provide children with opportunities to discover, act in and explore the natural environment on their own terms, attention has to be directed towards the conditions and means of the staff to negotiate this space.

References

Costall, A. (1995). Socializing Affordance. *Theory & Psychology,* 5 (4), 467-481. doi: 10.1177/0959354395054001

Fjørtoft, I. (2000). *Landscape as Playscape: Learning Effects from Playing in a Natural Environment on Motor Development in Children*. Ph.D. diss. Norwegian University of Sport and Physical Education.

Fjørtoft, I. (2004). Landscape as Playscape: The Effects of Natural Environment on Children's Play and Motor Development. *Children, Youth and Environments, 14* (2), 23-44.

Fjørtoft, I., & Tone R. (2003). Barn og unges relasjoner til natur og friluftsliv: en kunnskapsoversikt. *HiT skrift*. Porsgrunn: Høgskolen i Telemark.

Gibson, J. J. (1986[1979]). *The ecological approach to visual perception*. Hillsdale, Lawrence Erlbaum Associates.

Gill, T. (2014). The Benefits of Children's Engagement with Nature: A Systematic Literature Review. *Children, Youth and Environments* 24(2), 10-34.

Grahn, P., Mårtensson, F. Lindblad, B., Nilsson, P. & Ekman, A. (1997). *Ute på Dagis. Hur andvänder barns daghemsgården?* Alnarp: Movium.

Halldén, G. (2011). En institutionaliserad barndom eller rum för relationer. In G. Halldén, (red.) *Den moderne barndomen och barns vardagsliv (ss.164-174)*. Stockholm: Carlssons bokförlag.

HOD (1995). FOR 1995-12-01 nr 928: *Forskrift om miljørettet helsevern i barnehager og skoler* m.v.: https://lovdata.no/dokument/SF/forskrift/1995-12-01-928

Kampmann, J. (2004). Societalization of Childhood: New Opportunities? New Demands? In H. Brembeck, B. Johansson & J. Kampmann (eds). *Beyond the Competent Child (ss.127-152)*. Frederiksberg: Roskilde Univsersity Press.

Kernan, M. (2010). Outdoor Affordances in Early Childhood Educations and CareSettings: Adults' and Children's Perspectives. *Children, Youth and Environments* 20(1), 152-177. DOI: 10.7721/chilyoutenvi.20.1.0152

Korsvold, T. (2005). *For alle barn!: Barnehagens framvekst i velferdsstaten*. Oslo: Abstrakt forlag.

Lillemyr, O. F. (2009). *Taking Play Seriously: Children and Play in Early Childhood Education: An Exciting Challenge*. Charlotte, N.C.: Information Age Publishing.

Lysklett, O. B. (2013). *Ute hele uka: Natur- og friluftsbarnehagen*. Oslo: Universitetsforlaget.

Michael, M. & Still, A (1992). A resource for resistance: Power-knowledge and affordance. *Theory and Society* 21(6), 869-888.

Muños, S.-A. (2009). *Children in the Outdoors - a literature review*. Forres: Sustainable Development Research Centre.

Mårtensson, F. (2004). *Landskapet I leken. En studie av utomhuslek på förskolegården*. PH.D.diss., Alnarp University.

Norwegian Ministry of Education and Research (2011). *Framework Plan for the Content and Tasks of Kindergarten*. Rammeplan for Barnehagens innhold og oppgaver Oslo: Kunnskapsdepartementet.

Rosenow, N. & Bailie, P. (2014). Greening Childhood Education. *Children, Youth and Environments* 24(2): 1-9. DOI: 10.7721/chilyoutenvi.24.2.0001

Sandell, K., & Sörlin, S. (2008). *Friluftshistoria: från "härdande friluftslif" till ekoturism och miljöpedagogik: teman i det svenska friluftslivets historia*. Stockholm:Carlsson.

Stephenson, A. (2002). Opening up the outdoors: Exploring the relationship between the indoor and outdoor environments of a centre. *European Early Childhood Education Research Journal, 10*(1), 29-38. DOI:10.1080/13502930285208821

Tordsson, B. (2003). *Å svare på naturens åpne tiltale: en undersøkelse av meningsdimensjoner i norsk friluftsliv på 1900-tallet og en drøftelse av friluftsliv som sosiokulturelt fenomen.* Oslo: Norges idrettshøgskole, Institutt for samfunnsfag.

Tordsson, B. and Lill Susan Rognli Vale, L.S.V. (2013). Barn, unge og natur: en studie og drøftelse av faglitteratur. *HiT Rapport*. Porsgrunn: Høgskolen i Telemark.

Vigsø, B. & Nielsen, V (2006). *Børn og uteliv*. Esbjerg: CVU Vest Press.

Waller, T., Sandseter, E.B.H., Wyver, S., Ärlemalm-Hagsér, E. & Maynard, T. (2010). The dynamics of early childhood spaces: opportunities for outdoor play? *European Early Childhood Education Research Journal, 18*(4), 437-443. DOI:10.1080/1350293X.2010.525917

Änggård, E. (2011). Children's Gendered and Non-Gendered Play in Natural Spaces. *Children, Youth and Environments, 21*(2), pp. 5-33.

Ärlemalm-Hagsér, E. (2008). Skogen som pedagogisk praktik ur et genusperspektiv. A. Sandberg (Red.), *Miljöer för lek, lärande och samspel*. Lund: Studentlitteratur, 107-136.

Gjertrud Stordal is Assistant Professor at Queen Maud University College of Early Childhood Education, Trondheim, Norway. She can be contacted at gjs@dmmh.no.

Gro Follo is Senior Researcher at Centre for Rural Research, Trondheim, Norway. She can be contacted at gro.follo@bygdeforskning.no.

Ingar Pareliussen is Deputy Principle of Research and Development at Queen Maud University College of Early Childhood Education, Trondheim, Norway. He can be contacted at ipa@dmmh.no.

International Journal of Early Childhood Environmental Education, 3(1)

ISSN: 2331-0464 (online)

A Young Child's Perspectives on Outdoor Play: A Case Study from Vancouver, British Columbia

A. Elizabeth Beattie
University of British Columbia

Submitted June 10, 2015; accepted September 14, 2015

Acknowledgements

This research was supported in part by the Ontario Student Assistance Program. I would like to thank Dr. Ann Anderson for her guidance and wisdom, which helped me to conduct this work and to revise the manuscript. I am deeply grateful to the family I worked with while conducting this research.

ABSTRACT

There has been an increasing amount of concern about the lack of direct exposure that young children have to nature and the outdoors in Canada and the United States, leading to an increase in outdoor- and nature-based learning models for young children. However, very little research has been done in the field of early childhood environmental education. In particular, studies investigating young children's perspectives on outdoor learning and environmental education are extremely scarce. This article gives a critical summary of two previous studies that do consider young children's perspectives in relation to environmental education, and then describes a recent case study in which one young child's perspectives on outdoor play were sought. The findings from the three studies are compared. The importance of young children's choice in active, co-constructed environmental education is discussed. As well, the need for early childhood environmental education to take place in locations that are familiar to young children is highlighted.

Keywords: environmental education; early childhood education; outdoor play; young children's perspectives

Early Childhood Environmental Education and Outdoor Learning Is Supposed To Be Good For Children

In the past two decades there has been an increasing amount of concern about the lack of direct exposure that young children have to nature and the outdoors in Canada and the United States (Rosenow & Bailie, 2014). In response, many early years child care centers (such as "Hand-In-Hand Early Years Nature Education Program Comox Valley," n.d.) and some Kindergartens (for example, *Nature Kindergarten 2012-2013*, 2013) in British Columbia have turned to nature-based and outdoor-learning models. In general, this type of nature-based or outdoor-learning can be thought of as the Forest School approach (Den Hoed, 2014).

The underlying assumption at work is that direct exposure to nature is good for children. A recent review of the literature (Gill, 2014) supports this view: the review found that children under the age of 12, who engage directly with nature regularly, experience improved physical, emotional, and mental health; greater well-being; increased cognition; superior social skills; and are more likely to feel concern for the environment and connectedness to nature (Gill, 2014). Gill's (2014) literature review was based on 61 research articles, whose quality ranged from 'unclear' to 'good.' Based on my reading of the titles of these research articles, only five of the 61 articles considered children's perspectives, preferences, or perceptions (Gill, 2014). So at best, we can conclude that *adults* are sure that direct exposure to nature is good for children.

I am not going to argue that children should not learn and play outdoors. I will, however, suggest that children should be asked about their experiences and preferences when doing so.

What Do Young Children Think About Environmental Education and Outdoor Learning?

The gap in the research. Environmental education research is often conducted with high school and middle school students as participants, and their perspectives on environmental education and learning are occasionally sought out. For example, Blatt (2014) studied the alignment and disagreement between a teacher's perspectives and the students' perspectives on the goals of a high school environmental education course. Similarly, high school students have been asked about their opinions of the integrated Environmental Studies courses that they participated in (Breunig, Murtell, & Russell, 2014).

Rickinson (2006) recognized that the process of learning, and the role of the learner, were both under-researched in environmental education. He specifically indicated that future research on environmental learning should include all stages of life, including infancy and (early) childhood, not just the years of formal schooling (Rickinson, 2006). Unfortunately, even older students' perspectives on environmental learning are not often researched. Middle school and high school students' perspectives on other environmental topics are more likely to be investigated. For example, Barraza and Robottom (2008) elicited middle school students' conceptions of environmental issues. As well, a recent study (Kalvaitis & Monhardt, 2012) investigated 6-11 year olds' relationships with nature. One of the few studies looking at young children's perspectives is my Master's research, which looked at 4-6 year olds' conceptions of nature (Beattie, 2014).

In 2009, Davis conducted a review of the published literature in the field of early childhood education for sustainability and environmental education. Davis (2009) found such a scarcity of research articles that she declared early childhood environmental education (ECEE) to be a 'hole' in both the early childhood and environmental education fields of research. Davis (2009) suggested future work be done into research partnerships between ECEE and other fields, into professional development for early childhood practitioners, into ECEE centres, and into young children's capabilities as environmental stakeholders. Davis' (2009) last recommendation aligns with Rickinson's (2006) call for further research into the process of environmental learning and the active, participatory role the learner can take.

However, the most common form of environmental education research conducted with students of any age is some form of assessment, in which the researcher seeks to measure the impact of an environmental education program on the students' knowledge or attitudes. One year-long study measured the effectiveness of an environmental education course for 5-14 year olds that used empathy and critical thinking as teaching tools, and found that these teaching techniques were beneficial (Ampuero, Miranda, Delgado, Goyen, & Weaver, 2015). Another study (Bergman, 2015) measured fourth and fifth graders' environmental awareness, intention to act in an environmentally positive way, and their recollection of the environmental knowledge that was taught after a full year environmental education course. The results showed that the students' environmental awareness and knowledge had increased, but not their intention to act in an environmentally positive way (Bergman, 2015). Even a study of one of British Columbia's newest Nature Kindergartens (Elliot, Eycke, Chan, & Müller, 2014) focuses on documenting, measuring and assessing the effect the program has had on the young children's ecological awareness and environmentally responsible behaviours – which shows there is no significant difference between children who went to Nature Kindergarten and children who attended traditional Kindergarten.

Unfortunately, it does not seem as if Davis' (2009) and Rickinson's (2006) suggestions have been taken up. While a fair amount of work has been done to study adults' opinions on ECEE, young children's perceptions are still rarely solicited (Boileau, 2013). Boileau (2013) discusses some of the barriers to working with young children that may prevent such research from taking place; however, she also points out the methodologies and ontologies, which allow researchers to circumvent these problems. I believe that, armed with the Mosaic approach (Clark, 2001, 2007) and a sociocultural understanding of childhood (Robbins, 2005), there is no reason a researcher cannot develop a relationship with young children that will allow the researcher to elicit the children's perspectives on

environmental education or outdoor learning. As I see it, the outlines of the early childhood environmental education research gap are fairly clear. Research is done into children's perspectives on environmental and outdoor learning, but mainly with older children. More research is done into children's perspectives on general environmental topics; again, mostly with older children. Finally, the bulk of environmental education research is done without listening to the voices of the children, or students, at all.

Below, I give the details of two such studies – two of the very few studies in the field of environmental education that I am aware of – that do take young children's perspectives into consideration.

Research on environmental education and outdoor learning that includes young children's perspectives.

Green (2013) conducted research that focused on young children's experiences of their own 'special places' in or near their homes. The 12 children participating in the study were between 3 and 5 years old (Green, 2013). The notion of 'special places' is relevant to ECEE because the relationship children have to place and the physical environment is a crucial part of outdoor learning and environmental education (Proshansky & Fabian, 1987, Chawla, 1992, and Wilson, 2008, all as cited in Green, 2013). Children's perspectives were collected using multiple methods: the children created artistic representations of their special places by painting, drawing, using play dough, using blocks, or using a combination of these methods (Green, 2013). Since the children's artwork was not being judged, the content of the artistic creations was not analyzed, but was instead used to complement the oral data being collected (Green, 2013). Children also led the researcher on a tour of their homes, on which they shared the locations and stories of their special places (Green, 2013). The tours were conducted so as to maximize the children's comfort: parents or siblings came along as desired, and the tours ended when the children wanted them to finish (Green, 2013).

Green (2013) found that children desired special places for the purposes of autonomy, privacy, play, hiding, exploration, and resting. Many children had more than one special place, since one place alone was not adequate for both hiding and exploring (Green, 2013). The children's special places were found both inside and outside their homes (Green, 2013). The indoor special places were often cozy and familiar ones, with emotional attachments, and appeared to provide the children with a sense of belonging (Green, 2013). In contrast, the outdoor special places were often beyond the fenced-in limits of the children's backyards, or made use of features in the yards in unconventional ways, likely indicating that young children want to create their own rules and exert control when creating their outdoor special places (Green, 2013). When outdoors, children preferred unstructured spaces over formal, organized areas, such as their structured, organized backyards (Green, 2013). In many cases, the children were supported by their parents, and the children appeared to appreciate the guidance and learning opportunities this afforded them (Green, 2013). However, the children created special places that only they could access, suggesting that the balance between support and independence must be carefully maintained (Green, 2013).

I believe that Green's (2013) research is an excellent example of ECEE work that is based on children's perspectives and that can help answer questions about how young children think and feel about environmental education and outdoor learning. Outdoor play is a crucial element of environmental education and outdoor learning – and Green's (2013) work helps early childhood environmental educators understand where and how young children play, and therefore learn, outdoors.

Ghafouri (2012) also offers a study which includes a glimpse of 20 young children's perspectives. This study (Ghafouri, 2012) considers children as active learners who co-construct their experiences when directly engaged with nature, and aims to understand how different kinds of engagement affect the outdoor learning process. Different kinds of engagement, such as free-choice play, structured or goal-oriented activities, and emotional and intellectual engagement were all considered and differentiated within the children's learning (Ghafouri, 2012). The children participating in the research were students in a junior/senior kindergarten class, between 3 and 5 years old (Ghafouri, 2012). Ghafouri (2012) claims to use grounded theory methodology, but I don't believe this is accurate. My understanding of grounded theory is that the researcher begins without any theories and uses the data to develop one that explains the data and how they connect to the larger social system (Starks & Trinidad, 2007); I think Ghafouri (2012) has done the opposite, starting with several theories about learning, engagement,

and environmental/nature education, and then using the data to show how these theories mainfest in a specific situation.

Nonetheless, the observational data Ghafouri (2012) has collected gives readers a valuable glimpse into children's outdoor learning processes. In the study, the children found a dead squirrel while they were walking in the schoolyard (Ghafouri, 2012). This event created speculation about the cause of death and worry about how the squirrel felt; the children poked the dead squirrel, drew pictures, took pictures with a camera, and conversed in small groups (Ghafouri, 2012). The children inititated class outings in which they, which their teacher and the researcher, returned to visit and investigate the squirrel for five days, noticing more and more details each time (Ghafouri, 2012). During this time, their interest was also transferred to live squirrels in the school yard, and the children remained interested in squirrels even after the teacher removed the dead squirrel (Ghafouri, 2012). The teacher removed the dead squirrel because she felt it was making the children too sad (Ghafouri, 2012); Ghafouri's (2012) observations suggest that the children felt "anxiety over leaving the [dead] squirrel all alone" (p. 8) 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" (p. 9), but not necessarily sadness; for instance, the children covered the dead squirrel with leaves, to keep it warm, before they returned to their classroom, rather than shedding tears. The children were surprised and confused when they discovered that the dead squirrel had disappeared (Ghafouri, 2012). For them, this was a direct experience with nature, in which the children had agency, control, and demonstrated a desire to prolong their engagement with the subject. Ghafouri (2012) observed the same children on a visit to a local farm. The visit was a tour run by the farmers (Ghafouri, 2012). The children did not work in small groups, ask questions, draw pictures, or show a desire to investigate farms further after the organized visit (Ghafouri, 2012). Ghafouri (2012) suggests this is due to the adult-controlled nature of the farm visit – the children did not have enough time to engage with the animals or the activities, nor were the positioned as active learners.

I think Ghafouri (2012) could have improved this study by asking the children what they thought about the two outdoor learning experiences, rather than interpreting or assuming what caused the differences in the children's behaviour. However, we can take the children's comments, recorded by Ghafouri (2012), as reflective of their perspectives on their outdoor learning experiences. When investigating the dead squirrel, there were many questions and comments, on a range of subjects related to the squirrel (Ghafouri, 2012). Similarly, when the children were silent, as at the farm, and afterwards, that must mean something as well (Ghafouri, 2012). I would say that when the children were more interested in their learning, and felt more comfortable in the learning environment, they were more talkative. It is reasonable to see the results of Ghafouri's (2012) study as evidence that children's outdoor learning is more effective when it is co-constructed with the children, who are allowed to be active agents with control over the learning experience (Bransford, Brown, & Cocking, 1999, as cited in Ghafouri, 2012). This conclusion supports Green's (2013) finding, that children desire independence and control when playing, and learning, outdoors. This notion is further supported by Caiman and Lundegård's (2014) work which confirms young children's ability to act as agents in their own outdoor learning experiences, when they are given freedom to choose their own courses of action.

While I applaud the work done by Ghafouri (2012), Green (2013), and Caiman and Lundegård (2014), I do not think it is sufficient. Although they include comments from young children, and touch on the topic of early childhood environmental education, they are not asking the children about outdoor learning, directly or indirectly. Therefore, I believe that there is still a gap, or a 'research hole' (Davis, 2009), in the field of ECEE, that will require much more work to fill. A review of the literature (Hedefalk, Almqvist, & Östman) completed in 2014 indicates that research on how children learn about the environment or outdoors remains scarce.

Young children's perspectives on environmental education and outdoor learning should be included in future research.

It is important to make an immediate, and whole-hearted, effort to include ECEE that investigates young children's perspectives on environmental education and outdoor learning in the research priorities of both the environmental education and early childhood education fields. I think there are two main reasons for doing this. The first reason is that children's participation and perspectives in ECEE research are required by the United

Nations Convention on the Rights of the Child (UNCRC) (United Nations, 2015a). According to the UNCRC, young children have an ethical right to be involved in research on topics that concern them (Gray & Winter, 2011; Harcourt & Mazzoni, 2012). Canada ratified the UNCRC in 1991 (United Nations, 2015a), so Canadian children also have a legal right to participate in decision-making that will affect them (Government of Canada, 2015; United Nations, 2015b). Young children's outdoor play and outdoor learning certainly concerns young children, so research on this topic should involve young children.

The second reason is that deeper understandings of what young children think about environmental education and outdoor learning should allow early childhood and environmental educators to improve ECEE. High quality ECEE is important for the obvious, practical reasons: all educational experiences should be the best the educator can make them, so that the learners benefit as much as possible. ECEE experiences are particularly crucial, however. Beyond the 'good' that direct exposure to nature does for young children, discussed in the first section of this paper, childhood experiences in nature often contribute to a lifelong relationship with nature and a positive environmental attitude as an adult (Chawla, 2007; Stanger, 2014). If there is any way to prevent the earth from undergoing an ecological catastrophe, we will need people who feel this way. As Sobel (1998) says, "we need to give [young children] time to connect with nature and love the Earth [sic] before we ask them to save it" (p. 1). Thus, we need to ask young children how they wish to spend that time, and how they want to connect with nature, because they are experts on how to ensure that the time young children spend outdoors can generate a loving connection with the nature and the earth.

A Case Study Investigating A Young Child's Perspectives on Outdoor Play

In order to study young children's perspectives on environmental education, I conducted a case study into one young girl's perspectives on outdoor play. I believe research into young children's perspectives is necessary so that ECEE practitioners can create programs that offer meaningful learning opportunities (Ausubel, 2000) for young children – learning opportunities that relate new content to knowledge and experiences with which young children are already familiar. Further, I believe the best way to investigate young children's perspectives on ECEE is to explore their perspectives on outdoor play, since learning occurs spontaneously during young children's outdoor play (Kuh, Ponte, & Chau, 2013; Prince, Allin, Sandseter, & Ärlemalm-Hagsér, 2013).

METHODS

My research investigating one child's perspectives on outdoor play was conducted as an exploratory case study (Yin, 2009). I chose to use a case study method because I wanted to investigate a child's perspectives on outdoor play in a contemporary context that I did not control, which is precisely when case studies work best (Yin, 2009). Further, the case study method can deal with multiple forms of data, such as observations, interviews and documents (Yin, 2009); I anticipated that I would use many forms of data collection in my research, so this made case study a good method to choose.

Research questions. The research questions guiding my study were (1) What does this child like to do when playing outdoors? (2) What does this child think about outdoor play? and (3) What are some characteristics of this child's outdoor play?

Unit of analysis. The unit of analysis in my study is the child I worked with to conduct my research. This case is bounded by my topic of interest, the child's perspectives on outdoor play, and that is what I focused on when I spent time with the child. The child I worked with, Rachel (her name has been changed to preserve confidentiality), was 3 years old at the beginning of the study period. She turned four after the first interview session, so she was 4 years old at the end of the study period. Rachel lived in an apartment in the Greater Vancouver Area, British Columbia, and attended daycare several times per week. Her apartment complex did not have a place where she could play outdoors, although it did have an outdoor swimming pool. Her daycare had a playground. There were three playgrounds near her house, which she indicated that she enjoyed visiting.

