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Environmental Education in Pre-K Child Care Settings

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ENVIRONMENTAL EDUCATION IN PRE-K CHILD CARE SETTINGS

by

Kathryn Galloway-Thoele

A capstone submitted in partial fulfillment of the requirements for the degree of Master of Arts in Education: Natural Science and Environmental Education.

Hamline University

Saint Paul, Minnesota

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CHAPTER ONE

Introduction

The first chapter of my capstone will introduce the topic to be studied and provide some background on my personal interest in the topic. I will share stories of my own exposure to nature while growing up and the hopes that I now have for my daughter in how she interacts with the natural world around her. I will also discuss the evolution of my career in the environmental field, as my professional interests combined with my personal history have both motivated me to learn more about the importance of environmental education in early childhood development.

The research topic of this capstone will examine the ways in which different child care settings are incorporating environmental education and nature play into their curriculum and activities. More specifically, a goal of my research is to identify any differences in children’s fine or gross motor development or social interactions based on the range of environmental education they receive. I am using the term environmental education very broadly and consider hands-on nature play, traditional classroom environmental education, and exposure to sustainable practices within the daycares to all be important components of this topic. I am interested in the topic of environmental education in child care settings primarily because I am a relatively new mother with a daughter in daycare. I am very fortunate to have a Waldorf daycare right on site at my
place of work, so choosing child care was very easy for me. I’m happy knowing that nature play is a cornerstone of the Waldorf model and something my daughter is exposed to every day. Of course I have many friends with children in a variety of other daycares, which sparked my curiosity in how a wide range of child care environments use environmental education and how this impacts early childhood development.

My Early Exposure to Nature

Growing up, my family didn’t go camping or take many trips to national or state parks, but being a child of the 80s prior to the digital age, I spent most of my free time outside exploring my yard and neighborhood and developing an appreciation for being outdoors. The main source of my exposure to nature at an early age was our family cabin in northwestern Wisconsin. Through these combined experiences I grew to love animals, lakes and rivers, forests, and flowers.

My paternal grandparents built a lake cabin in Stone Lake, Wisconsin the year that I was born which meant I was able to spend many long weekends there every summer all the years of my childhood and teenage years. Stone Lake gave me a whole new world to explore that was entirely different from my suburban home. The feel of pine sap on my bare feet, the fresh smell of the woods, the haunting sound of loons calling, collecting pine cones and baby frogs, feeling a daddy long legs crawl up my arm – these were all experiences that helped shape my understanding of the natural world and how I am a part of it.

I have very fond memories of going on walks in the woods near Stone Lake with my grandmother to see the beautiful wildflowers, at times picking them very selectively
to create bouquets. My entire family also had an intense love for the water and we would spend hours in the crystal clear water of Stone Lake. There’s nothing like seeing your grandparents dive off of a dock to teach you that swimming in freshwater is far superior to a chlorinated pool any day. That and being able to see a loon pop up from the depths of the lake within close eyeshot or watching an otter family enter the water from the shoreline right off your dock. We also loved canoeing the Namekagen River where we often saw bald eagles and numerous song birds. I absolutely loved seeing the wildlife of the north woods, but there was one experience that stands out in teaching me about ecosystems and the influence humans can have on them. I was sitting on the deck of our cabin, just quietly enjoying the view of the lake while my family was inside making dinner. No more than 30 feet in front of me I watched a black bear emerge from the woods, cross the yard, and reenter the woods on the opposite side. It was frightening yet exhilarating. And for the first time it really hit me that we were residing in this bear’s habitat and the things we do to our land will affect not just the bear but also the entire ecosystem. It was a poignant moment and perhaps inspired me to focus my future education on environmental sciences.

School of Environmental Studies and Beyond

I am an animal lover and always have been. So when I was a sophomore in High School and learned about a new School of Environmental Studies opening on the grounds of the Minnesota Zoo, I became incredibly excited about the idea of taking classes like animal behavior and marine biology. I immediately submitted my application and was part of the first graduating class to go through both 11th and 12th grade at the new “zoo
Here I had an opportunity to take part in an interdisciplinary curriculum focused on environmental science. We read books like Silent Spring and Walden, learned outdoor winter survival skills and built snow quinzees, studied native trees and birds, and of course had opportunities to take classes that brought us to the zoo where we could observe and learn about animals first hand. This school transformed me from being an animal lover to an all out lover of nature. The quintessential experience for me at the School of Environmental Studies was hearing a presentation from Dr. Jane Goodall who visited our school after a concerted effort on the part of many students who invited her to speak. I remember she began her talk by loudly mimicking the calls of the chimpanzees she had studied so closely for many years. It was a startling and dramatic way to break the ice, but I came away from that experience with deep respect for all that Dr. Goodall had accomplished in her life and feeling inspired to pursue further studies in science and animals. While majoring in biology and environmental studies in college, I had an opportunity to spend a month in Tanzania visiting some of the places that have been central to Dr. Goodall’s career. During this trip I made up for any lack of camping in my earlier years. For four weeks I camped in National Parks and spent all of my time feeling incredibly close to nature – so close in fact that I could hear leopards and hyenas outside my tent at night. Not only was I able to learn about and observe all the beautiful African wild animals I had dreamed about, but I also learned a great deal about anthropology by staying with Masaii and Hadza communities and visiting places like Olduvai Gorge. This integration of human and natural history deepened my understanding of how people influence and depend on the natural world. From here I pursued a career in the
environmental field working for the last 13 years in both the nonprofit and private sectors.