Data collection. In this study, I collected data using a modification of the Mosaic approach (Clark, 2001, 2007). This method of data collection has been recommended for working with young children on the topic of environmental education and outdoor learning (Boileau, 2013). As suggested in the Mosaic approach (Clark, 2001, 2007), I used drawing and a playground tour in addition to the more traditional data collection methods of observation and interview. Contrary to the suggestions in the Mosaic approach (Clark, 2001, 2007), I did not collect data from Rachel's father, or any other adults. I felt that this would not be appropriate, since only Rachel was the unit of analysis for this case study. Finally, while the Mosaic approach (Clark, 2001, 2007) suggests that research end with participants and researchers working together to solve a problem or take action, I did not feel this was a necessary part of an exploratory case study, so I did not do this step.

This case study consisted of three sessions in which Rachel and I spent time together. All of the sessions were audio-recorded, with Rachel's assent. Rachel's father was present throughout all of the sessions. The first session took place at a playground near Rachel's apartment. Rachel chose which playground to go to, and gave me a tour of the playground. She showed me which playground elements she enjoyed, how she liked to play on them, and answered some questions about why she liked certain aspects of the playground elements.

The second session was held inside Rachel's father's office. I asked Rachel to draw a picture of herself playing outside, or to draw somewhere outside where she would like to play. While she was drawing, we talked about the features of her drawing as well as whether she had played outside that day. The third session was a walk around the University of British Columbia (UBC) campus in Vancouver, British Columbia. I offered Rachel a choice of toys and/or tools that she could use on the walk, such as a magnifying glass, binoculars, a ball, and a flying squirrel puppet. Her father and I followed her, letting her choose the path we followed and how long we spent at certain objects of interest. I asked her about what she could hear and see, and why she made certain choices. All of the sessions included observations and informal interviews.

Data analysis. I analyzed the data through a constant comparison analysis, which is appropriate for observations, text, conversations and drawings (Leech & Onwuegbuzie, 2008). I transcribed the audio-recordings from the three research sessions, so that I became more familiar with them. I transcribed the first session before I conducted the final session with Rachel. This meant that I had already started the data analysis before I finished the data collection; therefore, I was able to use the third session for confirmation of themes I thought I had identified in the data, for member checking, and for triangulation, as well as to gather new data. I did not consider any themes or codes in advance. I tried to let them emerge from the data as I read through, listened to, looked at, thought about, and coded the transcripts.

Researcher positioning. In my role as a researcher, I had an effect on the data that was collected and how it was analyzed. While I believe that it is extremely important for a researcher to put their own worldview aside, so as to focus more closely on the perspectives of the child they are working with, it is impossible for anyone to do this completely (Maxwell, 2006). Therefore, I need to clarify my biases and prior experiences that relate to the research topic.

As an educator and a researcher, I have some experience in the field of outdoor learning and/or environmental education for early childhood. I believe very passionately that outdoor learning is beneficial for young children, and that young children have the right to influence the design of their own outdoor/environmental learning experiences. Further, I believe in constructivism, and I understand meaningful learning to be based on prior knowledge and experience (Ausubel, 2000; Driver, Asoko, Leach, Scott, & Mortimer, 1994); this underlies the importance of working with young children to understand how to create meaningful outdoor and environmental learning experiences. When I was a young child, I enjoyed many positive, meaningful, outdoor learning experiences, which influenced my desire to work and teach outdoors.

Ethical considerations. Working with young children as research participants requires unique ethical considerations. For instance, it is crucial that children are given the choice of whether to participate in the research or not (Danby & Farrell, 2004). This is determined by the young children's informed assent, not by their

parent's/guardian's consent, although the adult's consent remains legally necessary. As well, young children are considered a vulnerable population, so participant confidentiality must be maintained at a high level.

Working with young children as research participants also means viewing them as "experts in their lives" (Mason & Danby, 2011, p. 185). Young children should be seen as active agents in ongoing socio-cultural processes (Rogoff, 2003), and as fully competent participants in their daily lives (Punch, 2002). Evers (2011, p. 98) indicates that young children should be understood not only "as 'culture takers' but also as 'culture makers'." Doing research with young children is not the same as researching with adult participants, but the findings are just as valuable; therefore it is especially important to make the extra efforts necessary to work with young children (Danby & Farrell, 2004).

FINDINGS

Slides. Rachel liked to play on slides when she went to the playground. During our first session together, the playground tour, the slides were two of the first elements she chose to show me. When I asked her what her favourite part of the playground was, she indicated the slides first. As she went down the slides, Rachel repeatedly said "whee!" and "that was fun!"

In the second session, she chose to draw a slide to represent 'somewhere outside that she would like to play' (see Figure 1). The slide in her picture was inspired by the "little green slide" at her daycare centre, but became a "really big" waterslide:

R: Yeah, but I want it to be a big slide, like there, there, there, there… [Indicating that the slide should go off onto another page]
L: All the way out to there?!? You can draw it like that if you want.
R: I want it all the way there, there, there, there…. [Again indicating that the slide should go off onto another page]
(Father: You can draw it.)
L: Draw it as big as you want…I'll hold the paper and you draw, ok?
R: OK.
[…]
L: Oh, that looks so fun…can you go slow on the slide?
R: No, FAST!
L: Fast! [Everyone laughs]
R: Look, this is only a waterslide. [As she starts colouring blue water on the slide]
L: A waterslide?!?
R: Yeah.

Speed. When Rachel played outside, she liked to do things that involved going "fast." This was evident in the conversation surrounding her drawing of the waterslide (see Figure 1), which is quoted above. Additionally, in the playground tour, she repeatedly asked her father to help her go faster. On the swings, when she wanted him to push her, she said: "DADDY!...can you push me?!...whee…faster!...SUPERDUPER FAST!!" While she was on the merry-go-round, she requested that he spin her "fast!!...whee…whoa…really really fast!"

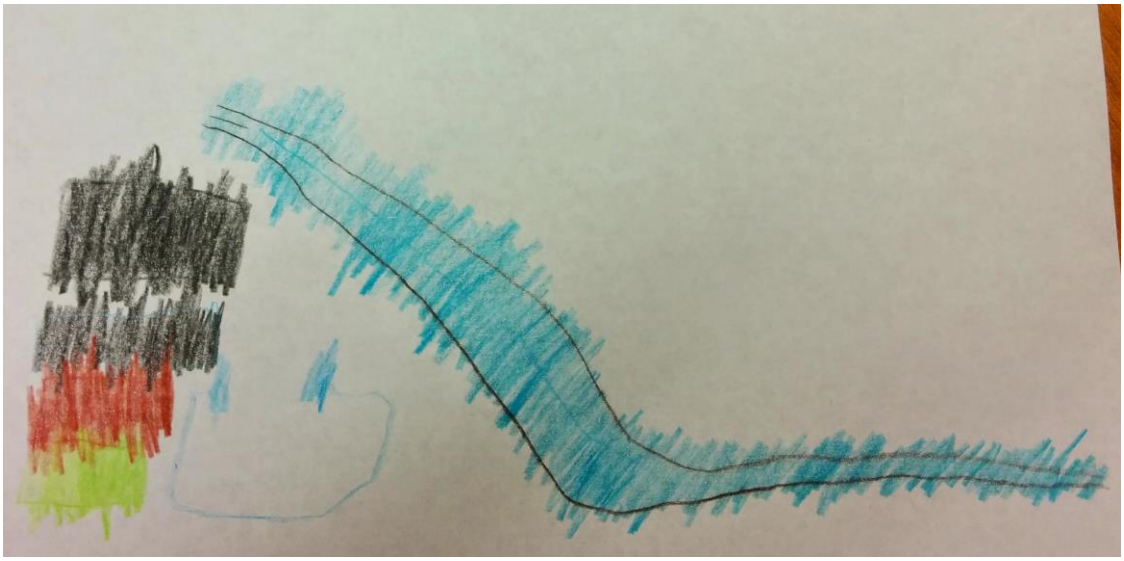


Figure 1. Rachel's drawing of a waterslide, representing somewhere outdoors that she would like to play.

In our third session, a walk at the UBC campus, Rachel was constantly running from place to place. At one point, she asked her father to "chase" her and to "run really fast." As well, even though she was holding the magnifying glass, and frequently used it to look at many different objects, she only spent a few seconds observing each item, according to the approximations in my observations.

Outdoor play as a social activity. Outdoor play was primarily a social activity for Rachel. During the playground tour, she needed her father's assistance to play on many of the elements. For instance, she required his help to spin the merry-go-round while she was on it, and to push her when she was on the swing. When she played on the teeter-totter[1], she directed her father and me as to where we should sit so as to maximize her enjoyment:

R: Teeter-totter! [Running over and sitting on one end]
F: Do you want me to get on one side?
R: Yeah….oh, the middle, Daddy, the middle!
F: You want me to get in the middle?
R: And you can go on that side. [Speaking to me]
L: I can go on that side, ok.
[…]
R: Hey Daddy, I got an idea…maybe I can sit on the middle. [Rachel and her father switch positions, and now her father and I are bouncing the teeter-totter]
L: Is that fun?
R: Yeah, it is.

In our third session, a walk at the UBC campus, Rachel acted as the leader, making the decisions about where we would go and continually calling out "now this way!" and "come on, this way!" A leader cannot lead without followers, so this was definitely part of her play that required other people. Later in the walk, we arrived at one of the fountains on the UBC campus, and found that it had been filled with soap, which was creating masses of bubbles. A group of university students was playing with the bubbles, flicking them at each other, blowing them out of their hands, and putting them on their heads like crowns. Rachel copied their actions, and even joined in their play to a degree, when Rachel and the students helped each other blow bubbles out of one another's hands.

[1] The teeter-totter at this playground was not the traditional type. It was very wide, made of a wooden plank, and the middle was supported by springs. Therefore, sitting on the middle was an enjoyable experience, which it would not have been on the older, metal, fulcrum-based teeter-totters.

Finally, Rachel indicated that she liked to play outdoors with her friends. While she was drawing steps up to the waterslide (see Figure 1), she said they were "for me, for all my kids [daycare friends] to go on, to go on the slide." In our first session, I asked Rachel about playing by herself, and it seemed as if she had never thought about it before:

L: What would you do if you were at the playground all by yourself?
R: [hesitation] I don't know.
L: You don't know? Think that would ever happen to you?
R: Yeah, maybe I'd be alone.
L: You would be alone.
R: Yeah.

I believe this conversation indicates that, for Rachel, the idea of outdoor play as a solitary activity is completely foreign to her. For Rachel, outdoor play always involved other people.

Outdoor play as a holistic experience. Rachel's outdoor play involved her whole body and many of her senses. For Rachel, outdoor play was a verbal, cognitive, emotional, and kinesthetic experience. At the playground, she challenged herself physically by climbing to the higher level of the merry-go-round; she challenged herself emotionally by being "brave" enough to slide down the pole that she initially described as "scary." When Rachel showed me how she climbed up to the slide, she counted out loud, indicating that playing involved both verbal and cognitive skills: "it just takes one, two, three, four, five."

In Rachel's drawing of a waterslide (see Figure 1), the stairs up to the slide are "really big." Rachel said that she and her friends would need to use their hands to help them climb up, suggesting that outdoor play required her to use her whole body. During our walk around the UBC campus, Rachel enjoyed looking at many different things through a magnifying glass. When we arrived at the fountain full of soap bubbles, however, she chose to switch from play that was primarily visual to play that was more tactile: she grabbed the soap bubbles with her hands, and tried to wipe bubbles on her father and me. She also smelled the bubbles.

Rachel often asked questions and carried on conversations while she played. She had distinct ideas about how she wanted to play and was able to articulate them. At the playground, she wanted to run in a circle on the merry-go-round, while the merry-go-round was spinning, but she kept falling. She explained her problem to her father and me, and I suggested that she run in the opposite direction. Rachel thought about this for a minute, and then tried it. My suggestion worked, and she was soon running and laughing. While walking at the UBC campus, Rachel asked many questions about objects we encountered, such as a cement truck, a sewer grate, the blue whale skeleton, and the students on bicycles. She stopped running to ask her questions and hear the answers, and then took off again when she was satisfied.

Outdoor play is not 'nature' play. While Rachel enjoyed playing outdoors, this does not mean she enjoyed playing in 'nature.' This is shown most clearly by the discussion surrounding another drawing she made during our second session (see Figure 2). This drawing shows "the beautiful blue sky," "a big spiky tree" that is "green and brown," and "a bird." Rachel was very clear that this picture shows a place that she would not want to play:

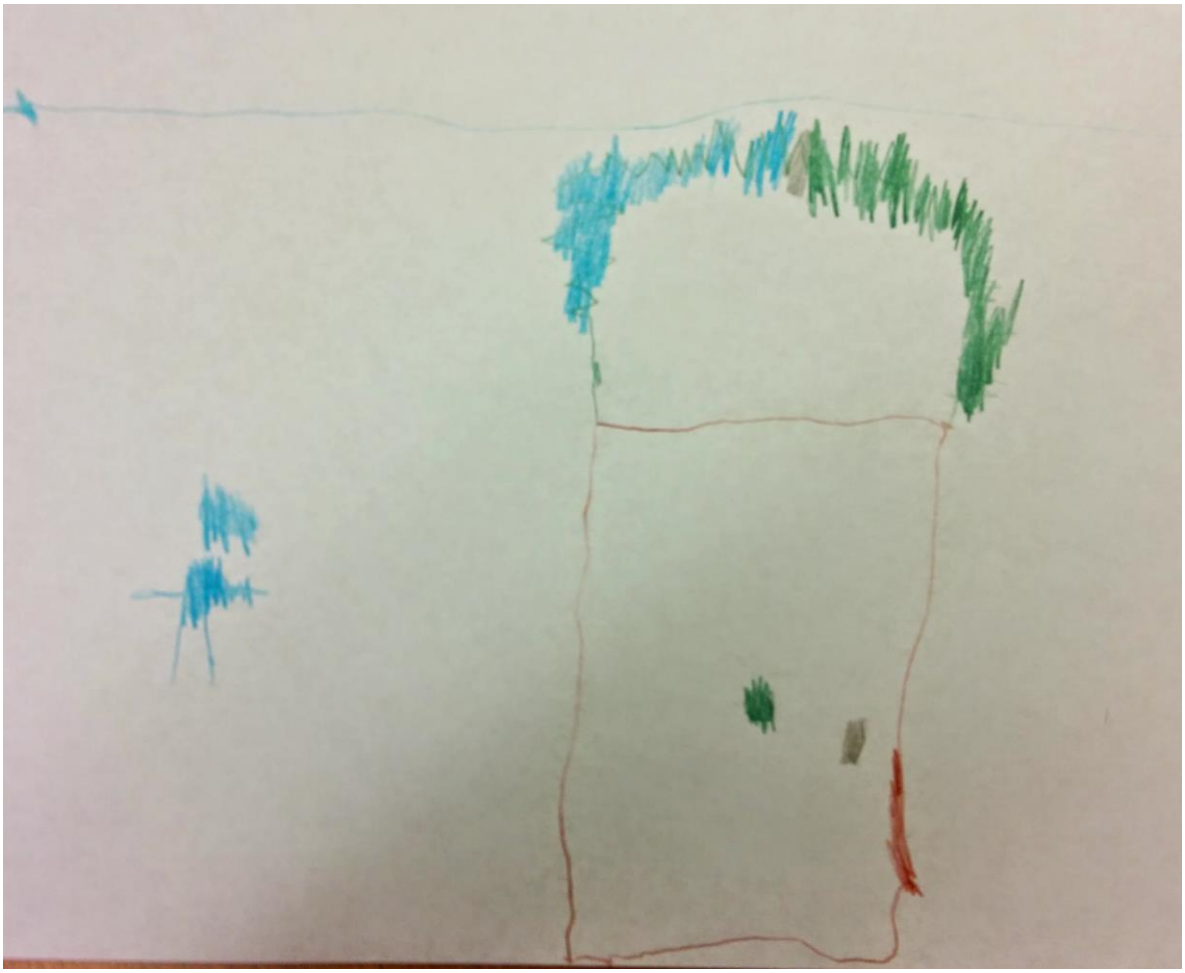


Figure 2. Rachel's drawing of "a big spiky tree" and "a bird."

L: So what else is in that picture?
R: Just only a tree, a big spiky tree.
L: And would you like to play beside that big spiky tree?
R: No.
F: Why not?
R: Cuz it's [the tree is] too spiky.
[…]
L: So what about you, would you be in this picture?
R: Only just a bird and a tree.

Rachel's father showed us a picture that Rachel had drawn of herself, demonstrating that Rachel can draw herself; thus, I know that Rachel did not leave herself out of the picture with the tree and the bird (see Figure 2) because she was not capable of drawing herself.

At the playground, Rachel found two large sticks in one of the play areas. Immediately, she stated, "I just have to be getting these sticks off here, because these don't go on here." This shows that, for Rachel, outdoor play at the playground and 'nature' play that might involve sticks do not go together. Finally, when using the magnifying glass during our walk around the UBC campus, Rachel was just as interested in looking at 'human-made' or 'built' items as she was in inspecting 'natural' items. For instance, she chose to look at her father's belt, her father's shoe, her own shoe, some benches, and a sign, all of which are 'human' items. She also chose to look at various small rocks

and the bark of a tree, which are more 'natural' items. The rocks and the tree were located right beside the path we were walking on, so Rachel did not leave the path to seek out these particular items.

Interestingly, during the drawing session, Rachel discussed how she had enjoyed playing outside all day at daycare, even though it had been raining. She and her friends wore their "muddy buddies"[2] so they could sit "on the wet slide," "on the wet swings" and "on the wet ground." Rachel's father asked, "did you like playing outside today?" and she replied, "yeah." Rain was a 'natural' element that did not interfere with Rachel's outdoor play at all. The rain was also not the focus of the outdoor play, although the mud it created may have been.

DISCUSSION

What Does Rachel Like To Do When Playing Outdoors? This case study indicated that Rachel had clear preferences regarding her outdoor play. She enjoyed high-speed activities, particularly slides. Rachel prefers to play outdoors with other people. Green (2013) suggested that young children prefer unstructured outdoor spaces to play in; Rachel's liking for playgrounds and 'human-made' objects appears to contradict Green's (2013) findings in this regard. Green's (2013) study was conducted with 12 children, aged 3 to 5 years, in Idaho. It appeared that most, if not all, of the children Green (2013) worked with lived in houses with backyards and access to "wide and open natural spaces for exploration" (p. 23) beyond their backyards. Rachel lived in an apartment, and a trip to a 'natural,' wilderness area would have required considerable planning and effort by her parents. On the other hand, Rachel could access a playground multiple times per week at daycare. It seems possible that young children's preferences for where they play outdoors are determined more by the children's current surroundings and previous experiences than by the outdoor spaces themselves.

Green (2013), Ghafouri (2012), and Caiman and Lundegård (2014) have all identified the importance of the social element in outdoor play, and Rachel's emphasis on enjoying group activities during outdoor play echoes their findings. Ghafouri (2012) observed 20 children, aged 3 to 4 years, in a city in Ontario; Caiman and Lundegård (2014) observed 6 children, aged 3 to 5 years, in suburban Sweden. Green (2013) showed that young children enjoy playing outdoors with their parents, and Ghafouri (2012) and Caiman and Lundegård (2014) found that young children's outdoor play and learning is enhanced when they can interact with their peers. Rachel indicated that she enjoyed outdoor play that included both her father and her friends, other young children. It appears that the social nature of outdoor play is common to young children from diverse locations and backgrounds.

What does Rachel think about outdoor play? Rachel enjoyed playing outdoors, and repeatedly indicated that it was "fun." There is very little research that addresses the question of whether young children enjoy outdoor play, specifically. Rather, this seems to be an assumption in most research into young children's outdoor play, outdoor learning, and environmental education; it is also assumed in the educational movement towards increasing young children's exposure to the outdoors. Based on my personal experience working with young children outdoors, I believe that most young children do enjoy playing outdoors, at least most of the time. The findings from this case study confirm my belief. Rachel indicated that she enjoyed playing outdoors even in the rain. Boileau (2011) worked with 32 young children, aged 3 to 5 years, in a small city in Ontario, and came to similar conclusions. Boileau (2011) found that all of the children enjoyed playing outdoors, and chose to remain outside when it started raining during an outdoor activity.

Rachel did not equate outdoor play with 'nature' play. This distinction has not been explored explicitly in much of the research that investigates young children's outdoor play, outdoor learning and environmental education. I believe this is due to the emphasis that environmental education places on the 'natural,' rather then the 'human-made,' environment (British Columbia Ministry of Education, 2007, 2008). My Master's research (Beattie, 2014), in which I investigated the conceptions of 'nature' held by 12 4 to 6 year olds from Toronto, Ontario, suggested that young children may understand 'nature' to be very different from 'the outdoors.' Further, my research indicated

[2] "Muddy buddies" are one-piece rain suits, similar to one-piece snowsuits, designed to be worn outdoors in rainy, muddy, or chilly weather. They only come in children's sizes.

that some young children do not want to be in 'nature,' although they enjoy going outside (Beattie, 2014). My work with Rachel in this case study supported this conclusion.

What are some characteristics of Rachel's outdoor play? The two major characteristics of Rachel's outdoor play were its social nature and its holistic nature. Rachel demonstrated and described her outdoor play as a social activity. I have discussed this aspect of her outdoor play, and how it confirmed the findings of other researchers in the field, above.

Rachel also described her outdoor play as involving her whole body; for instance, she often referred to climbing with her hands and feet. Further, she indicated that her outdoor play was more than a kinesthetic experience: her outdoor play had verbal, cognitive, and emotional elements as well. In Caiman and Lundegård's (2014) study, young children displayed these same four elements during their outdoor experiences. For Caiman and Lundegård (2014), this showed that the young children demonstrated agency during outdoor activities. Ghafouri (2012) also found that young children's self-directed outdoor play involved verbal, cognitive, emotional, and kinesthetic aspects.

Boileau (2011) indicated that verbal, cognitive, emotional, and kinesthetic skills are important elements of play, which should be included when developing outdoor learning or environmental education programs for young children. This case study supported Boileau's (2011) work. Further, this case study showed that these four elements of play are already present in Rachel's outdoor play. To me, this suggests that a transition from outdoor play to outdoor learning should focus on maintaining the verbal, cognitive, emotional, and kinesthetic elements that are already present, rather than introducing new ones.

Further research. As this research was a case study, there are limits to the generalizability of the findings. By combining and comparing this case with other work in the field, I have been able to suggest some broader conclusions. Further study will be necessary, however, before any broad claims can be made. In particular, I believe that further investigation into young children's preferences regarding activities and locations for outdoor play is called for; in addition, investigation of the reasons for these preferences should be undertaken.

More urgently, I believe that research that considers the links between outdoor play, outdoor learning, and environmental education must continue. There are many commonalities between the two, and these should be built upon so as to improve the early education environmental education programs that are developed. In particular, I am referring to the verbal, cognitive, emotional, and kinesthetic elements that appear in both activities. As well, both outdoor play and environmental education are social activities for young children. Research, and research methodologies, that take this into account should be developed.

Finally, the disparity between the 'human' and 'natural' environments that some young children may feel should be investigated further. Otherwise, early childhood environmental education may be taking place in locations where young children are uncomfortable, which is unlikely to lead to children forming positive, loving connections to nature. Offering early childhood environmental education programs in less 'natural' locations, such as playgrounds, may be a challenge, but it is a challenge that needs to be embraced. Ardoin, Clark, & Kelsey (2013) call for further research into environmental education in urban settings, and I add my voice to theirs. Environmental education for early childhood should be practiced in places that young children feel comfortable, and if those areas are not the 'natural,' wild locations traditionally associated with environmental education, then early childhood environmental educators must work to create programs that highlight the 'natural' elements of urban settings, and help young children to connect to the earth wherever they may be.

References

Ampuero, D., Miranda, C. E., Delgado, L. E., Goyen, S., & Weaver, S. (2015). Empathy and critical thinking: primary students solving local environmental problems through outdoor learning. *Journal of Adventure Education & Outdoor Learning*, *15*(1), 64–78. doi:10.1080/14729679.2013.848817

Ardoin, N. M., Clark, C., & Kelsey, E. (2013). An exploration of future trends in environmental education research. *Environmental Education Research*, *19*(4), 499–520. doi:10.1080/13504622.2012.709823

Ausubel, D. P. (2000). *The Acquisition and Retention of Knowledge: A Cognitive View [ebook edition]*. Dordrecht: Springer Science and Business Media. Retrieved from http://download.springer.com.ezproxy.library.ubc.ca/

Barraza, L., & Robottom, I. (2008). Gaining Representations of Children's and Adults' Constructions of Sustainability Issues. *International Journal of Environmental and Science Education*, *3*(4), 179–191. Retrieved from http://www.ijese.com/IJESE_V3_N4_Barraza.pdf

Beattie, A. E. (2014). *Assessing Young Children's Personal Constructs of "Nature" Using a Modified Repertory Grid Test: A Case Study*. (Master's thesis). Retrieved from ProQuest. (MS25352).

Bergman, B. G. (2015). Assessing impacts of locally designed environmental education projects on students' environmental attitudes, awareness, and intention to act. *Environmental Education Research*, 1–24. doi:10.1080/13504622.2014.999225

Blatt, E. N. (2014). An investigation of the goals for an environmental science course: teacher and student perspectives. *Environmental Education Research*, 1–24. doi:10.1080/13504622.2014.918935

Boileau, E. Y. S. (2011). *"It's alive!": An exploration of young children's perceptions of the natural world*. (Master's thesis). Retrieved from Proquest. (MR84622).

Boileau, E. Y. S. (2013). Young Voices: The Challenges and Opportunities That Arise in Early Childhood Environmental Education Research. *Canadian Journal of Environmental Education*, *18*, 142–154. Retrieved from http://cjee.lakeheadu.ca/index.php/cjee/article/view/1204/679

Breunig, M., Murtell, J., & Russell, C. (2014). Students' experiences with/in integrated Environmental Studies Programs in Ontario. *Journal of Adventure Education and Outdoor Learning*, 1–17. doi:10.1080/14729679.2014.955354

British Columbia Ministry of Education. (2007). *Environmental Learning and Experience. An Interdisciplinary Guide for Teachers*. Retrieved from http://www2.gov.bc.ca/assets/gov/education/kindergarten-to-grade-12/teach/teaching-tools/environmental-learning/environ_learning_exper.pdf

British Columbia Ministry of Education. (2008). *The Environmental Learning & Experience Curriculum Maps*. Retrieved from http://www.bced.gov.bc.ca/environment_ed/ele_curricmaps.htm

Caiman, C., & Lundegård, I. (2014). Pre-school children's agency in learning for sustainable development. *Environmental Education Research*, *20*(4), 437–459. doi:10.1080/13504622.2013.812722

Chawla, L. (2007). Childhood experiences associated with care for the natural world: A theoretical framework for empirical results. *Children, Youth and Environments*, *17*(4), 144–170. Retrieved from http://www.jstor.org.ezproxy.library.ubc.ca/stable/pdf/10.7721/chilyoutenvi.17.4.0144.pdf?acceptTC=true&jpdConfirm=true

Clark, A. (2001). How to listen to very young children: The mosaic approach. *Child Care in Practice*, *7*(4), 333–341. doi:10.1080/13575270108415344

Clark, A. (2007). A Hundred Ways of Listening: Gathering Children's Perspectives of Their Early Childhood Environment. *Young Children*, *62*(3), 76–81. Retrieved from http://www.jstor.org/stable/42730028

Danby, S., & Farrell, A. (2004). Accounting for young children's competence in educational research: New perspectives on research ethics. *The Australian Educational Researcher*, *31*(3), 35–49. doi:10.1007/BF03249527

Davis, J. (2009). Revealing the research "hole" of early childhood education for sustainability: a preliminary survey of the literature. *Environmental Education Research*, *15*(2), 227–241. doi:10.1080/13504620802710607

Den Hoed, R. C. (Ed.). (2014). *Forest and Nature School in Canada: A Head, Heart, Hands Approach to Outdoor Learning*. Forest School Canada. Retrieved from http://www.forestschoolcanada.ca/wp-content/themes/wlf/images/FSC-Guide_web.pdf

Driver, R., Asoko, H., Leach, J., Scott, P., & Mortimer, E. (1994). Constructing Scientific Knowledge in the Classroom. *Educational Researcher*, *23*(7), 5–12. doi:10.3102/0013189X023007005

Elliot, E., Eycke, K. T., Chan, S., & Müller, U. (2014). Taking Kindergartners Outdoors: Documenting Their Explorations and Assessing the Impact on Their Ecological Awareness. *Children, Youth and Environments*, *24*(2), 102–122. Retrieved from http://www.jstor.org/stable/10.7721/chilyoutenvi.24.2.0102

Evers, S. J. T. M. (2011). Kinning in the Imagination: Perceptions of Kinship and Family History among Chagossian Children in Mauritius. In S. J. T. M. Evers, C. Notermans, & E. van Ommering (Eds.), *Not Just a Victim: The Child as Catalyst and Witness of Contemporary Africa*. Leiden, Boston: Brill. Retrieved from https://openaccess.leidenuniv.nl/bitstream/handle/1887/31974/ASC-075287668-2972-01.pdf?sequence=2

Ghafouri, F. (2012). Close encounters with nature in an urban kindergarten: a study of learners' inquiry and experience. *Education 3-13*, 1–23. doi:10.1080/03004279.2011.642400

Gill, T. (2014). The Benefits of Children's Engagement with Nature: A Systematic Literature Review. *Children, Youth and Environments*, *24*(2), 10–34. Retrieved from http://www.jstor.org/stable/10.7721/chilyoutenvi.24.2.0010

Government of Canada. (2015). Children's Human Rights. *Canada.ca*. Retrieved from http://www.international.gc.ca/rights-droits/kids-enfants/index.aspx?lang=eng

Gray, C., & Winter, E. (2011). Hearing voices: participatory research with preschool children with and without disabilities. *European Early Childhood Education Research Journal*, *19*(3), 309–320. doi:10.1080/1350293X.2011.597963

Green, C. (2013). A Sense of Autonomy in Young Children's Special Places. *International Journal of Early Childhood Environmental Education*, *1*(1), 8–31. Retrieved from http://www.naaee.net/sites/default/files/publications/IJECEE/6. IJECEE First Issue Research Study Sense of Autonomy FINAL.pdf

Hand-In-Hand Early Years Nature Education Program Comox Valley. (n.d.). Retrieved from http://hand-in-handeducation.com/

Harcourt, D., & Mazzoni, V. (2012). Standpoints on quality: Listening to children in Verona, Italy. *Australasian Journal of Early Childhood*, *37*(2), 19–26. Retrieved from http://content.ebscohost.com.ezproxy.library.ubc.ca/

Hedefalk, M., Almqvist, J., & Östman, L. (2014). Education for sustainable development in early childhood education: a review of the research literature. *Environmental Education Research*, 1–16. doi:10.1080/13504622.2014.971716

Kalvaitis, D., & Monhardt, R. M. (2012). The architecture of children's relationships with nature: a phenomenographic investigation seen through drawings and written narratives of elementary students. *Environmental Education Research*, *18*(2), 209–227. doi:10.1080/13504622.2011.598227

Kuh, L. P., Ponte, I., & Chau, C. (2013). The impact of a natural playscape installation on young children's play behaviors. *Children, Youth and Environments*, *23*(2), 49–77. Retrieved from http://www.jstor.org/stable/10.7721/chilyoutenvi.23.2.0049

Leech, N. L., & Onwuegbuzie, A. J. (2008). Qualitative data analysis: A compendium of techniques and a framework for selection for school psychology research and beyond. *School Psychology Quarterly*, *23*(4), 587–604. doi:10.1037/1045-3830.23.4.587

Mason, J., & Danby, S. (2011). Children as Experts in Their Lives: Child Inclusive Research. *Child Indicators Research*, *4*(2), 185–189. doi:10.1007/s12187-011-9108-4

Maxwell, T. (2006). Researching into some primary school children's views about school: Using personal construct psychology in practice with children on the special needs register. *Pastoral Care in Education: An International Journal of Personal, Social and Emotional Development*, *24*(1), 20–26. doi:10.1111/j.1468-0122.2006.00357.x

Nature Kindergarten 2012-2013. (2013). Retrieved from http://naturekindergarten.sd62.bc.ca/wp-content/uploads/2013/11/Nature-Kindergarten-Report-September-2013.pdf

Prince, H., Allin, L., Sandseter, E. B. H., & Ärlemalm-Hagsér, E. (2013). Outdoor Play and Learning in Early Childhood From Different Cultural Perspectives. *Journal of Adventure Education & Outdoor Learning*, *13*(3), 183–188. doi:10.1080/14729679.2012.672242

Punch, S. (2002). Research with Children: The Same or Different from Research with Adults? *Childhood*, *9*(3), 321–341. doi:10.1177/0907568202009003005

Rickinson, M. (2006). Researching and understanding environmental learning: hopes for the next 10 years. *Environmental Education Research*, *12*(3-4), 445–457. doi:10.1080/13504620600799182

Robbins, J. (2005). Contexts, Collaboration, and Cultural Tools: a sociocultural perspective on researching children's thinking. *Contemporary Issues in Early Childhood*, *6*(2), 140–149. Retrieved from http://cie.sagepub.com/content/6/2/140.full.pdf+html

Rogoff, B. (2003). Orienting Concepts and Ways of Understanding the Cultural Nature of Human Development. In *The Cultural Nature of Human Development*. Oxford, UK: Oxford University.

Rosenow, N., & Bailie, P. (2014). Introduction to the Special Issue: Greening Early Childhood Education. *Children, Youth and Environments*, *24*(2), 1–9. Retrieved from http://www.jstor.org/stable/10.7721/chilyoutenvi.24.2.0001

Sobel, D. (1998). Beyond ecophobia. Retrieved from http://www.yesmagazine.org/issues/education-for-life/803

Stanger, N. R. G. (2014). *(Re)placing ourselves in nature: An exploration of how (trans)formative places foster emotional, physical, spiritual, and ecological connectedness (iBook ebook)*. (Doctoral dissertation).

Starks, H., & Trinidad, S. B. (2007). Choose Your Method: a Comparison of Phenomenology, Discourse Analysis, and Grounded Theory. *Qualitative Health Research*, *17*(10), 1372–80. doi:10.1177/1049732307307031

United Nations. (2015a). UNTC: Chapter IV Human Rights 11. Convention on the Rights of the Child. Retrieved from https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=IV-11&chapter=4&lang=en

United Nations. (2015b). UNTC: Ratification. Retrieved from https://treaties.un.org/pages/Overview.aspx?path=overview/glossary/page1_en.xml#ratification

Yin, R. K. (2009). *Case Study Research. Design and Methods* (4th ed.). Thousand Oaks, CA, USA: SAGE Inc.

A. Elizabeth Beattie is with the Department of Curriculum and Pedagogy, Faculty of Education, University of British Columbia. She can be contacted at lizbeattie22@gmail.com.

International Journal of Early Childhood Environmental Education, 3(1)

ISSN: 2331-0464 (online)

Children as "Solutionaries": Environmental Education as an Opportunity to Take Action

Elizabeth O. Crawford
University of North Carolina Wilmington

Nancy Luke
Western Carolina University

William Van Pelt
HeartGift, Austin, Texas

Submitted October 3, 2014; accepted September 30, 2015

Abstract

"Do You Want Paper or Plastic?" *An Inquiry into Single-Use Grocery Bags* is an inquiry-based, solutions-focused environmental education unit developed for the U.S. Fund for UNICEF. Field-tested in two U.S. southeastern regions, the unit engages students as informed change makers who investigate the production, consumption, and disposal of single-use, disposable grocery bags. Based upon their inquiries, students become empowered as "solutionaries," or individuals who plan and implement action steps that lead to a sustainable future. Results from the curriculum pilot offer support for the importance of interdisciplinary environmental education in the elementary setting.

Keywords: curriculum, inquiry, environmental sustainability, plastic pollution, global citizenship, STEM

CURRICULUM OVERVIEW

Using large format photography, "Plastic Bags" by artist Chris Jordan (2007) (see Figure 1) depicts our mass consumption of single-use bags - 60,000 every five seconds in the U.S. alone. Statistics like these pertain to the study of everyday "stuff," including how a product is made, who invented it, the raw materials used, why and how it changes over time, and whether there is a more sustainable process to meet our human wants and needs.

Figure 1: Chris Jordan's (2007) "Plastic Bags[1]"

[1] This is for online journal use, one issue only. For any subsequent uses, permission must be obtained. Credit: Photo by Chris Jordan, www.chrisjordan.com.

A Framework for K-12 Science Education (National Research Council, 2012) reinforces the interrelated nature of science, technology, engineering, and mathematics (STEM), and inspires learners to create solutions to 21st century global challenges. Engaging in scientific inquiry about the materials economy fosters learning in all three dimensions of the NRC framework: (a) **practices** (scientist behaviors); (b) **crosscutting concepts** (those that are transdisciplinary and apply to all domains of science); and (c) **disciplinary core ideas** (key ideas that focus learning and investigation in the physical, life, and earth space sciences, as well as engineering, technology, and applications of science). Specifically, students analyze cause and effect relationships in interdependent local and global systems, gather and analyze data, use technology in authentic ways, and explore the design and development of solutions to problems. As students weigh the intended (and often unintended) effects of innovations like single-use, disposable grocery bags, they conclude there is no "best" solution, but rather many solutions to solve complex, global issues.

This article details the design and field-testing of an inquiry-based, solutions-focused environmental curriculum unit entitled "*Do You Want Paper or Plastic*? *An Inquiry into Single-Use, Disposable Grocery Bags.*" Developed on behalf of TeachUNICEF, the Education Division of the U.S. Fund for UNICEF, this unit addresses UN Millennium Development Goal (MDG) #7 *Ensure Environmental Sustainability* (United Nations, n.d.). Importantly, "*Do You Want Paper or Plastic*?" affords "opportunities for young learners to engage in exercises of ecological citizenship," says Dr. Jay Shuttleworth, a scholar of environmental sustainability at Teachers College, Columbia University. He continues:

> *This carefully considered curriculum links being informed about sustainable living with matters of civic responsibility. Through potentially existential inquiries about where consumer goods "come from" and discarded items "go," this curriculum also creates the potential for students to recognize the interconnectedness of the natural world. Most importantly, the lessons may lead participants-- with minimal prodding from the teacher-- to conclude that the answer to "paper or plastic?" may be derived from a different source altogether (like, "I brought my own bags."). Thus, the instructional objective of students as "solutionaries" offers possibilities to challenge assumptions about consumer habits, and as a result, forge new paths of understanding and action-taking.* (J. Shuttleworth, personal communication, June 24, 2015).

Informal science educator and doctoral candidate at the University of Maryland College Park, Emily Hestness, agrees. "*Do You Want Paper or Plastic*?" helps to meet the "growing need for curricular materials that help educators to foster the competencies, knowledge, dispositions, and actions necessary for environmentally literate citizens (E. Hestness, personal communication, June 24, 2015). It also easily connects to existing curriculum standards (e.g., Common Core State Standards, Next Generation Science Standards), says Dr. Scott Morrison, Assistant Professor at Elon University with a specialization in environmental and ecological studies (S. Morrison, personal communication, June 29, 2015).

Intentionally flexible in design, *"Do You Want Paper or Plastic*?" is adaptable to diverse early and elementary grades and contexts, as teachers consider students' prior knowledge, experiences, and interests in exploring sustainability issues and possible solutions to resolve them. The focus on student inquiry is key, as it "allows teachers to adjust lessons based on student knowledge, ability, and interest" (S. Morrison, personal communication, June 29, 2015). Further, the content is relevant to the lives of students. Morrison continues: "[Students] all consume products and participate in what Annie Leonard calls 'the materials economy.' What they see, use, and throw away everyday becomes part of the curriculum."

Figure 2. Photograph of beach plastic on a Taiwanese shore (Terry, 2014).

Finally, although "*Do You Want Paper or Plastic*?" focuses on one specific issue, the inquiry design allows the content to be easily substituted. Hestness explains, "[this resource's] approach may be applied to the investigation and analysis of myriad environmental issues of personal relevance and interest to learners" (E. Hestness, personal communication, June 24, 2015). Morrison concurs, adding "the inquiry-based structure is a model for other units on sustainability, so the use of the guide extends beyond the paper and plastic bag issue" (S. Morrison, personal communication, June 29, 2015).

RATIONALE

As children develop as learners and thinkers from birth through high school, it is their teachers (including parents) who help shape their understanding of the world directly around them and, by extension, the world as a whole. This understanding is multifaceted and includes understandings related to the natural world and the interaction between humankind and the environment (Duhn, 2012; Pearson & Degotardi, 2009). It is important, as Christenson (2004) notes, for teachers to help young children develop critical thinking about their world by teaching them that human interactions and decisions that impact the environment are made for both diverse and complex reasons. By examining and understanding these cause and effect relationships, children can develop the ability to make more informed and deeply considered decisions, not only about the environment but, how they view and interact with the choices that others make. Christenson further states that for young children "environmental education (EE) must also help develop the social knowledge and critical thinking skills that are necessary for examining diverse viewpoints on environmental issues" (p. 3).

While many early childhood and elementary teachers affirm the need to teach EE, some are reluctant to do so for a variety of reasons including concerns with covering potentially controversial content, frightening students with exploration of destructive human or natural events, or potentially upsetting parents (Christenson, 2004; Duhn, 2012). "Too many teachers leave students feeling helpless in the face of environmental destruction," explains Morrison (S. Morrison, personal communication, June 29, 2015). Research supports this notion. As Özsoy and Ahi (2014) studied the drawings of elementary children depicting the current and future state of the environment, for example, they found that children's perceptions ranged from hopeful to bleak. What may be inferred from these findings and from others (e.g., Davis, 2009) is that young children have a beginning context for understanding and representing the environment yet there is also a need to help children engage in exploration and inquiry so that they may more deeply comprehend environmental issues such as sustainability, recycling, and social action. Instead of overwhelming students, "*Do You Want Paper or Plastic*?" is designed to empower students to consider the positive differences they can make.

The need to address EE using effective and innovative approaches is indeed reflected throughout the world (Conde & Sanchez, 2009; Dimopoulos, Paraskevopoulos, & Pantis, 2009; Sagy & Tal, 2015) as schools, teachers, and educational systems turn their focus to developing and implementing meaningful and authentic integrated units of study to address topics related to exploring, understanding, and caring for our global resources and environment. Dimopoulos, Paraskevopoulos, and Pantis (2009) field-tested a module for young children that focused on endangered species in protected areas with positive results affirming the use of this model for future EE units of study. Sagy and Tal (2015) presented a landscape view of EE in Israel's schools looking at both historical and current practices and encouraging increased commitment from systems and teachers to integrate environmental education in the curriculum.

Further, Conde and Sanchez (2010) investigated the influence, effectiveness and efficiency of environmental education using an eco-audit approach in 13 primary and pre-primary Spanish schools. Their findings gathered via participatory action research methodology indicated progress in successful integration of EE but also the need for further research into the "treatment of the content, the preparation of materials, [and] the motivation and habits and attitudes of the pupils" (p. 491). Additionally, conducting research on the potential of EE curricula to positively impact the hearts and minds of young learners with regard to the environment is specifically needed. Research studies of this kind are gradually increasing, but as Hardy (2011) asserts, there is a continued need for empirical and robust testing of EE curricula's effectiveness in "cultivating responsible environmental behavior and other components of environmental literacy (knowledge, affect, and skills)" (p.1).

In another study, Forbes and Zint (2010) found that certain elements must be in place for elementary teachers to strengthen and develop their beliefs about and practices related to the power of inquiry to support children's learning about the environment. One of these factors was access to appropriate and meaningful EE curriculum materials. While there exist many curricula that address topics inherent in EE, such as sustainability and social action, what makes "*Do You Want Paper or Plastic?*" unique and particularly helpful for teachers of early and elementary learners is the natural integration of many essential ideas and practices that incorporate multiple subject areas. While other curricula may include some important knowledge, skills, and dispositions related to current educational practice, including EE, this unit seeks to inclusively weave together essential 21st century skills (Partnership for 21st Century Skills, 2009) including: inquiry (e.g., research processes, critical thinking, collaboration, and problem solving); multimodal, environmental, and global literacy; environmental awareness of the interdependence of all living things; and the authentic and developmentally appropriate use of technology to represent knowledge and understanding.

Resources were indeed purposefully selected in the development of "*Do You Want Paper or Plastic?*" As Christenson (2004) found in her action research with fellow elementary teachers, using quality children's literature was an effective strategy in teaching multiple perspectives and critical thinking about the environment including issues such as recycling. *"Do You Want Paper or Plastic*?" includes high quality children's literature throughout to scaffold students' ability to take multiple perspectives and their understanding of concepts related to the materials economy and the positive and negative effects of innovations on humans, animals, and the environment, as highlighted in Table 1 (see next page).

Table 1
Sample Descriptions and Applications of Children's Literature in "Do You Want Paper or Plastic"?

Book Title	**Brief Description and Application**
Browne, A. (1998). *Voices in the park.* New York: DK Publishing.	The same story is told from four different perspectives illustrating to the reader that there is more than just one way to interpret an event, situation, or setting. Students can discuss and write about examples from their own lives in which they saw multiple perspectives at play. Younger children can explore and share the differences between fact and opinion and accept that they may differ from their peers in how they feel or think about a particular situation or idea related to the environment.
Claybourne, A. (2007). *The story of inventions*. Tulsa, OK: EDC Publishing.	The history and impact of a variety of inventions (e.g. spectacles, jeans, computers) is described with a unifying theme that innovation has an effect on our society and the way we live. Students can research other inventions as part of their inquiry and can also brainstorm and discuss inventions that have impacted their lives and the world around them. Younger children can collaboratively create a class picture book choosing and drawing an invention and then listing one way it helps them and one way it may negatively affect their life or their environment.
Deedy, C.A., & Seeley, L. L. (1994). *Agatha's feather bed: Not just another wild goose story*. Atlanta: Peachtree Publishers.	In this children's book the theme of "*Everything comes from something, / Nothing comes from nothing*" is reinforced in an engaging and humorous story. Teachers can use this book as a springboard for a discussion on renewable or non-renewable resources. For younger children, photos of renewable and non-renewable resources can be sorted as part of a learning station or guided small group activity.

In addition to understanding and engaging in inquiry about the environment, children should also examine and discover ways to take action for making their world a healthier and more sustainable place (Locke, 2009). Through investigating case studies of practices and attitudes toward consumption among elementary Dutch children, Kopnina (2013) found that some students, particularly those of lower socioeconomic status, "exhibited less awareness of environmental impact of consumption and less belief in their own agency in bringing about positive change" (p. 131) while others were able to "perceive the link between (over) consumption and [the] environment" (p. 133). The variability of these results may indicate a need for focused early childhood and elementary curriculum that encourages not only awareness but also support for students to make changes in their individual behavior as well as take social action to improve the environment. Strong environmental education curricula that are cross-disciplinary as well as socially conscious can be supported by children's literature as stated above (Christenson, 2004), as well as by the innovative uses of digital technologies (Willis, Weiser, & Kirkwood, 2014). In each lesson, *"Do You Want Paper or Plastic*?" offers sample technology applications for use by teachers and students, as appropriate based on students' ages and context. Sample digital resources and their possible applications are detailed in Table 2.

Table 2
Sample Descriptions and Applications of Digital Resources in "Do You Want Paper or Plastic"?

Digital Resource	**Brief Description and Application**
Animoto: Video creation (https://animoto.com/)	Children can upload images and add captions, audio narration, and music to create an online video that shows what they have learned as a result of their inquiry and/or to support ways in which they "take action".
Delicious: Social bookmarking (https://delicious.com/)	Teachers and students can collaboratively store and publically access web sites that guide and support their inquiry in one online location. Links can also be categorized and annotated based on topics related to their study of sustainability and the environment.
Glogster: Online posters (http://edu.glogster.com/)	This tool supports students to create digital, interactive posters on a website that specifically targets K-12 classrooms. Children can embed and link to text, images, audio and video files to represent content, ideas, and perspectives related to their research.
Padlet: Wonder Wall online (https://padlet.com/)	Collections of student questions or "wonderings" as they begin and throughout the unit can be posted and collected either publically or behind password protection on this digital board. The web link to students' questions can also be shared with parents.

Lastly, Davis (2009) asserts the need for more research related to environmental education and early childhood including investigating the effectiveness of multidisciplinary and social action oriented curricula, "exemplars of practice" (p. 235) such as the field-tested unit of curriculum described in this article.

THE CURRICULUM

"*Do You Want Paper or Plastic*?" includes six lesson plans with recommended extension activities. Scaffolded using Kath Murdoch's (1998) inquiry model, students learn about the origin of common goods, the effects of consumption on living things and the environment, and why governing bodies worldwide have imposed restrictions on single-use plastic bags. The unit follows the philosophy of solutionary education, defined by the Institute for Humane Education (n.d.) as:

> *Someone who identifies inhumane, unsustainable, and exploitative systems and then develops practical, effective, and visionary solutions, both large and small, to replace them with those that are restorative, healthy, and just. Solutionaries bring their knowledge and skills to bear on pressing and entrenched challenges in an effort to create positive changes for all people, animals and the earth.* (paras. 1-2)

Making informed decisions regarding consumption habits is deemed a civic responsibility and aims to empower children as individuals who plan and implement action steps that lead to a sustainable future. This unit outlines how educators may implement inquiry-based teaching and learning about the specific issue of single-use,

disposable grocery bags; however, any material good and its related environmental and human health issues can be researched, analyzed, and acted upon by students.

First, we developed a curriculum framework structured around the Murdoch inquiry model, outlining broad, open-ended questions and enduring understandings, or transferable "big ideas." Afterwards, we created topic-specific questions related to the specific issue of single-use grocery bags (Table 3). While the sequence of these questions is intentional and guide students' investigations and decision-making, they also afford flexibility. The unit neither intends to answer questions for students nor to instruct them how to develop solutions to the issues presented. Students are encouraged to delve deeply into the problems, to draw their own conclusions, and to make decisions regarding how they may be "solutionaries".

Table 3
"Do You Want Paper or Plastic?" Curriculum Framework

Lesson	**Enduring Understanding**	**Overarching Questions**	**Topical Questions**
Lesson 1: "Tuning In" to Consumption	The goods we purchase are made from limited natural resources; therefore, we must make informed, thoughtful choices as consumers.	Where do the goods come from? How are goods produced and distributed?	What are paper and plastic bags made from? How are they produced? How are bags distributed to local grocery stores?
Lesson 2: "Finding Out" about Human Innovation	Scientific discoveries and technological innovations affect the way society functions. These changes may result in predictable /unpredictable, positive / negative effects on living things and the environment.	How do advancements in science and technology affect society?	What led to the production of paper and plastic bags? How have they evolved over time and why? What are the perceived benefits and drawbacks of paper and plastic bags to society?
Lesson 3: "Sorting Out" Diverse Perspectives	People have diverse perspectives that may explain the behaviors of individuals and groups. Sometimes these different points of view lead to conflict.	What does it mean to have a perspective or point of view? How does one's perspective affect or influence one's behaviors?	What perspectives do stakeholder groups have regarding the production, consumption, and disposal of paper and plastic bags?
Lesson 4: "Going Further": Local to Global Bag Politics	Governing bodies affect the choices or decisions we make as consumers through the implementation of laws and policies.	What is the role of the government in regulating the production, distribution, consumption, and disposal of products?	What local, national, and international laws and policies have been passed regarding paper and plastic bags?
Lesson 5: Making Conclusions, Making Informed Choices	Being an informed citizen is a civic responsibility.	What are the effects of consumerism on humans, other living creatures, and the environment?	What happens when paper and plastic are thrown away? Where is "away"? What are the effects of disposal?
Lesson 6: "Solutionaries" Taking Action	An individual's choices and actions can have a positive impact on others and the environment. Anyone can be a "solutionary"!	How can individuals, groups, and nations work together to solve problems?	In what ways can I make positive choices regarding consumption of goods to lessen my impact on the local environment and the entire planet?

The Inquiry Model

Each lesson plan includes two parts. Part I builds interdisciplinary background knowledge. Part II outlines the teacher's facilitation of the inquiry model that we made into a student-friendly poster to be displayed in the classroom (Figure 3). Subsequent sections of this paper describe each stage and its relationship to the content under study. Reflective of the unit's flexible design, the teacher may determine students have adequate prior knowledge and skills addressed in Part I and proceed to Part II. Within each lesson, a variety of resources are provided, including sample children's literature and technology tools for teaching and learning, as explained previously.

Field-Testing the Inquiry

We field-tested the unit in six third-grade classrooms located in two regions: coastal Georgia and western North Carolina. The classroom teachers taught the lessons and were asked to provide written feedback regarding their effectiveness, as well as to suggest improvements. Each student maintained an inquiry journal and completed authentic projects, offering insights about their mastery of the unit goals and objectives.

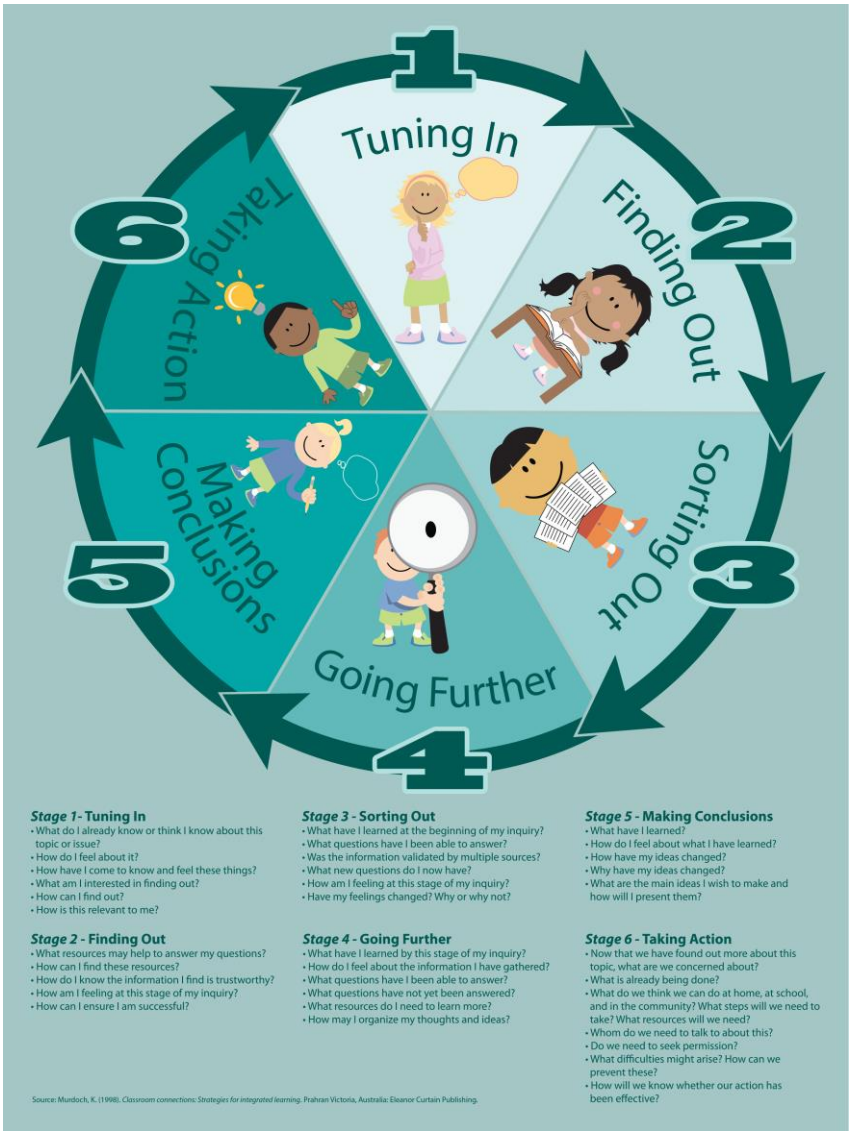


Figure 3. Kath Murdoch inquiry cycle.

Pre-Assessment: Causes and Effects of Environmental Issues

Prior to beginning the unit, each student completed a pre-assessment table of knowledge and perceptions in his or her inquiry journal. During the pilot, it was evident that most third graders understood cause and effect relationships *and* could identify specific examples that related to human-environment interactions. This allowed teachers to begin Lesson 1 without introducing or reviewing this overarching concept as it is woven throughout the unit. Table 4 highlights a compilation of written responses from both regions. (Note: To maintain the integrity of the students' original voices, their words are presented throughout the manuscript in the original spelling and grammar).

Table 4.
Student Pre-Assessment of Human-Environment Cause and Effect Relationships

Issue or Problem	What Caused It?	What are the Effects?
Littering	Throwing trash in environment	Harm the environment
Oil spills	Explosion	Animals die
Paper bags	Grocery shopping	Killing trees
Animals coming into cities	Humans tearing down habitats Not too many predators	Animals coming closer into cities and towns
Deer are overpopulating	People	Deer create big troubles
Cutting down trees	Careless people	Less oxygen
Wasting water	Driving car	Less water to drink
Gasses/pollution	Matches	Harm to animals
Fire		Burn
No trees	Too much paper made	No habitat for animals
Damage	Hurricane or tornado	The world world
Bad water	Lead	Getting sick
Pollution	Oil spill	Oil in the water

Lesson 1: "Tuning In" to Consumption

> *Everything comes from something,*
> *Nothing comes from nothing.*
> *Just like paper comes from trees,*
> *And glass comes from sand.*
> — Carmen Agra Deedy
> (Excerpt from *Agatha's Featherbed: Not Just Another Wild Goose Story)*

Prompted by common household items such as canned goods and shampoo bottles, students explore the origin of everyday products. *Where have you seen these items? How are they used? What do you know about how they are made?* They discover that all goods have a *story* or a *life cycle*—how they are manufactured or produced, shipped or distributed, and used and disposed of by consumers. At their basic, raw level, all products are made from natural resources. Following a teacher-guided discussion and a read-aloud such as *Agatha's Featherbed* by Carmen Agra Deedy and Laura L. Seeley (1994), students learn whether the natural resources used to make goods are renewable or non-renewable. They can then create a graphic organizer such as a T-chart using *renewable* and *non-*

renewable as headings and then list the resources in what they think is the correct column. Feedback from the pilot indicated that most students categorized resources similarly, labeling trees as *non-renewable*. Although most trees can be classified as renewable, the students were indeed correct: some trees do take longer to regrow than humans currently use them. This resulted in our revision of the final unit, clarifying that some natural resources are both renewable *and* non-renewable.

In Part II, students begin their inquiry by "tuning in." The teacher displays a paper bag and a plastic bag. Students record what they *think they know* and what their *wonderings* are about this issue in their inquiry journals. The teacher can also designate wall space within the classroom, often referred to as a "Wonder Wall," on which students post their questions or "wonderings" on sticky notes. These notes, with their questions, serve to support and document their investigations. Sample student "wonderings" from the pilot included:

- *Why do people litter and hurt our environment?*
- *What will happen if we keep littering?*
- *How many trees die to make paper, and how many animals die because of plastic in the ocean and on land?*
- *What is plastic made of?*
- *Is paper better than plastic?*
- *How you could destroy plastic better, so it does not hurt the environment.*
- *I wonder what if we lose trees and the oils, what will happen to earth?*
- *I whant to know how we can make sure people do not waist paper or plastic because if you waist paper and plastic for something really waistful and then throw it away we wouldn't have a lot of paper or plastic, and then we won't have a lot of trees for paper.*
- *I want to find out how many things that are in the trash, that are supposed to be rycicled.*

Students' questions focused their research throughout the inquiry and were revisited in each lesson.

Lesson 2: "Finding Out" about Human Innovation

The second lesson builds students' understanding of the production of goods with a focus on *why* new goods are made to replace older products or ideas. By reading books like *The Story of Inventions* **(**Claybourne & Larkum, 2007), students discover the intentional and unintentional consequences of human innovation. They record reflections to questions such as: *Is a new discovery or technology always better than that which it replaces? Why or why not*? Student responses suggested that innovations like iPads were overall positive, but that not all technologies improve human life. For example, one student wrote, "Som people like books better than nooks." During Part II, students participated in small research groups, taking notes from a variety of print-based and digital sources that were saved on a class social bookmarking account (Figure 4).

Whereas most students focused their research on commonly used technology tools, others researched the specific innovation of paper and plastic bags. Handwritten notes based on print-based and digital research included:

- *First plactic sandwitch bag was made in 1957. Between 25 and 30 percent of packing for bread is plactic. Only 1 to 2% of plastic are getting recycled in the USA. Paper is better.*
- *Approx. 380 billon bags are used in the united states every year. That's more than 1,200 bags per year. In 1852 paper bags were made 1852-2012 In 1957 plastic bags were made, 1957-2012*
- *1957- First plastic sandwich is made. 1966- Between 25 and 30 percent of packing for bread is plastic. 1969- New York City begins collecting garbage in plastic bags. 1974- Retail giants sears and J.C. Penny switch to plastic shopping bags. !977- Super markets begin to say: paper or plastic? 1994- Denmark creats firs plastic bag tax. 1997- Over 80% of all bags used are plastic. 2002- Ireland interduses the worlds first consumer paid plastic bag tax.*

- *There are diffrant plastic bags and are used for many purposes. In 1996 over 80% of all bags used are plastic. In 1957 the first sandwich bag was made. Approx. 380 billion plastic bags are used in the United States every year. That's more than 1,200 bags per US resident, per year.*

Early in these investigations, students determined the complexity of human innovations and how they can result in both beneficial and harmful impacts on humans, animals, and the environment.

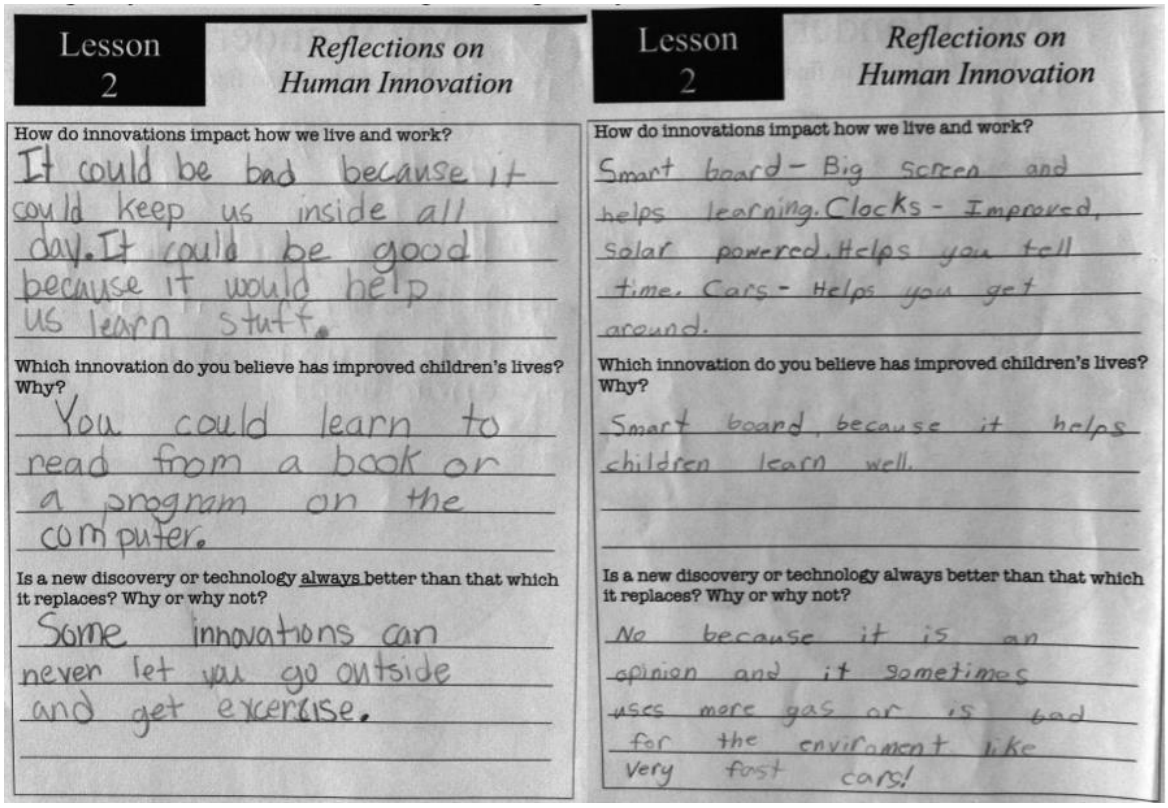


Figure 4. Georgia (left) and North Carolina (right) third grade student reflections on human innovation.

Lesson 3: "Sorting Out" Diverse Perspectives

In this third lesson, students' skills in perspective-taking are enhanced through reading and discussing a work of fiction, such as *Voices in the Park* (Browne, 1998), relating point of view and author's voice to stakeholder perspectives. By being introduced to a variety of perspectives, students begin to *sort out* their research findings and to validate sources of information as they continue their investigations. They also reflect on their *feelings* during the inquiry, determining whether and how they have changed. Contrary to the lesson's focus on flexible thinking, the majority of students shared that their feelings remained constant, with most expressing persistently negative perceptions of plastic. "I still think paper is better because it decomposes quicker and paper is made out of trees and uses a renewable resource," one recorded in her journal. Another wrote:

> *I feel like paper & plastic are two very very different things. [Have my feelings changed? Why or why not?] No, because I still lik paper much much more. I like paper more because it is better for the envirerment and decomposses faster.*

Another student supported this belief: "My feelings haven't changed. I still think plastic is worse." Some admitted to feeling affirmed by their unchanged perspectives. For example, one wrote: "I feel great about what I've learned. My feelings have not changed. All of our research is leading to paper." Unaltered perceptions aside, another

explained that research has been helpful because "I have bin learning many more ways paper is better than plastic."

A few students expressed being upset by what they were learning (even if feelings remained the same). For example, one student wrote, "I feel sad because some animals died. My feelings haven't changed." Another shared:

> *I am mad about what I have been learning. People are littering way too much. A lot of trash is going into the ocean and killing animals. My feelings have not changed because I still think paper is better.*

In sum, while a few students in each class did express changing their perspectives as a result of the inquiry (e.g., "My feelings have changed a little bit because I didn't recycle and used to use plastic bags"), the majority expressed unchanged beliefs. This finding suggests, perhaps, that some students may be less open to new information that changes their existing core belief structure about the environment and issues of sustainability.

Lesson 4: Going Further - Local to Global Bag Politics

Students *go further* in their inquiry by learning how local, national, and international groups have responded to this issue of single-use, disposable grocery bags. The child-friendly version of the documentary film *Bag It!* (Hill & Beraza, 2010) and websites such as ChicoBag (https://www.chicobag.com/track-movement) (2014) allow one to "Track the Movement" around the world. Students conclude how complex, controversial, and ever evolving are environmental concerns, economic systems, and politics. Through collaborative research, students discover that policies set in place by governing bodies affect consumers' choices. During the pilot, many students expressed disdain for taxes and regulations, such as fees imposed on single-use grocery bags. Sample written comments included:

- *It is not fair to other people to get charged for what they buy becquse they will run out of money.*
- *We should be able to use what we want to do! Government you stink.*
- *It's not fair to us. Because maybe we can't pay that much.*
- *We should be alould to use plastick bags.*
- *I dont think it is fair because some people need bags and dont want to pay 10 cent.*

Other students appeared to support governmental regulations when human activity causes harm. For example, one wrote that bags "can get in the ocean or kill animals." Another agreed: "[the government] may place a ban because it is polluting the envirment." Finally, one student specifically referenced the role of government in protecting human safety: "People throw their single-use plastic bag on the road and could get cought in other people on the road and could reck."

Lesson 5: Making Conclusions, Making Informed Choices

Drawing upon their research-based findings and reflections, students begin to *make conclusions* regarding the issue under investigation. They learn about human rights by watching *Cartoons for Children's Rights* (UNICEF, 2004) and discover their related responsibilities to one another and to the environment. Students reflect upon how their ideas and feelings have changed throughout the inquiry, ultimately deciding upon what is most essential to communicate with others. Conclusions made by students during the pilot varied, some citing specific statistics they wanted to share, others explaining the negative effects of both paper and plastic bag production and disposal. Sample written statements included:

- *Both Plastic and PaPer are bad because Plastic is bad for the enviromen and PaPer cuts trees and we would not have any oxshugen and we will die.*

- *Americans use about 100 billion plastic bags per year. Paper bags are better for the enviroment. Paper goes through a better prosses of recycling.*
- *I think we should put a ban on plastic. Using a high quality bad helps stop you from using disposeble begs each year I think we should have all of* those rights from the story.

Several students commented specifically on the inquiry process, calling it "fun," whereas others elaborated: "Research is inportant because you look things up and you get to know more about paper and plastic. And keeping our enviroment safe and clean!" We were pleased to learn that many students expressed awareness that being informed is an essential part of one's civic duties.

Lesson 6: "Solutionaries" Taking Action

In this culminating lesson, students determine how they can become change agents. Inspired by "solutionaries" worldwide, students review a list of possibilities in their inquiry journals, such as "design a poster by hand or using technology (e.g., Glogster)" or "write a script and create a video (e.g., Animoto) to promote awareness." Students decide how they will take action. The North Carolina third graders chose among the options, some crafting a sign-up sheet to "join the environment club" and collecting peers' signatures. Unfortunately, due to time constraints at the end of the school year and standardized testing in the 3rd grade, they were unable to implement their plan. In contrast, through a coordinated effort of the teachers, students, and parents in Georgia, the school participated in a community "Let It Shine" art exhibit. The third graders designed artwork and selected their favorite (Figure 3), which was screen-printed on reusable cloth bags and sold to raise money for UNICEF. In collaboration with a local environmental artist, they also created a quilt made of plastic bags and large-scale sculptures using recycled materials (Figure 5). The students put STEM into action through their research, design, and implementation of their chosen solutions, which was personally meaningful and had an impact in their communities.

Figure 5. Original student artwork to bring awareness to the issue of single-use, disposable grocery bags.

Figure 6. Student-created plastic quilt and fish sculpture using recycled materials displayed at the community art exhibit.

CONCLUSION

To raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and marks real advance in science.
— Albert Einstein

"*Do You Want Paper or Plastic?*" challenges learners to consider the complex relationships between environment, society, technology, and science – including ethical questions they may face as consumers and citizens – and, ultimately, to translate these deliberations to informed and responsible action" (E. Hestness, personal communication, June 24, 2015). As a common household good, disposable bags were relatable to students in both regions. Although student perceptions of paper and plastic remained largely unchanged as a result of the inquiry, they expressed genuine concern, particularly for animals and the environment. Students wanted to take action at the local level to bring awareness to the community using their design skills. As the authors of *A Framework for K-12 Science Education* emphasize, science education "should help students see how science and engineering are instrumental in addressing major challenges that confront society today" (NRC, 2012, p. 9). The curriculum pilot provided evidence of this critical need.

Teachers participating in the pilot also expressed how their involvement improved their own teaching practices, knowledge of environmental issues, and personal behaviors. One commented that the unit pilot prompted her to be more "purposeful" as she approaches teaching issues of environmental sustainability across the curriculum. Another shared:

> *I was amazed at how involved and interested students became in the environmental issues. This made my perception a lot more positive in the fact that these students care so much about this issue. Also, this pilot made me begin practicing what I preach. I since have bought these two canvas baskets that fold flat that I keep in my car to carry my groceries to avoid ever using plastic bags.*

Another reflected upon the positive impact of students' passion for the subject matter. "My students would not let me throw ANYTHING away. I have begun using the cloth bags that were stuffed in my trunk more often," one

teacher shared. A different teacher agreed that the unit "definitely opened my eyes and opened a new door to a number of ways that I can take my part in keeping the environment cleaner and protect my BEAUTIFUL environment!"

As with all curriculum pilots, our work was not without its challenges, with time constraints being most restrictive. "In reality we have about 30 minutes a day to teach the science standards," one teacher commented. As a result, many classroom teachers were unable to complete the unit and to fully support students' action-taking due to end-of-grade testing and the amount of dedicated time needed to thoughtfully implement the lessons and inquiry cycle. One veteran teacher expressed frustration that "there is neither time nor space in the curriculum for [teachers] to implement [meaningful] curriculums to the degree that they should be" and that he is "very disappointed that we did not complete/implement the curriculum to the degree we should have - this was an injustice to the curriculum (which is extremely well thought out and written)." Another teacher at the same school agreed:

> *The one thing I would say that did not work too well was the time frame that I was given to teach the lesson. There is A LOT of information in this unit, and it is somewhat unreasonable to teach all of the content with the small amount of instructional time given for science. All great and important information, just not sure that it is AS important as the others considering the amount of time it demands (like language arts, reading, or math) due to testing of these other subjects.*

Although "excited" to teach the unit, another commented that the "reality of time constraints prevented me from getting through the entire thing as efficiently and thoroughly as I would have liked."

The diverse use of technology tools was also deemed both beneficial and frustrating. One teacher shared how technology can engage students in the learning process in unexpected ways:

> *I had not ever used technology prior to this experience as much as I did in this unit. I would typically use technology in the presentation of the material I was teaching; but through this unit, I used it in every way possible. Not only did I teach with the technology, but also I allowed the students to use it as well through an extended project. They had not even seen the computer that many times throughout a week prior to the unit. They were extremely excited about that, I might add. ;) I also want to mention that one of my students followed the unit up (without being asked) with a PowerPoint presentation containing information about what she learned. She claimed that she would "Show it to friends so that they will no more about how to save our planet!"*

Several teachers also commented that the tools allowed them to be more efficient and taught the students new skills. The social bookmarking site *delicious.com* was considered valuable as it "led students right to what you need them to see, but then it also let them begin learning researching skills by searching for answers to questions asked of them," one teacher shared. Technology malfunctions could be frustrating, however. "Several of the links were broken," one teacher wrote. Although time constraints prohibited one from fully incorporating technology in the unit's lessons, one teacher plans to "spend some time learning moviemaking /editing techniques so that we could have realized some of the projects undertaken."

In closing, environmental education researcher Scott Morrison underscores that "Students must be taught not only about what is wrong in the world; they must also be equipped with the skills necessary to advocate for peace, justice, and sustainability. ["*Do You Want Paper or Plastic?*"] is a step in that direction" (S. Morrison, personal communication, June 29, 2015). When immersed in the study of "stuff," students engage in deep, critical thinking about their roles as consumers and how they can be change agents. As the pilot results suggest, deep, integrated learning *does* require dedicated time and support. These findings reflect prior research on teaching EE as teachers express concerns regarding the time required to plan and teach environmental topics (Christenson, 2004). Indeed, there is documented need to approach EE from a multidisciplinary and cultural perspective with a focus on sustainability (Davis, 2009; Duhn, 2012). Environmental education should not be reserved for one content area (such as science) or one 30-minute time frame after other more seemingly critical subjects are taught (e.g., ELA or

mathematics). With appropriate scaffolding, we believe that children *can* be empowered to see themselves as "solutionaries" who change their personal choices to contribute positively to their world, who develop larger solutions that address broad issues such as environmental sustainability. We hope that "*Do You Want Paper or plastic?*" is one such resource to support teachers in these efforts.

References

Browne, A. (1998). *Voices in the park.* New York: DK Publishing.

Claybourne, A., & Larkum, A. (2007). *The story of inventions*. London: Usborne Pub Ltd.

ChicoBag. (2014). Track the movement. Retrieved from http://www.chicobag.com/track-movement.

Christenson, M. (2004). Teaching multiple perspectives on environmental issues in elementary classrooms: A story of teacher inquiry. *The Journal of Environmental Education*, *35*(4), 3-16.

Cole, A. (2007). Expanding the field: Revisiting environmental education principles through multidisciplinary frameworks. *The Journal of Environmental Education*, 38(2), 35-45.

Conde, M. D. C., & Sánchez, J. S. (2010). The school curriculum and environmental education: A school environmental audit experience. *International Journal of Environmental and Science Education, 5(*4), 477-494.

Davis, J. (2009). Revealing the research 'hole'of early childhood education for sustainability: A preliminary survey of the literature. *Environmental Education Research*, 15(2), 227-241.

Deedy, C. A., & Seeley, L.L. (1994). *Agatha's feather bed: Not just another wild goose story.* Atlanta, GA: Peachtree Publishers.

Dimopoulos, D. I., Paraskevopoulos, S., & Pantis, J. D. (2009). Planning educational activities and teaching strategies on constructing a conservation educational module. *International Journal of Environmental and Science Education, 4*(4), 351-364.

Duhn, I. (2012). Making 'place' for ecological sustainability in early childhood education. *Environmental Education Research*, 18(1), 19-29.

Forbes, C. T., & Zint, M. (2010). Elementary teachers' beliefs about, perceived competencies for, and reported use of scientific inquiry to promote student learning about and for the environment. *The Journal of environmental education, 42*(1), 30-42.

Hardy, J. M. (2011). A" right" way to teach about endangered species?: An analysis and comparison of two environmental education approaches using North Atlantic right whales as a case study (Doctoral dissertation, University of Georgia).

Hill, M. & Beraza, S. (2010). *Bag it: Is your life too plastic?* United States: Reel Thing Production Films.

Institute for Humane Education. (n.d.). What is a solutionary? Retrieved from http://humaneeducation.org/become-a-humane-educator/what-is-humane-education/what-is-a-solutionary/.

Jordan, C. (2007). Plastic bags [digital image]. *Running the numbers: An American self-portrait* (2006 - Current). Retrieved from http://www.chrisjordan.com/gallery/rtn/#plastic-bags.

Kopnina, H. (2013). An exploratory case study of Dutch children's attitudes toward consumption: Implications for environmental education. *The Journal of Environmental Education*, 44(2), 128-144.

Locke, S. (2009). Environmental education for democracy and social justice in Costa Rica. *International Research in Geographical and Environmental Education*, 18(2), 97-110.

Murdoch, K. (1998). *Classroom connections: Strategies for integrated learning.* Prahran Victoria, Australia: Eleanor Curtain Publishing.

North American Association for Environmental Education (2011). Developing a framework for assessing environmental literacy. Retrieved from http://www.naaee.net/sites/default/files/framework/DevFramewkAssessEnvLitOnlineEd.pdf.

National Research Council (NRC). (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. Washington, DC: The National Academies Press.

Özsoy, S., & Ahi, B. (2014). Elementary School Students' Perceptions of the Future Environment through Artwork. *Educational Sciences: Theory & Practice*, 14(4), 1570-1582.

Sagy, G., & Tal, A. (2015). Greening the curriculum: Current trends in environmental education in Israel's public schools. *Israel Studies*, *20*(1), 57-85.

Terry, B. (2014). *Beach plastic* [digital image]. Retrieved from http://myplasticfreelife.com/.

UNICEF. (2004). Cartoons for children's rights. Retrieved from http://www.unicef.org/videoaudio/video_top_cartoons.html.

United Nations. (n.d.). United Nations Millennium Development Goals. Retrieved from http://www.un.org/millenniumgoals/.

United States Fund for UNICEF. (2014). Retrieved from http://teachunicef.org/.

Elizabeth O. Crawford is an Assistant Professor in the Department of Early Childhood, Elementary, Middle, Literacy, and Special Education at the University of North Carolina Wilmington. She can be reached at crawforde@uncw.edu.

Nancy Luke is an Assistant Professor of Elementary Education and Digital Literacy in the School of Teaching and Learning at Western Carolina University. She can be reached at ncluke@wcu.edu.

William Van Pelt is the CEO of HeartGift, an organization providing lifesaving heart surgery to children from around the world. He can be reached at wvanpelt@heartgift.org.

International Journal of Early Childhood Environmental Education, 3(1)

ISSN: 2331-0464 (online)

Wild Beginnings:
How a San Antonio initiative instills the love of nature in young children

Deepti Kharod
Maria G. Arreguín-Anderson
The University of Texas at San Antonio

Submitted April 9, 2015; accepted July 26, 2015

Acknowledgements

The authors would like to thank Peggy Spring, Wendy Drezek, and Susan Campbell for the opportunity to conduct this research about their Starting out Wild workshops.

Abstract

This paper describes an environmental education initiative called Starting out Wild (SoW) designed for toddlers and their caretakers. The program, developed by staff and volunteers of a city parks department, engages children ages 1-3 and their parents and caretakers through outdoor learning experiences. We suggest that environmental education learning for young children should focus on nurturing positive emotional relationships with nature and keep in mind practices that are appropriate to the children's development. In this article, first we offer a rationale for situating early environmental learning in an affective approach. Next, we examine learning about the environment in the context of developmentally appropriate practice for young children, drawing on guidelines developed by the North American Association for Environmental Educators (NAAEE) and the National Association for the Education of Young Children (NAEYC). Then we describe the San Antonio-based SoW program, including discussion of a sample lesson. We conclude with recommendations for practice.

Keywords: environmental education, nature learning, early childhood, toddlers, family involvement

Taking a nature walk with an enthusiastic group of toddlers is a treat. As children spontaneously explore, their wonderings immediately translate into hands-on experiences that fill them with joy. Soon, they immerse themselves in the mysteries of fallen leaves, hidden insects, animal tracks, and birds' songs. In doing so, young children learn, but they also begin to connect with and to love nature. In this article, the authors describe Starting out Wild (SoW) a San Antonio environmental education initiative designed for children ages 1 to 3 that seeks to capture a stage of children's development when attitudes towards nature are being formed (North American Association for Environmental Education (NAAEE), 2010). Starting out Wild (SoW) engages young children and their caretakers, often their mothers, in experiences that draw on children's natural curiosity and attraction towards nature, while offering a foundation for learning. We argue that environmental education experience in early education settings should provide opportunities to develop affection for nature in the context of developmentally appropriate activities. Initially, we offer a rationale for an affective approach to early childhood environmental education. Next, we place environmental education within the context of developmentally appropriate practice for young children. Then, we describe Starting out Wild, including an example of an implemented workshop. Finally, we offer recommendations for practice.

Rationale for an Affective Approach to Early Childhood Environmental Education

Affect is a term used in psychology to distinguish emotions and mood from thinking and behavior (Harlan & Rivkin, 2012). Although researchers have long argued that emotions pique curiosity and interest in learning, formal environmental education instruction, just as formal science instruction, traditionally has not embraced an affective approach. Harlan and Rivkin (2012) draw on brain research to argue that "emotions are fundamental to our ability to focus attention, and they are critical to how we process, use, and store information" (p. 6). In fact, many researchers believe that activating the affective domain must precede cognitive activity for learning to take place (Chawla, 2006, 2007; Harlan & Rivkin, 2012; Kellert, 2002, 2007; Noddings, 1992; R.A. Wilson, 1996).

Affect, as described by Iozzi (1989), is the "the key entry point to learning and teaching", (as cited in Kellert, 2002, p. 126) and is addressed by the North American Association for Environmental Education (NAAEE) in their guidelines specifically targeting EE for early childhood learners (NAAEE, 2010). A section explaining the differences between EE for younger and older learners states that "the task of environmental education for young children is to forge the bond between children and nature" (NAAEE, 2010, p. 4).

The need to promote a child-nature bond in early childhood is documented in research suggesting that early exposure makes a difference (NAAEE, 2010) and children's attitudes towards nature are significantly influenced by the presence of empathizing adult role models. Chawla's (2006, 2007) interviews of 56 environmentalists in Norway and Kentucky revealed the strong influence of childhood experiences in establishing positive and active attitudes toward nature in adulthood. Kahn (2002), in his studies of five sets of children in various urban and rural settings in three countries, also said that the roots of what he called environmental generational amnesia (forgetting that the current degraded state of our environment is not how it always was) are situated in childhood, so addressing it must begin there, as well.

The presence of adult role models not only helps establish a loving relationship between child and nature, but also between child and caregiver, which Chawla (2006, 2007) found to be one of the two strongest indicators for positive attitudes toward the environment among adult environmentalists (see also Carson 1956; Noddings, 1992 on the role of adults). Kahn (2002) suggested that by sharing their own stories with children, adults could help children conceive of a healthier environment that may no longer be present, but was at one time. For the community, such sharing helps recapture lost memories and raises the benchmark of what a healthy environment should be, rather than relying solely on a possibly more degraded current state.

In practical terms, an affective approach to learning is evident in SoW, a program in which adults share their own wonder, curiosity, respect, and caring for nature by verbalizing their observations, by listening and responding to children's remarks, and by observing children as they engage in developmentally appropriate activities. Thus, the SoW facilitators serve as role models for the young children, as well as their caregivers.

Using Developmentally Appropriate Practice in Environmental Education

An important guideline in the development of environmental education programs for young children is the purposeful infusion of developmentally appropriate activities that take place in the outdoors (Wilson, 1996). According to the principles of Developmentally Appropriate Practice (DAP), developmental stages must be considered when planning learning experiences. Gayford (1987) and Tilbury (1994) referred to children's critical sensitive periods, which provide windows for certain types of learning and can affect how children develop as they mature in various domains, including the ecological self (as cited in R.A. Wilson, 1996, p. 121).

By understanding developmental periods, teachers can choose appropriate activities, language, literature, and other resources, as well as help parents to support their children's growth. General DAP principles accept that learning moves from simple to complex, concrete (or specific) to abstract (or general), and iconic to symbolic (Kostelnik, Soderman, & Whiren, 2011; NAEYC, 2009). In the realm of EE, Kahn (2002) found that children move from anthropocentric perspectives (human-centered) to biocentric thinking (focusing on the "intrinsic value of nature") as they mature (p. 98). This insight can help teachers develop lessons that introduce ideas from a self-

oriented perspective, which is typical and easier to grasp for most young children, while introducing and nurturing nature-oriented thinking.

Another developmental consideration helps plan for appropriate materials and spaces. Heerwagen and Orians (2002) relied on evolutionary adaptations to explain that toddlers and preschoolers prefer small objects and semi-enclosed spaces. The smaller spaces (in nature, these can be under a tree or behind a hedge) offer a greater sense of protection and security. The preferences for smaller objects help narrow or localize the field of operations, which would have provided an evolutionary advantage for survival by discouraging wandering off since smaller objects are often easily found close to home. They argued that factors such as increased mobility (moving from sitting to crawling, walking, and running) determine which environmental inputs are more valuable for survival and hence, interesting, at various stages of development. Because most toddlers are mobile, they enjoy discovery and direct access to objects found in their fields of operations.

The Need for Direct, Unstructured, and Everyday Experiences in Nature

Indirect and direct experiences of nature are useful and common. Teachers and parents use books, videos, photographs, artwork, models, and other such tools to expose their children to nature. As Kellert (2002) said, such vicarious or indirect experiences can be meaningful, however, not as a substitute for direct experience. Studies show that the decline of direct, unstructured contact with nature in industrialized settings in favor of indirect and planned activities is a concern for environmental educators (Cohen & Horm-Wingerd, 1993; R.A. Wilson, 1996). Educational researchers specifically advise teachers and caregivers to provide time and opportunity for direct, hands-on, and unstructured experiences outdoors (Chawla, 2006, 2007; Cohen, 2012; Kellert, 2002; Noddings, 1992).

Direct experiences are also supported by emphasizing the local and ordinary experiences of nature, rather than seeking the exotic (Carson, 1956; Kellert, 2002). Looking for pebbles in a neighborhood lot, observing ants or worms in the backyard, or taking walks regularly in a community park are examples of local and everyday experiences, which are found to have more enduring effects on building positive relationships with nature than the dynamic and exotic experiences that come from visiting national parks or watching television shows about great white sharks. (Those are valuable in a different way, but the importance of the ordinary should not be overlooked.) Another benefit of seeking the everyday in nature, and arranging for it in lessons and activities, is that it is to be found everywhere. “Bugs, pets, plants, trees, wind, rain, soil, sunshine…” are ubiquitous and available to all children (Kahn, 2002, p. 113). It is this love of everyday nature that SoW seeks to nurture through its exploration of the local environment.

The SoW initiative

In 1983 two West Coast organizations introduced Project WILD (Wildlife In Learning Design) for K-12 educators with the purpose of providing information, resources, and activities about wildlife that are grounded in scientific and educational research. The WILD programs also align with the EE guidelines set forth by the North American Association for Environmental Education (NAAEE, 2011) by maintaining an interdisciplinary and educational focus and avoiding advocacy. (For a detailed history of Project WILD and its sponsors, see CEE & Project WILD, 2013, pp. vi-x and the national website: http://projectwild.org/).

As the need for an early childhood version of EE was realized, coordinators from six states (Alaska, Arkansas, California, Colorado, Idaho, Minnesota, and Utah) began to adapt Project WILD activities for young learners. In 2011 the Growing Up WILD manual for educators of children aged 3-7 years was published. Its goals included building on young children’s innate “sense of wonder about nature” using direct experience in nature (Council for Environmental Education (CEE), n.d., b). Growing Up WILD activities align with Head Start learning standards, as well as recommendations for developmentally appropriate curriculum from the National Association for the Education of Young Children (NAEYC) (CEE & Project WILD, 2011). While Project WILD and Growing Up WILD curricula provide environmental education activities and programs for children ages 3-18, toddlers continue to be

an overlooked segment of the population. Just as GUW adapted the Project WILD activities for young learners SoW is extending that curriculum for even younger children.

Starting out Wild Program in San Antonio

The City of San Antonio Natural Areas have been offering the Growing Up WILD programs (GUW) for several years but in 2002 Peggy Spring, Education Coordinator, saw a need to engage toddlers and their parents through the city's nature programs. Although Spring had experience working with children of various ages, she tapped one of her regular volunteers Wendy Drezek, an expert in infant and young children's education, to develop a developmentally appropriate parent-child nature program for toddlers.

"I didn't really think it would work at first, but I was happy to put something together," recalled Drezek, over a lunch meeting with new SoW facilitators-in-training (Drezek, 2014). They used the GUW curriculum as a framework, since it was familiar, respected, and successful. At the time of publication, Drezek's 24-unit curriculum includes many topics from GUW as well as others focusing on Texas, including bats, cactus, bees, and flowers, (W. Drezek, personal communication, April 3, 2015). Like other San Antonio Parks nature programs, the SoW sessions are offered free of charge.

Program Launch

Spring launched SoW in February 2013 at Friedrich Wilderness Park with a lesson about bears. After four months, the July session filled to capacity with nearly 20 children, so she added a second session that month. The high level of enrollment continued even after the summer vacation surge ended. In December, she found both the sessions were again filled with 15 children each. She also realized that 13 students was more manageable, but often enrolled up to 15. As she tried to manage a growing waiting list, Spring decided to increase the number of SoW sessions to three per month from February 2014, and added a fourth day to accommodate two mothers' groups, with a new theme each month.

Furthermore, in March 2014 Susan Campbell, San Antonio Parks and Recreation Education Coordinator for Phil Hardberger Park, launched SoW at her location. By the end of March, pre-registration for her first three months of classes (March-May) was already at capacity with 15 students per class. With students already enrolling by early February, Campbell knew she needed her own crew of teachers.

SoW Facilitators Training

The SoW program has two audiences – the children and their parents – so its facilitators are trained to think of both groups when they lead classes. At training for new SoW facilitators at Phil Hardberger Park, Campbell and Drezek explained to volunteers that the program's goal is to nurture "rich relationships… to the world of nature " in children and their parents (Drezek, 2014). To that end, many facilitators are volunteers drawn from the Texas Master Naturalists program, who are required to complete nearly 40 hours of training in nature learning approved by the Texas Parks and Wildlife Department (TPWD & Texas A&M Agrilife, n.d.).

As a toddler/parent program, SoW seeks to capitalize on parents' intrinsic motivation to involve their children in nature-based activities. As primary caregivers, parents are in a crucial position to continue, "facilitating their children's adventures in the natural world" (Drezek, 2014). Teaching parents and providing a rationale for each activity is crucial as they learn developmentally appropriate ways to explore nature in any setting, including their own backyards and areas removed from the SoW experience.

Spring elaborated, adding that SoW's emphasis is on "getting children connected to nature and getting parents involved. We're more interested in the process than the product. We want the child manipulating the materials." She pointed to a session about spiders for which they chose clay and pipe cleaners as the media for children to make models of spiders. Her intention was to let children experience the texture of the clay as they squished, pressed, and rolled it. Spring recalled how sticking pipe cleaner legs into the clay bodies was a challenge for many

children, supporting the growth of their motor skills and providing direct sensory experiences (Spring, personal communication, 2015).

In keeping with SOW's hands-on approach, the training included a sample lesson so facilitators could experience the activities and their flow. Since each lesson includes several song and movement activities, Drezek and Campbell lead the volunteers through several songs with movements and dancing, as well as a brief walk outdoors.

Lesson Format and Themes

Each SoW lesson begins and ends with a song, which establishes a routine for the children. A lead teacher and two or three volunteers facilitate lessons for a typical class of 13-15 children and their parents, although several regulars come with grandparents or other family members. Each hour-long lesson includes a read-aloud, hands-on exploration of real natural objects and models, crafts, songs with music-movement activities, and a snack – all related to the monthly theme. (See Figure 1. Appendix A contains a sample lesson.)

Figure 1. Exploration of models (plastic ants in sand boxes) real objects, living organisms (worms)

The highlight for many children, and a vital part of every lesson, is the nature walk. SoW facilitators, toddlers, and caretakers amble at a relaxed pace over a short, easily navigable trail (See Figures 2.). After a few visits, the children are familiar with the trail since they use the same one each time. They squat and probe, looking for items related (or unrelated!) to the lesson's topic. (See Appendix B for themes.) Both Park educators Susan and Peggy locate most of the activities outdoors. (S. Campbell, personal communication, February 28, 2014; P. Spring, personal communication, March 20, 2014).

Figure 2. Nature Walk – looking for worms and ants

An evident outcome of SoW`s nature walks has been caretakers' perception of themselves as key exploration partners and facilitators of outdoor direct experiences for their children. A mother who has brought her son and nephew for eight SoW sessions remarked that Starting out Wild helps kids and parents learn how to get outside,

what to do outside, and forms a base knowledge of nature that parents and children can build on when they get back outside on their own. Similarly, another parent commented: "We play outside a lot, and now I will point out leaves and trees and the textures for him to explore. Also, he really liked the recycling lesson, so we will pick up clean trash when in parks or outside on walks."

In addition to the nature walk, activities such as read alouds and theme-based snacks are inviting to the children, as seen from this parent's feedback about her two-year-old son:

> *"[He] continues to be somewhat reserved when we first join the group, but when a volunteer brings out a book, he is instantly engaged. I would say that the story time is [his] favorite activity except that he likes the nature walks at least as much, if not more. He quickly works his way to the front of the group and would walk much further than the planned route if we did not herd him back to the classroom area."*

Furthermore, the parent added that the hands-on activities offer opportunities for toddlers to experience various textures: "He was utterly dismayed about getting paint on his hands while painting with a feather, but he loved digging his hands into the dirt to fill his pot when we planted seeds."

A Peak into a Lesson on Trees

Living In a Tree, detailed here, was a lesson developed and implemented by the researchers adhering to the standard SoW format: Objectives and four-15 minute segments (welcome and story, nature walk, activity and snack, and closing). All lessons include a literature connection and a parent handout encouraging participation during the lesson and follow up at home.

Objectives. In the Living in a Tree lesson the researchers wrote two sets of objectives using the original SoW lesson as a guide and focusing on building positive emotional attachments to nature. In this case, children focused on the potential relationship with a tree, its size, location, and the view of a tree as shelter for other organisms. The parent's objectives also placed emphasis on ways to promote the nature-language connection (see Table 1).

Table 1:
Objectives for Living in a Tree lesson

Objectives for Children	Objectives for Parents
Trees are our friends/ We love trees	Child and parents can enjoy nature together.
Trees are big and small	Questions and words support children's language development
Trees are outside. (Outside/ inside)	
Who lives in a tree? Bird, spider, squirrel…	

Welcome and Story (First 15 minute segment). The lesson began indoors with the facilitators singing a welcome song greeting each child by name then introducing the day's theme using songs and movement, related objects to explore, and a book. Parent participation was supported with PowerPoint slides with song lyrics and questions to ask as children explore the items. The ample floor space and nearby chairs also invited parents to sit with their children and join in the observation of leaves, twigs, seed pods and subsequently participate in a read aloud. (See Figure 3.)

Figure 3. Parents and caregivers join children on the floor during a read aloud.

Nature Walk (Second 15 minute segment). Then, the entire group headed outdoors to explore a nearby trail. Although the children and caregivers were invited to look for certain objects related to trees, free exploration on the familiar and easily navigable trail was always encouraged. During the tree lesson, children explored baggies of natural objects such as bark, twigs, mulch, acorns, and a variety of leaves. Once at the trail, they were encouraged to locate similar items along their path. Using cue cards (see Table 2), the presenters encouraged parents to initiate or extend conversations related to the experience.

Table 2:
Parent Cue Cards Sample Content

Words to develop language:
- Outside / inside (We are going outside.)
- Under (There are leaves are under this tree!)
- Big/ small (and other describing words for what we see, hear, feel…)
- Rough/ smooth (How does the bark feel? The acorn, the leaf?)

Thoughts to spark a conversation:
- Which tree is your special friend?
- What do you think this is?
- Do you see anything that is brown? Green?
- What is the smallest thing in here? The biggest?

Activity and Snack (Third 15 minute segment). The next part of the lesson took place outdoors – a hands-on activity and healthy snack. The loose structure of the entire lesson allowed children to proceed at their own pace. During the tree lesson, children enjoyed scooping soil into cups, pushing seeds into it with their fingers, and then watering them with plastic pipettes. A parent reported back the following month that her child was so excited to see the emerging shoots as they cared for their bean plant at home.

Closure (Last 15 minute segment). The final activities include a good-bye song, providing time for families to linger, finish snacks, and wrap up activities. As they departed, parents were given a handout recapping the day's theme and learning including song lyrics or text for a foldable book. (see Table 3).

Table 3:
Information for Parents (excerpts)

Literature Connection *The Busy Tree* by Jennifer Ward (2009). New York: Marshall Cavendish.	Notes about Learning Given to Parents Early childhood is a powerful time for children to build connections with nature, and one of the best ways to do so is by exploring the areas in your own community, such as backyards and local parks. See how the bee is helping the flowers by carrying their seeds? See how the flowers are helping the butterflies get their food? See how the tree helps us by giving us shade? See how we help these plants when we give them water? These positive emotional relationships are the seeds for a mindset of learning in the future, and parents are the first role models for their children! Thank you for being part of this wonderful community of learning!
Songs from the Lesson (Twinkle, Twinkle tune) Trees are big and trees are small Trees can be so very tall I love my tree My tree loves me Can you help me find my tree? Trees are big and trees are small Trees can be so very tall	

IMPLICATIONS AND CONCLUSIONS

Initiatives such as SoW in San Antonio are valuable in different ways: First, they confirm the need for environmental education programs specifically for toddlers, a segment of the population often left unattended. Second, they confirm the key role that adult role models play in establishing affective ties with nature. Third, given children' s inherent inclination to explore their surroundings, they point to the need to design activities that actively engage children's senses in developmentally appropriate ways. Finally, the SoW lessons include elements of choice and decision-making by the child, providing room for the children's voices as they construct relationships with nature.

The need for environmental education programs for young children is evident. The rapid growth of SoW sessions in San Antonio and the expansion of SoW sites to locations that are more convenient to participants in other sections of the city are evidence of parents' willingness to invest both their time and effort to expose their children to the outdoors in semi-structured formats. Although this initiative currently reaches a limited number of children whose middle and upper middle class parents can afford transportation and time, an added goal would be to reach the immense number of children from low-income families who do not have the transportation or the means to participate and are subsequently excluded from these experiences.

Because SoW requires the presence and participation of an adult along with the child, we suggest that environmental educators must deliberately infuse their programs with components that encourage parent-child conversations and actions that emphasize and model caring behaviors towards nature. With this in mind, environmental educators must provide a rationale that informs parents about the purpose of the activities and suggestions to extend conversations and caring behaviors to settings removed from the original experience.

Furthermore, EE education programs for young children must include activities that engage children's senses in developmentally appropriate ways through experiences that progress from concrete to abstract and simple to complex, predominantly favoring a "hands-on" approach. SoW's approach is to nurture young children's (and their parents') connections to nature. The NAAEE guidelines for early childhood specifically distinguish between the

more structured, skills and academic orientation of instruction for older children and the need for "development of individual feelings, beliefs, and inner unity with nature that are so critical in the early years" that forms the core of their approach for very young children (NAAEE, 2010, p.3). The NAEYC also cautions against the practice of "downward mapping," which involves simplifying the curriculum developed for older learners, rather than creating one that is grounded in research about early learners (NAEYC, 2009, p. 4)

Based on research from the fields of environmental education, educational philosophy, and early childhood education, there is a pressing need to address the emotional landscape of young children if educators desire to nurture a positive relationship with nature (Ardoin 2006; Carson, 1956; Chawla, 2007; Kellert, 1993; McVay, 1993; White & Stoecklin, 2008; Wilson, 1993). Moreover, many researchers argue that advancing an academic focus in learning too early can actually hinder the strong positive experiences that will support future, long-term learning (Harlan & Rivkin, 2012; Osborne, Simon, & Collins, 2003).

Finally, play is critical to young children's learning. Play, by definition, offers choice and pleasure, along with opportunities for intrinsically motivated learning and exploration. These findings support the need to adopt an early years EE program like SoW that provides a developmentally appropriate and affective approach to learning in and about nature.

References

Ardoin, N. M. (2006). Toward an interdisciplinary understanding of place: Lessons for environmental education. Canadian Journal of Environmental Education, 11, 112-126.

Carson, Rachel. (1956). Sense of Wonder. New York: Harper & Row, Publishers.

Chawla, L. (2006). Learning to love the natural world enough to protect it. Barn, 2, 57-78.

Chawla, L. (2007). Childhood experiences associated with care for the natural world: A theoretical framework for empirical results. Children, Youth, and Environments, 17, 144-170.

Cohen, S. (1992). Promoting ecological awareness in children. Childhood Education, 68, 258-260.

Cohen, S. & Horm-Wingerd, D. (1993). Children and the environment: Ecological awareness among preschool children. Environment and Behavior, 25, 103-120. doi: 10.1177/0013916593251005

Council for Environmental Education (n.d. a). Growing Up Wild. Retrieved from http://www.projectwild.org/growingupwild.htm

Council for Environmental Education (n.d. b). Overview [of Project WILD]. Retrieved from http://projectwild.org/overview.htm

Council for Environmental Education & Project WILD (2011). Growing up WILD: Exploring nature with young children, ages 3-7. Houston, TX: Author.

Council for Environmental Education & Project WILD (2013). Project WILD: K-12 curriculum & activity guide. Houston, TX: Author.

Drezek, W. (2014, February) Starting out Wild facilitator training workshop. Presented as part of the San Antonio Parks and Recreation program, Phil Hardberger Park, San Antonio, TX.

Harlan, J.D. & Rivkin, M.S. (2012). Science experiences for the early childhood years: An integrated affective approach. Boston: Pearson.

Heerwagen, J.H. & Orians, G.H. (2002). The ecological world of children. In P.H. Kahn Jr. & S.R. Kellert (Eds.), Children and nature: Psychological, sociocultural, and evolutionary investigations (pp. 29-63). Cambridge, MA: The MIT Press.

Kahn, P.H. Jr. (2002). Children's affiliations with nature: Structure, development, and the problem of environmental generational amnesia. In P.H. Kahn Jr. & S.R. Kellert (Eds.), Children and nature: Psychological, sociocultural, and evolutionary investigations (pp. 93-116). Cambridge, MA: The MIT Press.

Kellert, S. R. (1993). The biological basis for human values of nature. In S.R. Kellert & E.O. Wilson (Eds.), The Biophilia Hypothesis (pp. 42-69). Washington, D.C.: Island Press.

Kellert, S.R. (2002). Experiencing nature: Affective, cognitive, and evaluative development in children. In P.H. Kahn Jr. & S.R. Kellert (Eds.), Children and nature: Psychological, sociocultural, and evolutionary investigations (pp. 117-151). Cambridge, MA: The MIT Press.

Kellert, S.R. (2007). Biophilia, children, and restoring connections to nature in the modern built environment [PDF document]. Retrieved from http://www.childrenandnature.org/reports/9_2006/PPTs/kellert.pdf

Kostelnik, M. J., Soderman, A.K., & Whiren, A. P. (2011). *Developmentally appropriate curriculum: Best practices in early childhood.* Boston, MA: Pearson.

McVay, S. (1993). Prelude. In S.R. Kellert & E.O. Wilson (Eds.), The Biophilia Hypothesis (pp.3-19). Washington, D.C.: Island Press.

National Association for the Education of Young Children. (2009). Developmentally appropriate practice in early childhood programs serving children from birth through age 8.Washington, D.C.: Author.

Noddings, N. (1992). The Challenge to Care in Schools: An Alternative Approach to Education. New York, Teachers College Press.

North American Association for Environmental Education. (2010). Early childhood environmental education programs: Guidelines for excellence. Washington, D.C.: Author.

North American Association for Environmental Education. (2011). Excellence in environmental education: Guidelines for learning (K-12). Washington, D.C.: Author.

Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: A review of the literature and its implications. International Journal of Science Education, 25, 1049-1079. doi: 10.1080/0950069032000032199

Starting out WILD. (n.d.) Retrieved from http://www.sanantonio.gov/parksandrec/directory_friedrich_starting_out_wild.aspx

Texas Parks and Wildlife Department & Texas A&M Agrilife Extension. (n.d.)Texas master naturalist: About. Retrieved from http://txmn.org/whats-a-master-naturalist/

White, R. and Stoecklin, V.L. (November 9, 2008). Nurturing children's biophilia: Developmentally appropriate environmental education for young children. Retrieved from http://www.whitehutchinson.com/children/articles/nurturing.shtml

Wilson, E.O. (1993). Biophilia and the conservation ethic. In S.R. Kellert & E.O. Wilson (Eds.), The Biophilia Hypothesis (pp. 31-41). Washington, D.C.: Island Press.

Wilson, R.A. (1996). The development of the ecological self. Early Childhood Education Journal, 24, 121-123.

APPENDIX A
Sample lesson

Mighty Ants

First 15 Minutes

Gathering: March around mats to the 'The Ants Go Marching' , look at bug cubes; ant books (Thinking Like an Ant, Ant Cities, etc.), SAPAR ant materials=photos, puzzle, models, use multi facet lenses to see Ants Eye View, follow path of plastic ants, build an anthill from dirt or sand, sign in families, give song handouts and name labels.

Focus: Hello Friends, names

- Ants work together—1,2,3 (put up 1,2,3, fingers)
- Ants live in a colony!
- (Spread fingers and bring both hands together.)

Learning:

- Show 3 paper plate (head, thorax, and abdomen) and pipe cleaner (6 legs and 2 antennae) model of ant body parts. Compare and contrast with spiders. Review exoskeleton by tapping on skull, elbow and knees. Use balloons to pretend to communicate. Explain that ants live in groups and cooperate. Different ants have different jobs. Assign "jobs" to toddler ants.
- Movements to teach body parts--Sing the Head Thorax song to Head, Shoulders, Knees and Toes
- Head, thorax, abdomen, abdomen (2X) touch parts
- 6legs, some wings and exoskeleton –3 fingers each hand, 2 fingers each hand, tap skull
- Head thorax abdomen!
- Head, thorax, abdomen, abdomen (2X)
- Big eyes, small size, 2 antennae too –cupped hands to eyes, two fingers close together, 2 fingers on head
- Head thorax abdomen!
- Read the Hey Little Ant singing story
- Transition—line up like an ant line and walk out to patio.

Second 15 minutes

Walk: Use ant plates to see which foods attracts ants—have plates ready with a shred of bologna, spoonful of sugar, spoonful of jelly, cooked bean—first show a tray of foods. Look for good places to find ants and place the plates there, walk to find ants and ant hills, then return and check plates to see which foods the ants go to. You may want to place plates out in advance and then check them during class. Look for ants on the trail. Back-up for bad weather—have a large paper anthill and ant stickers or stamps to place on the anthill.

Third 15 minutes

Crafts: Make Model Magic ants with pipe cleaner legs and antennae. Have baggies with three balls of Model Magic and 8 pieces of pipe cleaner. Option--2 med-size and 1 smaller Styrofoam craft balls stuffed into a knee-high stocking (clearly indicating head, thorax, abdomen), and 6 pipe cleaner legs.

Fourth 15 minutes

Snack: Be a "colony" and form a line to go to the snacks like ants following to find food. Make (raisin) ants on a (pretzel and cream cheese) log snacks—Transition—use the music to march to the mat.

Closing: Review the story, song, fingerplay and sing the Good-bye songs, give out handouts, and preview coming attractions.

APPENDIX B
SoW Lessons Themes

Table B1
Themes of 2013- 2014 SoW workshops at Friedrich Wilderness Park

2013	2014
February - bears	January - rocks
March - spiders	February - worms
April - worms	March - ants
May - ants	April - trees
June - no lesson	May - growing
July - birds	June - no lesson
August - growing	
September - seeds	
October - leaves	
November - turkeys	
December - recycling	

Table B2
Themes of 2013- 2014 SoW workshops at Phil Hardberger Park

2014
March - ants
April - trees
May - growing
June – no lesson

Deepti Kharod is a doctoral student in the Department of Interdisciplinary Learning and Teaching at the University of Texas at San Antonio. She can be reached at deepti.kharod@utsa.edu.

María G. Arreguín-Anderson is an Associate Professor of Early Childhood and Elementary Education at the University of Texas at San Antonio. She can be reached at maria.arreguinanderson@utsa.edu.

International Journal of Early Childhood Environmental Education, 3(1)

ISSN: 2331-0464 (online)

Nature and the Outdoor Learning Environment: The Forgotten Resource in Early Childhood Education

Allen Cooper
National Wildlife Federation

> *"The whole playground is so much more engaging; the kids are neither overwhelmed nor bored. They didn't run before…now they run. Our proudest moment has to be watching the children with the natural elements: flowers, branches, overcoming fear of bees, worms, butterflies, and crickets."* (Childcare professional at Munchkin Academy, Buxton, NC, describing the impact of enhancements to the center's outdoor setting.)

Longitudinal studies now confirm the economic, academic, and social importance of high-quality early childhood education. At the same time, a substantial body of research indicates that an outdoor learning and play environment with diverse natural elements advances and enriches all of the domains relevant to the development, health, and wellbeing of young children. Despite these findings, the outdoor learning environment goes virtually unmentioned in national and state level standards, guidelines, and regulations, and has been largely overlooked in the considerable efforts to enhance the quality of early childhood education (ECE). Moreover, children most likely to benefit from an outdoor play and learning environment are less likely to have access to one.

A natural outdoor play and learning environment is outdoor space at an early childhood education center that includes diverse features designed to promote structured and unstructured physical activity, play, and learning. The two photos below, provided by the Natural Learning Initiative at North Carolina State University, show the Munchkin Academy in Buxton, North Carolina before and after addition of trees and shrubs, raised garden beds, and a looping pathway:

This article lays out recommendations for increasing the availability and use of natural outdoor play and learning environments in order to improve the quality of ECE. The article begins with a summary of research indicating the contribution of an outdoor learning environment to the domains of ECE; describes the current policy related to the outdoor learning environment and nature exploration in state regulations; identifies model policy content in key areas; and concludes with specific actions that will increase availability of quality outdoor learning environments.

Benefits of Natural Outdoor Play and Learning Environments

- Improves self-regulation
- Advances physical fitness and gross motor development
- Improves nutrition
- Improves eyesight
- Promotes cognitive development
- Improves academic performance
- Lessens the symptoms of ADHD and improves concentration
- Promotes self-confidence
- Builds understanding and appreciation of ecosystems, food systems, and environmental processes

Proposed Minimum Standards to Promote Quality Natural Outdoor Learning Environments

- Formally designate the outdoor space an outdoor play and learning environment or similar
- The outdoor play and learning environment has at least two outdoor gross motor features (e.g., climbing features or looping pathways)
- The outdoor play and learning environment has at least two outdoor learning settings (e.g., gardening area, loose parts station, or dramatic play area)
- The outdoor play and learning environment includes a diverse selection of plants and habitats representative of local flora and fauna
- The outdoor play and learning environment includes natural features that enrich children's play and learning such as: non-toxic trees, shrubs, or vines; topographic variations (such as mounds, terraces, slopes); a variety of ground surfaces (mulch, grass, pebbles); smooth rocks, wood or logs; non-poisonous flowering plants or garden plants and vegetables; birdfeeders, bird baths and birdhouses
- An outdoor water source for irrigation is available
- The outdoor play and learning environment has a looping pathway and wheeled toys
- At least 30 minutes of outdoor time is offered per three hours at the center.
- Consumption of fruits and vegetables grown on site is expressly allowed
- A nature supplement for early learning guidelines is adopted
- Professional development for enhancing and utilizing the outdoor play and learning environment is provided
- Each center has outdoor space of at least 75 sq. ft. per child, with exemptions granted only if daily walking outings to nearby parks or public spaces are provided

Strong evidence that nature inquiry and outdoor learning environments advance the goals of ECE

ECE programs are expected to foster the physical, mental, and social-emotional development of children, and, increasingly, to address an array of threats to American children's health and wellness.

The prevalence of overweight children ages 6 to 11 has more than doubled in the last 20 years, increasing to 18.8% in 2004, and the rate among adolescents has more than tripled (CDC 2007). Overweight and obese children suffer from a myriad of health problems, including higher risks of cardiovascular disease, diabetes, bone and joint problems, and sleep apnea (Ogden 2006). These health problems are so severe that researchers warn of the possibility that for the first time in American history, life expectancy may actually *decrease* because of the health impacts of the current childhood obesity epidemic (Olshansky et al 2005).

In the area of mental health, approximately 11% of children have been diagnosed with Attention Deficit/Hyperactivity Disorder (ADHD) with the rates of diagnosis increasing 5% per year from 2006 to 2011 (CDC 2014).

School readiness is seen as a growing responsibility in ECE, and the K-12 standards movement has had a substantial impact on ECE, with virtually every state and territory adopting Early Learning Guidelines which specify desired ECE learning and development outcomes, often aligned with K-12 standards.

If ECE is to contribute to addressing these challenges then all available resources must be mobilized. A growing body of scientific literature indicates that play and learning in a diverse, natural area provides a wide array of health, learning, gross motor, and mental health benefits for children.

Learning and Cognitive Development

- *Promotes Cognitive Development.* The "richness and novelty" of being outdoors stimulates brain development (Rivkin 2000). Research shows that "direct, ongoing experience of nature in relatively familiar settings remains a vital source for children's physical, emotional, and intellectual development" (Kellert 2004). Proximity to, views of, and daily exposure to natural settings increases children's ability to focus and enhances cognitive abilities (Wells, 2000).
- *Improves academic performance.* Studies in the US show that schools that use outdoor classrooms and other forms of nature-based experiential education show significant student gains in social studies, science, language arts, and math. Students in outdoor science programs improved their science testing scores by 27% (American Institutes for Research, 2005).

Mental Health, Self-Regulation and Improved Behavior

- *Promotes constructive, imaginative, and collaborative play.* Lower quality outdoor environments are associated with repetitive play and negative behavior, while higher quality environments are associated with more constructive play (DeBord, Hestenes, Moore, Cosco, and McGinnis 2005). Natural materials added to the outdoor environment increase children's spatial-cognitive awareness, physical competence and skills, and socialization (Herrington and Studtmann 1998). Inclusion of loose parts of natural materials increases constructive and dramatic play (Hannon and Brown 2008.)
- *Improves Self-Regulation and Reduces Stress and Aggression.* Time spent in green spaces, including parks, play areas, and gardens, has been shown to reduce stress and mental fatigue (Taylor 2001). In one study children who were exposed to greener environments in a public housing area demonstrated less aggression and violence and less mental stress (Kuo & Sullivan 2001). Just viewing nature reduces physiological stress response, increases level of interest and attention, and decreases feelings of fear and anger or aggression (Burdette & Whitaker 2005.)
- *Lessens the Symptoms of ADHD***.** Spending time outdoors reduces the severity of symptoms of children with ADHD. Even short walks in urban parks increase concentration and lessen ADHD related symptoms (Kuo & Taylor 2004, Taylor et al 2001).

- *Promotes Self-Confidence and Improves concentration***.** Children who spent time playing outside are more likely to take risks, seek out adventure, develop self-confidence and respect the value of nature (UKSDC 2007). Outdoor recreation experiences like camping can improve children's self-esteem (Marsh 1999). Green spaces outside the home can increase concentration, inhibition of initial impulses, and self-discipline (Taylor et al 2001).
- *Builds Environmental Stewardship Ethic*. A number of studies indicate that childhood contact with nature contributes to shaping a lasting environmental ethic and an interest in environmental professions (Wells & Lekies, 2006). Respondents who had played in wild natural environments were more likely to have positive perceptions of natural environments and outdoor recreation activities (Bixler & Hammitt 2001).

Physical Activity, Nutrition, and Gross Motor Development

- *Advances Physical fitness and Gross Motor Development.* Children who play outdoors are generally more fit than those who spend the majority of their time inside. Children who play outside in natural areas also show a statistically significant improvement in motor fitness with better coordination, balance, and agility (Fjortoft 2001). The mere presence (with no additional programming) of an outdoor learning environment with natural features and a looping pathway is associated with a 22% increase in physical activity (Cosco, Moore, Smith, 2014). Children's physical activity is motivated by diverse outdoor environments (Boldemann et al, 2006) and the preschool outdoors is a determinant of preschool physical activity (Cardon et al 2008.)
- *Improves nutrition.* Children who grow their own food are more likely to eat fruits and vegetables (Bell & Dyment, 2008) and to show higher levels of knowledge about nutrition (Waliczek, Bradley & Zajicek, 2001). They are also more likely to continue healthy eating habits throughout their lives (Morris & Zidenberg-Cherr, 2002). Gardens that support children's engagement with vegetables and fruits and increase frequency of consumption are associated with acceptance of diverse tastes (Cabalda et al 2011) as a positive strategy to support healthy eating (Meinen et al 2012.)
- *Improves eyesight.* More time spent outdoors is related to reduced rates of myopia (nearsightedness) in children and adolescents (Rose et al 2008).

EXISTING ECE POLICY FRAMEWORK UNDERUTILIZES THE OUTDOOR SPACE

Despite the documented benefits, a review of the ECE policy framework at federal and state levels shows a missed opportunity to use the outdoor play and learning environment to advance ECE goals. ECE is governed by a complex and decentralized regulatory structure. All mandatory regulation occurs at the state level, and consists of minimum regulatory requirements, non-mandatory Quality Rating and Improvement Systems (QRIS) which incentivize improvements to ECE, and non-mandatory early learning and development guidelines (ELG) which specify desired learning and development outcomes. At the national level, there are evaluation tools such as the Environment Rating Scale, non-mandatory accreditation systems developed by private organizations such as National Association for the Education of Young Children (NAEYC), and performance standards for Head Start centers. A review of each policy body shows virtual absence of policy or incentive related to outdoor learning and nature inquiry, with some exceptions.

A. Licensing and Administrative Regulations. State licensing regulations are the minimum standards that every licensed child care center in a state must meet. These regulations are developed and administered by state governments. A separate Natural Start Alliance comprehensive review of state licensing requirements is forthcoming, so in this article only two states—Florida and North Carolina—are contrasted in the table below to demonstrate the variety in regulatory requirements for childcare centers related to outdoor play and learning environments. Florida requires 45 square feet of outdoor space per child--with a broad exemption for centers designated urban—and no outdoor programming requirements. North Carolina, by contrast, requires a minimum 75 square feet per child, with no exemption, as well as outdoor time and programming requirements. North Carolina includes additional requirements for regular outdoor time and expressly permits the consumption of fruits and vegetables grown on-site.

	North Carolina	Florida
Outdoor space requirement	75 ft2 per child	45 ft2 per child
Outdoor space exemptions	None	Exemption for 'urban' centers
Outdoor programming requirement	At least 30 minutes, and one of four planned activities, outdoors per day, weather permitting	No requirement
Fruits and vegetables grown on site	Expressly permitted to eat if washed	No mention

Recommended enhancements to Licensing Requirements

1. Minimum outdoor space requirement of 75 square feet per child and addition of requirements to enrich the outdoor space.
2. Exemptions for minimum outdoor space only in narrow circumstances, such as when on-site outdoor space is unavailable, and daily off-site walks to nearby parks or public spaces are provided.
3. Daily outdoor programming requirement of at least 30 minutes and one planned outdoor activity per day.
4. Consumption of site-grown fruits and vegetables expressly allowed.

Vegetable gardens provide a context for learning about nature and nutrition

"We are proud of the garden - kids planting and picking: green beans, red onion, sunflowers, lettuce, carrots, mustard greens, turnip greens, spinach, squash, green peppers, tomatoes, and blueberries."

(Childcare professional)

B. Quality Rating Improvement Systems (QRIS). Quality rating improvement systems (QRIS) have been used by many states to improve the quality of child care centers above the minimum level required by licensing regulations. Thirty-five states or localities have quality rating programs. Most quality rating systems are voluntary programs where providers are assessed on a variety of standards. Some states then provide financial incentives to programs that attain higher standards, and publicize the resulting scores, so QRIS becomes a way to improve quality without public mandates. QRIS offer a powerful tool for encouraging provision and use of natural outdoor play and learning environments beyond levels required by state licensing standards, but a review of 35 QRIS standards shows that few states use QRIS standards for this purpose. Only six states have standards relating to either provision of daily time outdoors or quality of outdoor learning environments. The remaining states either leave the outdoor learning environment unaddressed, or treat it through the Environment Rating Scale, which offers only minimum consideration to the outdoor setting (discussed further below.)

Michigan's QRIS has the strongest outdoor time requirement of 30 minutes for every 3 hours and is one of only 5 states (IN, NY, MI, OK, WI) with standards related to outdoor time. Oklahoma's QRIS has a standard requiring daily outdoor time, and also has a standard specifying that at least two outdoor learning areas be available. Texas' QRIS is the only one with detailed quality standards for outdoor learning environments.

QRIS Policy Dimension	State	Exemplary Language
Outdoor time requirement	IN, NY, MI, OK, WI	MI: "30 minutes of every 3 hours dedicated to active outdoor time, with appropriate indoor physical activities available when weather prohibits outdoor play"
Quality of outdoor space requirement	IN, OK, TX	OK: "A minimum of 2 learning areas are available outdoors." TX: See sidebar
QRIS contains no requirements relating to outdoor space beyond Environment Rating Scale or Similar	AR, AZ, CA, CO, DE, GA, IA, ID, IL, KY, MA, MS, MT, NC, ND, NV, OH, PA, SC, TN, VA, WA	N/A

Recommended Enhancements to Quality Rating Improvement Systems

Because Environment Rating Scale does not adequately address the outdoor learning environment, QRIS should not depend exclusively on the ERS to evaluate outdoor settings, as is the case in more than 20 states. QRIS should also include the following specific standards:

1. A standard for minimum time outdoors, weather permitting. The Michigan standard of 30 minutes per 3 hours of programming is a minimum standard.
2. At least 75 square feet of outdoor learning space per child.
3. Standards for features of outdoor learning environments including a) number of outdoor learning features, b) number of gross motor activity features, including looping pathways, c) natural features in the outdoor environment that enrich children's play and learning such as: Non-toxic trees, shrubs, or vines; topographic variations (such as mounds, terraces, slopes); a variety of ground surfaces (mulch, grass, pebbles); smooth rocks, wood or logs; non-poisonous flowering plants or garden plants and vegetables; birdfeeders, bird baths and birdhouses.

Wheeled toys and a looping pathway are associated with increases in levels of physical activity

"The children love the trike path and log seating, and building clubhouses with the logs and tree cookies: building, stacking, carrying."

"Our proudest achievement would have to be the discipline improvement. The kids are not all doing the same things as each other, instead they are using their imaginations more."

"There are more ways for disabled children to play and interact with other children, not just watching."

(Comments from early childhood education professionals)

Sidebar: Texas Rising Star Standards Emphasize Nature in the Outdoor Learning Environment
In 2015 Texas Rising Star program guidelines were amended to change the name of the outdoor space from 'playground' to 'outdoor learning environment' and to include the following qualitative elements:

1. Outdoor environment and activities are linked to and reinforce indoor learning.
2. The outdoor environment provides children with the opportunity to care for living things and appreciate nature/beauty such as: Non-toxic trees, shrubs, or vines; topographic variations (such as mounds, terraces, slopes); a variety of ground surfaces (mulch, grass, pebbles); smooth rocks, wood or logs; non-poisonous flowering plants or garden plants and vegetables; birdfeeders, bird baths and birdhouses.
3. Outdoor environment and natural and manufactured equipment/materials, provides partial shade, motivates children to be physically active and engage in active play such as balancing, climbing, crawling, moving, pushing/pulling, riding, walking, and running. Key elements may include: balls, swings, balance beams, climbing structures, tumbling pads, tricycles or riding toys, marching music, jump ropes, space to skip, hop, and roll.
4. Natural outdoor environment supports social emotional development including but not limited to areas that invite social gatherings, tummy time, dramatic play, group games, music and movement, and spaces for quiet and calm activities. Key elements may include: Natural additions such as boulders, tree stumps, sand area and benches, design elements such as stages, platforms, wind chimes, canopies, teepees, gazebos.
5. Outdoor equipment/materials encourage infants to experience the environment through all five senses

Texas Rising Star Standards available at www.twc.state.tx.us/svcs/childcare/texas-rising-star-program-guidelines.pdf last reviewed on 2.13.15)

C. Early Learning Guidelines. Early Learning Guidelines (ELG) are the primary tool used by states to influence the learning and development outcomes produced by early childhood education providers. ELG are voluntary guidelines which specify desired learning and development outcomes for children of a given age. The prevalence of ELG has increase alongside the standards movement in K-12 education, as more attention is paid to K-12 readiness. In 2002 24 states had adopted ELG, but by 2014 56 states and territories had adopted ELG for children in the 3-5 age group. While ELG are not mandatory, virtually every state Quality Rating Improvement System makes reference to them and provides incentives to centers for offering a curriculum aligned with the state ELG. Early Learning Guidelines therefore represent the most robust tool for increasing environmental and nature learning outcomes in early childhood education.

A review of 50 state ELG found a wide variation in approaches to ELG and to environmental education content. The difference most relevant to the concerns of this paper relate to the degree of detail offered in early learning guidelines. Some states offer ELG that specify general outcomes, which typically are descriptions of something a child will have the capacity to *do,* whereas other states identify very specific and detailed learning goals that relate to mastery of content. Almost all state ELG only addressed environmental education in the science domain, missing opportunities to use environment to aid learning about place and community and to advance dispositions to learning such as curiosity, risk-taking, and perseverance. Within the science domain a contrast of the

Washington State and Pennsylvania ELG for science illustrates the disparate approaches to environmental learning content.

In the Washington State ELG, which takes a capacity approach, science outcomes for 4-5 year olds are encompassed in the following list of what a child should be able to do:

- Predict what will happen in science and nature experiences. Consider whether these predictions were right, and explain why or why not.
- Use tools to explore the environment (a magnifying glass, magnets, sifters, etc.).
- Measure sand or water using a variety of containers.
- Use one sense (such as smell) to experience something and make one or two comments to describe this.
- Investigate the properties of things in nature. Begin to understand what various life forms need in order to grow and live.
- Take responsibility in taking care of living things, such as feeding the fish, watering plants, etc.
- Talk about changes in the weather and seasons, using common words, such as rainy and windy.
- Look at where the sun is in the morning, afternoon, evening and night.
- Take walks outside and gather different types of leaves, name colors he/she sees outdoors.
- Participate (with adult direction) in activities to preserve the environment, such as disposing of litter properly, saving paper and cans to be recycled, etc.
  (Source: http://www.del.wa.gov/publications/development/docs/guidelines.pdf)

By contrast Pennsylvania's early learning guidelines offer a robust content approach. The science section alone spans more than 18 pages and has an Environment and Ecology Glossary with 30 terms. The glossary includes terms such as adaptation, aquatic ecosystem, biodiversity, habitat, integrated pest management, non-point pollution, terrestrial system, and watershed. The Pennsylvania ELG contains by far the most detailed environmental content of any state (see https://www.pakeys.org/uploadedContent/Docs/Career%20Development/2014%20Pennsylvania%20Learning%20Standards%20for%20Early%20Childhood%20PreKindergarten.pdf).

There is an active debate on whether a capacity or content approach best serves the child learning and development goals of ECE, depending in large measure on one's view about which approach is developmentally appropriate for a child of a given age. Taking a position on the debate is outside the scope of this review, and readers are directed to the North American Association for Environmental Education's Early Childhood Environmental Education Programs: Guidelines for Excellence, and to National Association for the Education of Young Children's position paper on early learning standards. Readers with a content orientation are encouraged to review the Pennsylvania standards, whereas those with a capacity orientation are encouraged to review the guidelines of Washington State, Montana, or Missouri.

Recommended enhancements to Early Learning Guidelines

1. Use nature and outdoor learning to advance learning goals across all domains, and not just in cognitive and science development.
2. Develop examples of how to use the outdoor learning environment and natural materials to advance each learning goal, following the model of the supplement to the Nebraska Early Learning Guidelines "Connecting Children to Nature."

D. Environment Rating Scale. The Environment Rating Scale (ERS) is an influential national measurement tool to assess process quality in an early childhood care group. There are four environment rating scales, each for a different age groups and settings: infants and toddlers (ITERS-R), early childhood (ECERS-R), family care (FCCERS-R), and school-aged care (SACERS-R), and each scale has items to measure what it considers the three most basic child needs: 1) Protection of their health and safety; 2) Building positive relationships; and 3) Opportunities for stimulation and learning from experience. The ERS is developed by the Frank Porter Graham Child Development Institute at the University of North Carolina at Chapel Hill and is non-binding, but it is the most influential

measurement tool because it has been incorporated by reference by 22 state Quality Rating Improvement Systems, and in most of these cases, the ERS is the only vehicle for evaluating the outdoor environment.

Given the influence of this tool, the Early Childhood Environment Rating Scale-Revised (ECERS-R) was reviewed for content related to outdoor environment. The nature and outdoors content of ECERS-R is modest. Three of 43 items on the measurement scale relate to nature or the outdoor learning environment, and a center could achieve an 'excellent' rating with modest outdoor and natural features. (The term 'environment' as utilized by ERS refers to the total care environment, encompassing indoor and outdoor physical environments, programming content and structure, and interactions.)

Recommended enhancement of ERS

The outdoor learning environment and living and natural items are underutilized resources in ECERS-R. The following environment features should be included in the point scale:
(1) At least 30 minutes outdoors per 3 hours in care, weather permitting
(2) Point scale incentives for outdoor gross motor features
(3) Point scale incentives for outdoor learning stations
(4) Point scale incentives for natural features in the outdoor environment that enrich children's play and learning such as: Non-toxic trees, shrubs, or vines; topographic variations (such as mounds, terraces, slopes); a variety of ground surfaces (mulch, grass, pebbles); smooth rocks, wood or logs; non-poisonous flowering plants or garden plants and vegetables; birdfeeders, bird baths and birdhouses

Fixed logs provide an opportunity for gross motor activities like jumping, climbing, and balancing

"They are learning control and ethics in how they interact with nature: what to pick, what not to pick."

"The garden is a kind of therapy to the children from difficult situations and with special needs."

(Comments from early childhood education teachers)

E. Head Start Performance Standards. Established in 1965, Head Start promotes school readiness for children in low-income families by offering educational, nutritional, health, social, and other services. Head Start operates in every state and serves almost one million children and families, and because of the scale and reach of the program, the Head Start Performance Standards are important indicators of quality in ECE. https://eclkc.ohs.acf.hhs.gov/hslc/data/factsheets/docs/hs-program-fact-sheet-2012.pdf

The performance standards recognize an essential role for outdoor time by establishing minimum outdoor space requirements and requiring time outdoors for play and gross motor development as well as for learning. Each

center must provide "at least 75 square feet of usable outdoor play space per child," (1304.53(a)(5), child physical development must be promoted by 'providing sufficient time, indoor and outdoor space, equipment, materials and adult guidance for active play and movement that support the development of gross motor skills" (1304.21(a)(5)(i)), and a curriculum that "provides individual and small group experiences both indoors and outdoors" (1304.21(c)(1)(vii)).

Recommended enhancements

While the Performance Standards recognize the importance of outdoor time, they could be improved by adding the following specific requirements:
1. A standard for minimum time outdoors, weather permitting, such as 30 minutes outdoors per 3 hours at the center.
2. Standards for features of outdoor learning environments including a) number of outdoor learning features, b) number of gross motor activity features, c) natural features in the outdoor environment that enrich children's play and learning such as: Non-toxic trees, shrubs, or vines; topographic variations (such as mounds, terraces, slopes); a variety of ground surfaces (mulch, grass, pebbles); smooth rocks, wood or logs; non-poisonous flowering plants or garden plants and vegetables; birdfeeders, bird baths and birdhouses.

F. National Association for the Education of Young Children (NAEYC) Early Childhood Program Standards.
The National Association for the Education of Young Children is the leading professional association for ECE providers, and their program standards and accreditation criteria represent best practice in the field. Many state Quality Rating Improvement Systems require NAEYC accreditation in order to achieve the highest rating in their system.

The NAEYC standards make good use of nature and the OLE. The curriculum includes daily indoor and outdoor experiences (2.A.07.b) and children should have the opportunity to learn content such as the difference between living and non-living things, life cycles of various organisms, and about the earth and the sky (2.G.02.a&b). Teaching staff should support children's needs for 'fresh air,' (3.A.03.c) and there should be both an outdoor learning environment with 'a variety of age- and development appropriate materials and equipment' (9.A.04) as well as "outdoor play areas, designed with equipment that is age and developmentally appropriate" (9.B.01) and with at least 75 square feet per child (9.b.04.) The program standards also consider whether walks are undertaken which include exploration of what was encountered(2.D.04.)

Recommendations for enhancement of NAEYC Early Childhood Program Standards are the same as for Head Start Performance Standards.

CALL TO ACTION

In the past 20 years significant strides have been made in increasing public understanding of the benefits of early childhood education and in gaining public support for ECE. With this growing public awareness comes heightened expectations about the ability of ECE to provide children with experiences that improve their health and school readiness. In this context, it is essential that we make use of every low-cost resource that can contribute to these positive outcomes.

A growing body of research indicates that daily time in a rich natural outdoor play and learning environment contributes positively to every desired outcome in ECE—including improvements in cognitive development, social and emotional development, physical activity, and nutrition. But as this review has amply demonstrated, the great number of policy instruments that have been developed to improve the quality of ECE consistently underutilize the outdoor learning environment and nature inquiry.

We call on all ECE policymakers to adopt the following measures across the range of ECE policy instruments to make natural outdoor play and learning environments available to all children:

- Formally designate the outdoor space an outdoor play and learning environment in state licensing regulations
- The outdoor play and learning environment has at least two outdoor gross motor features (e.g., climbing features or looping pathways)
- The outdoor play and learning environment has at least two outdoor learning settings (e.g., gardening area, loose parts station, or dramatic play area)
- The outdoor play and learning environment has a looping pathway and wheeled toys
- The outdoor play and learning environment includes a diverse selection of plants and habitats representative of local flora and fauna
- The outdoor play and learning environment has natural features that enrich children's play and learning such as: non-toxic trees, shrubs, or vines; topographic variations (such as mounds, terraces, slopes); a variety of ground surfaces (mulch, grass, pebbles); smooth rocks, wood or logs; non-poisonous flowering plants or garden plants and vegetables; birdfeeders, bird baths and birdhouses
- At least 30 minutes of outdoor time is offered per three hours at the center
- An outdoor water source for irrigation is available
- Consumption of fruits and vegetables grown on site are expressly allowed
- A nature supplement for early learning guidelines is adopted
- Professional development on creating and utilizing the outdoor play and learning environment is provided
- Each center has outdoor space of at least 75 sq. ft. per child, with exemptions granted only if daily walking outings to nearby parks or public spaces are provided

References

American Institutes of Research. 2005. Effects of Outdoor Education Programs for Children in California. Sacramento: Author.

Bell, Anne C., and Janet E. Dyment. 2008. Grounds for movement: green school grounds as sites for promoting physical activity. *Health Educ. Res. (2008) 23 (6): 952-962.*

Berg, M., and E. Medrich. 1980. Children in Four Neighborhoods: The physical environment and its effect on play and play patterns. *Environment and Behavior* 12 (3):320-348.

Bixler, R. and Hammitt, W. 2001. Managing Urban Forest Fear/Safety and Vegetation/Safety. (http://www.urbanforestrysouth.org/resources/library/managing-urban-forest-fear-safety-and-vegetation-privacy) (accessed 11-23-10)

Boldemann, C, M. Blennow, H. Dal, F. Mårtensson, A. Raustorp, K. Yuen, and U. Wester. 2006. Impact of pre-school environment upon children's physical activity and sun exposure. *American Journal of Preventive Medicine* 42:301-308.

Burdette, Hillary, and Robert Whitaker. 2005. Resurrecting free play in young children: looking beyond fitness and to attention, affiliation, and affect. *Archives of Pediatrics & Adolescent Medicine* 159 (1):46-50.

Cabalda A, Rayco-Solon P, Solon JA, Solon F. Home gardening is associated with Filipino preschool children's dietary diversity. J Am Diet Assoc. 2011;(111):711-715.

Cardon G, Van Cauwenberghe E, Labarque V, et al. The contribution of preschool playground factors in explaining children's physical activity during recess. Int J Behav Nutr Phys Act. 2008; 5(11):1-6.

Centers for Disease Control. 2007. Prevalence of overweight among children and adolescents: United States, 2003-2004. *National Center for Health Statisics*, http://www.cdc.gov/nchs/products/pubs/pubd/hestats/overweight/overwght_child_03.htm.

Centers for Disease Control. "Attention-Deficit/Hyperactivity Disorder." 2014. http://www.cdc.gov/ncbddd/adhd/data.html

Cosco, N., Moore, R., and W. Smith. 2014. Childcare Outdoor Renovation as a Built Environment Health Promotion Strategy: Evaluating the Preventing Obesity by Design Intervention. Am Journal of Health Promotion 28 (3): s27-s32.

DeBord, K., Hestenes, L., Moore, R., Cosco, N., & McGinnis, J. (2005). The preschool outdoor environment measurement scale. Kaplan Learning Company.

Fjørtoft, I. 2001. The Natural Environment as a Playground for Children: The Impact of Outdoor Play Activities in Pre-Primary School Children. *Early Childhood Education Journal* 29 (2):111-117.

Hannon, J. & B. Brown. (2008). Increasing preschoolers' physical activity intensities: An activity-friendly preschool playground intervention. Preventive Medicine 46 (6): 532-536.

Herrington, S., & Studtmann, K. (1998). Landscape interventions: New directions for the design of children's outdoor play environments. Landscape and Urban Planning, 42, 191-205.

Hofferth, S. and J. Sandberg. (2001). "Changes in American Children's Time, 1981-1997." In Hofferth, S.L. and T.J. Owens, eds. *Children at the Millennium: Where Have We Come From, Where Are We Going?* Oxford, England: Elsevier Science.

Kellert, Stephen R. 2004. *Building for Life: Designing and Understanding the Human-Nature Connection*. Island Press.

Kuo, F.E. & A. Faber Taylor (2004). "A Potential Natural Treatment for Attention-Deficit/Hyperactivity Disorder: Evidence from a National Study," *American Journal of Public Health* 94 (9): 1580-1586.

Kuo, F.E., & W.C. Sullivan. 2001. "Aggression and violence in the inner city: Effects of environment via mental fatigue". *Environment & Behavior*, Special Issue 33(4). 543-571.

Marsh, P. (1999). Does camping enhance self-esteem? *Camping Magazine*, 72(6), 36-40.

Meinen A, Friese B, Wright W, et al. Youth gardens increase healthy behaviors in young children. *J Hunger Environ Nutr.* 2012; 7:192-204.

Morris, J., & Zidenberg-Cherr, S. (2002). Garden-enhanced nutrition curriculum improves fourth-grade school children's knowledge of nutrition and preference for vegetables. *Journal of the American Dietetic Association,* 102(1), 91-93.

Ogden CL, et al. (2006). "Prevalence of Overweight and Obesity in the United States, 1994-2004. " JAMA 295: 1549-1555.

Olshansky, SJ, D Passaro, R Hershow, J Layden, B Carnes, J Brody, L Hayflick, R Butler, D Allison, and D Ludwig. 2005. A Potential Decline in Life Expectancy in the United States in the 21st Century. *New England Journal of Medicine* 352 (11):1138-1145.

Rivkin, Mary S. (2000). "Outdoor Experiences for Young Children." ERIC clearinghouse on Rural Education and Small Schools, http://www.eric.ed.gov (accessed on Nov. 17, 2007).

Rose, K.A., I.G. Morgan, A Kifley, S Huynh, W Smith and P. Mitchell (2008). Outdoor activity reduces the prevalence of myopia in children," *Ophthamology* 115(8):1279-85.

Taylor, Andrea et al. (2001). "Coping with ADD: The Surprising Connection to Green Play Settings," *Environment and Behavior*, 33: 54-77.

United Kingdom Sustainable Development Commission (2007). *Every Child's Future Matters*. http://www.sd-commission.org.uk/publications/downloads/ECFM_report.pdf (accessed Nov. 1, 2007).

Waliczek, T. M., Bradley, R. D., & Zajicek, J. M. (2001). The effect of school gardens on children's interpersonal relationships and attitudes toward school. HortTechnology 11 (3): 466-468.

Wells, N., and K. Lekies. 2006. Nature and the Life Course: Pathways from Childhood Nature Experiences to Adult Environmentalism. *Children, Youth and Environments* 16 (1):1-24.

Wells, Nancy. 2000. At home with nature. Effects of "Greenness" on children's cognitive functioning. *Environment and Behavior* 32 (6):775-795.

Allen Cooper is with the National Wildlife Federation and can be contacted at coopera@nwf.org.

International Journal of Early Childhood Environmental Education, 3(1)

ISSN: 2331-0464 (online)

naaee
North American Association for Environmental Education

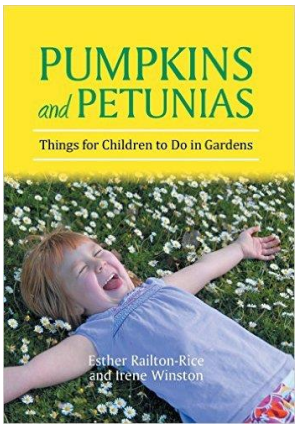
CHILDREN'S BOOKS AND RESOURCES REVIEW

Brenda Weiser and Jill Smith, Editors

Each issue of the journal will focus on a theme for children's books, activity guides, and resources. Children can use their five senses to discover what lives around them and how all things interact. *All about Fall* allows you to celebrate fall events, changing of the seasons, and scary animals. Here are few resources that can enhance your teaching this fall.

Future themes include *Winter Wonders* which will concentrate on how plants and animals survive along with what you can do for animals in the winter. For the spring, *Gardening with Children* will follow the winter and the emphasis will be getting children outside and planting gardens with them.

Pumpkins and Petunias: Things for Children to do in Gardens b*y Esteher Railton-Rice and Irene Winston*



Fall gardening is a wonderful adventure with young children. After reading Pumpkins and Petunias, you are going to want to round up some young children and take them to the local garden to learn about their place. The audience for this book is anyone that provides for young children. This includes parents, teachers, day-care providers, grandparents, and Head-start program leaders.

The book begins with an introduction which includes background information on gardening and the current standards, explains the different kinds of gardens, and how to use a garden for more than play, A portion of the introduction also includes how to use the activities, safety, materials needed, and how to include writing with the young children.

A collection of activities that are grouped into eight "Things to Do" topics, provides you with ideas and lessons to do in the garden. Let's Explore, Let's Measure, and Let's Enjoy Winter are just three of the sections found in the book. Each section contains four to ten activities that are correlated to the NAEYC

standards such as Criteria for the Arts, Health and Safety, the Next Generation Science Standards for grades K – 2 along with the Common Core Standards for mathematics and English Language Arts.

Each activity includes at least one objective, a "Note to the Leader" which includes tips on how to conduct the activity or even safety with the children, a list of materials and the step by step procedures needed to implement the activity. In addition, in each activity you will find the concepts being taught, along with the processes of learning being used by the students. Finally, each activity includes "Suggested Related Activities" segment where you are provided with ideas on how to incorporate specific subjects such as science, Language Arts, or Art.

This book not only provides you with numerous activities, but gives you ideas on how STEM elements and the Arts can be emphasized in a garden setting. To address the why should we take children outside, a brief explanation, based on research, is included along with safety in the garden and taking students outside.

Overall, Pumpkins and Petunias will spark your interest in using the local garden or even planting a garden that young children can play while learning about their environment. This book is a wonderful resource in itself and would benefit any early childhood or environmental educator, including students in early childhood courses. ISBN: 978-1-4836-8852-7; 978-1-4836-8851-0; and 978-1-4836-8853-4. In addition, you can go to www.Xlibris.com for more information.

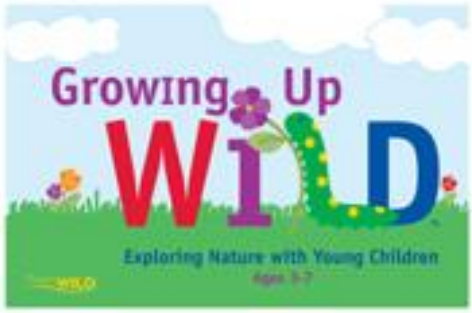
Leaf Man b*y Lois Ehlert*

With the brightly colored pages filled with leaves, this book is one that should be in every child's library. As fall comes, leaves change colors and fall to the ground. Where does a Leaf Man go when the wind blows? As the wind picks up, the Leaf Man begins his travels. He heads east over the marsh, the ducks, and the geese. Then he moves on to the fields of fall vegetables. As he drifts to the west, Leaf Man goes over the prairie meadows and then drifts to the north. This story allows for discussion on where the Leaf Man goes and how the wind takes him on his adventure.

The book has imprints of a variety of leaves, yes, real leaf prints, along with die-cut pages that create landscapes that even adults will appreciate. In addition, leaf prints are identified for the reader and there is a note from the author to the reader.

Ages 4 – 8; Published by Harcourt, Inc.; ISBN: 0-15-205304-2.

Growing Up WILD *by Council for Environmental Education, Project WILD*



When you receive your Growing Up WILD Activity Guide, and open it, you will see brightly colored pages that consider both the educator and the student. The 11”x17” activity guide is designed to build on children’s sense of wonder about nature and encourages them to explore the world around them, including wildlife.

The guide features 27 hands-on activities with over 400 different experiences for young children that have been correlated to the National Association for the Education of Young Children (NAEYC) Accreditation Standards and the Head Start Domains. The activities may include outdoor explorations, scientific inquiry, art projects, music and movement, conservation activities, reading and math connections, literacy connections, and a section titled "Healthy Me".

Each activity has multiple components that will provide educators with a variety of teaching styles while meeting the needs of the children. Quick Facts, key vocabulary words, materials needed, how to prepare for the activity, step-by-step procedures and wrap-up are included in each activity. In addition, the activity will address how to take children outside; ideas for centers and extensions, snacks, and connecting with the adults at home. A sidebar is included in each activity that can be used as a quick reference providing correlations to the NAEYC standards, Head Start Domains, resources (fiction/non-fiction books, and websites), and age level of the activity.

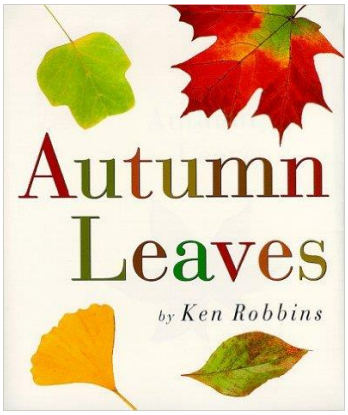
The guide includes ideas and suggestions on connecting children to nature, developmentally appropriate practice, Nature Play, how to spark creativity, assessment, the importance of respecting living things, responsible collecting and safety. The appendices include, but not limited to, copy me pages, state symbols, tips for teachers, and how to incorporate wildlife into holiday celebrations. The guide provides a listing of children’s books that are used within the different activities and experiences for a quick glance. There are also on-line resources to support the educator including guide resources, education links and reports, and meeting the educators’ needs.

Growing Up WILD is a multi-award winning program having received the 2009 Family Choice Award and the 2011 Renewable Natural Resource Foundation Excellence in Journalism Award.

To obtain a copy of the guide, you may either attend a Growing Up WILD workshop or purchase the guide directly. For more information, go to http://www.projectwild.org/growingupwild.htm

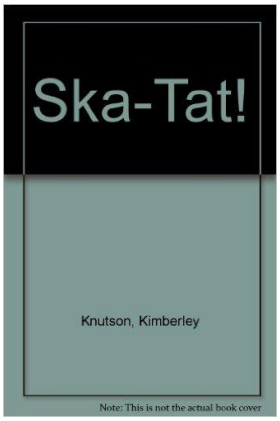
Ages 3-7; Published by Council for Environmental Education.

Autumn Leaves b*y Ken Robbins*



The perfect combination of striking photographs displaying a broad array of trees in their natural settings, paired together with close-up views of actual leaves from the tree. This visual feast provides a pleasing context in which to deliver the accompanying description of the tree, its leaves, and seeds. This book offers a unique autumn portrait of twelve varieties of trees showcasing them in the splendor of their changing colors. In addition, Robbins provides the reader with a brief description of each tree and its leaves – a simplistic nature guide – perfect for the young naturalist. Concluding pages provide young readers with a descriptive explanation of photosynthesis and the processes that occur in the leaves producing the changes in color and the eventual separation of the leaves from the branches. This book offers features that make it the perfect companion for fall nature walks and a guide to leaf identification and collection. Ages 3-8. Scholastic, 1998. ISBN-10:0590298798, 40 pages.

Ska-tat! b*y Kimberley Knutson*



Knutson's tribute to both fall leaves and the playful sounds of children as they catch the falling leaves, rake them into mountainous heaps of glorious fun. A virtual smorgasbord for the senses, she orchestrates the use of onomatopoeia in order to entice children into the story and provide them with the sensory stimulation that whisks them away to play along with the children in the story. Using cut-paper collages as her artistic medium, she combines the earthy tones of the dried leaves with splashes of bold colors that catch the eye of the reader and positions her images on a stark white canvas to intensify the effect of the contrasting hues. The leaves come to life as Knutson likens them to dancers in a ballet, turning, diving, and dropping to the ground. She brings to life all the exhilarating activities children love to engage in with leaves and inspires young children to replicate these activities – kicking, stomping, jumping, and throwing leaves in their own backyards. Ages 3-8. Macmillan Publishing, 1993. ISBN 0-02-750846-3, 32 pages.

International Journal of Early Childhood Environmental Education, 3(1)

ISSN: 2331-0464 (online)

INTERNATIONAL JOURNAL OF EARLY CHILDHOOD ENVIRONMENTAL EDUCATION (IJECEE)
Addressing Issues, Policies, Practices, and Research That Matter

Information for Authors

The journal has two broad visions:

(a) To encourage thoughtful sharing of information about important ideas, conceptualizations, and frameworks, as well as effective practices and policies in early childhood environmental education; and

(b) To reach an extensive global readership in order to maximize the impact of the thoughtful information.

Thoughtful information may manifest through book reviews, description of educational approaches and programs, research investigations, and development or interpretation of theoretical perspectives. Associations among and between the following will be emphasized:

· Young children
· Family circumstances
· Community opportunities
· Policy mandates or recommendations
· Environmental activities, education, or experiences
· Mechanisms or processes related to knowledge acquisition
· Attachment or maintenance of affective dispositions
· Abilities, behaviors, or skills development related to good decision making in a range of environmental contexts; and
· Cognitive, economic, and social influences or impacts.

In order to reach an extensive global leadership, the journal will be available electronically, at no cost. NAAEE will permanently post all issues of the journal on the *Publications* link on its website. Translation of the articles into other languages is encouraged.

SUBMISSION PROCEDURES

Manuscripts, along with email notes, should be submitted to the IJECEE Executive Editor (ybhagwan@fau.edu). Manuscripts must follow APA formatting style, including a cover page, and attached as Microsoft Word documents. Once received, authors will be acknowledged with a manuscript code to be used in consequent communication. The editorial board will also prepare the manuscripts for a blind peer-review process. It is estimated that the review process may take between 4-6 weeks to complete.

In the email note, please indicate the author name(s), provide contact information, and a statement that permissions or releases have been obtained for all pertinent aspects in the articles (e.g., consent for research studies, illustrative renderings, photographs).

Although copyright of articles is maintained by the authors, IJECEE requests the right to be the first publisher of the articles. Along with the first serial publication rights, authors are required to indicate the following statement in the email note:

"All authors confirm that the manuscript has not been published previously and all permissions related to the attached manuscript have been obtained. (The co-authors and) I indemnify NAAEE and IJECEE against any violations of copyright or privacy right, as well as against any claims, damages, and legal suits. (The co-authors and) I provide IJECEE the first right to publish the manuscript in an electronic format on its website and on electronic education databases published by others receiving our permission."

The submission of the email note itself will serve as proof of the author signing off on the confirmation, as well as the date of virtual signature.

Please contact any one of the IJECEE Executive Editors (ybhagwan@fau.edu or borasimmons@gmail.com) with further inquiries or questions.