Becoming a Mother

In April of 2013 I became a mother to Isabel. I had wanted to be a mother for what felt like an eternity and I was incredibly excited to welcome my daughter into the world, but nothing could have prepared me for the overwhelming feeling of love that comes with being a parent. I also quickly found that I had an incredible desire to protect Isabel and create the best possible environment for her to grow up in. Not only did this mean choosing the safest bottles and mattress for her but also finding the right toys and activities to encourage her fine and gross motor development. Quite early in Isabel’s life I started to wonder about the connection between time spent outdoors and infant and early childhood development. Questions like, would touching grass and pinecones encourage better development of her senses and motor skills than plastic toys? Or, as she becomes older, would helping me in the garden or going on nature hikes to listen to birds cultivate in her certain skills or behaviors that children lacking in this type of experience wouldn’t otherwise have?

I want to give Isabel as many experiences in nature as possible, however as a working mom, I quickly realized that the majority of her time is spent with teachers and fellow students in daycare. Yes, I will always be her mother and the primary caregiver and guardian, but the activities that fill the eight hours each day while I’m at work will also significantly influence Isabel’s development. And of course as her mother, I want nothing but the very best for her. I feel very lucky in that the daycare on site at my place
of work focuses on nature play and learning through the head, heart, and hands, so I didn’t have to think hard about whether or not I’d choose this child care option for Isabel. After spending a year and a half in this daycare, I can say that Isabel is engaged in activities that are beyond my highest expectations. However, I realize that there is a wide range of child care environments and that the use of nature play and environmental education likely varies greatly within the different settings. I became curious about the impact this has on early childhood development and the differences observed within various daycare environments.

Early Childhood Nature Play

Children today spend half as much time outdoors as they did 20 years ago (National Wildlife Federation, 2011). This has led to a growing phenomenon known as nature-deficit disorder, a term coined by Richard Louv in the book Last Child in the Woods (Louv, 2005). The term is used to describe the increasing disconnect between children and nature, and the range of resulting behavioral problems that can occur due to the absence of this relationship. It’s hard not to be a witness to this problem when digital devices and screens of all sizes surround our society. Whether they want to or not, kids today have far more screen time than ever before because it can be virtually inescapable. What seems important to me is to set clear boundaries and limitations around deliberate screen time for children and to facilitate more time spent outdoors in nature. This is something I’ve tried to do with Isabel from the very beginning.

As a newborn baby, Isabel went on daily walks with me in her baby carrier. I wanted her senses to know the feel of the sun and fresh air from an early age. By the time
she was four months old, I started sitting with her in the grass and grabbing leaves and twigs for her to touch and feel. I remember seeing her eyes look especially bright when I’d hold her up to reach for a leaf in a tree or a flower in our garden. Fast-forward a few months to the winter when Isabel was 10 months old and we took her outside to experience snow. She couldn’t even walk, but she loved crawling around on the snow and grabbing it in her fists. The initial startle due to the cold seemed to make it a far more exciting experience than anything she was exploring indoors.

The summer of 2014 was especially eye-opening for me in terms of the ways in which Isabel interacts with nature. She was much more mobile and went through lots of physical developmental milestones. It was fun to watch the ways that she played outdoors in the summer and see how it correlates to improved coordination, balance, and even independence. For example, Isabel learned to help me in the garden. She loves to fill her little watering can from the rain barrel, carefully walk it over to the garden and water the plants. One of her favorite things is to pick the cherry tomatoes – something that involves fine motor skills and also helps develop her sense of sight to pick out the red from the green tomatoes deep within the vines. She also loves to collect pieces of nature, whether it’s flowers she has picked or small pebbles, and deposit them into her little wagon, which she proudly pushes around the yard. Filling the bird feeders is another source of fun for Isabel and involves both fine and gross motor skills while also engaging her sense of touch. I’m convinced that all of these simple experiences in our yard are not only helping Isabel develop physically but also lengthen her attention span and encourage more exploration. I’ve noticed that Isabel seems to be happier and is much less likely to
become frustrated or impatient when she is playing outside rather than playing with toys indoors.

Graphics 1 and 2. Isabel picking tomatoes and playing with flowers in our yard.

Our little family had many fun experiences in nature over the summer of 2014, not just in our backyard but also in local parks and at a cabin in northwestern Wisconsin. Isabel was at such a great age to introduce her to some of our favorite outdoor places and it was thrilling for us as parents to witness the excitement in her as she experienced these things for the first time. Taking time outside also helps change the pace from our usual busy workday routines and allows us to disconnect from our screens and distractions and focus on what’s really important: watching our daughter grow and develop as she experiences things for the first time.
Capstone Topic

The research study I conduct for this capstone will focus on the types of environmental education being done in a variety of child care settings and the ways in which it impacts early childhood development. Since nearly 11 million American children under the age of five participate in some form of child care every week, daycares and preschools are important sources of exposure to the natural world and environmental concepts (Child Care Aware of America, 2012). If children don’t have adequate time outdoors and exposure to nature in their daycares, it will be hard for parents to find enough time to offset that deficit. Furthermore, the critical stages of early childhood development in which children have an affinity for the natural world will be lost and it may become harder to establish that bond, connection, and understanding later in life.

The primary research question I would like to answer in this capstone is the following: How does environmental education and nature play in child care settings benefit children? Some examples of supporting questions to answer this primary question are: What types of environmental activities are done with what age groups of children within the daycare?; How does time spent on environmental education or nature play correlate with stress levels, social interaction, motor development, intellectual performance, and overall wellbeing?; What are the daycare’s sustainability practices and what is the staff’s level of involvement in these programs? I hope to learn a great deal about the types of environmental education activities being done in a range of child care settings and the associated benefits of that education or differences in children between daycares that conduct more or less robust environmental education programs.
I have intentionally selected a range of child care settings to participate in this research. The teaching models range from Waldorf to Montessori to traditional pre-schools and the settings range from large daycare centers to smaller private daycares. I plan to conduct an online survey for the daycare managers to complete which will inform me about their environmental education programs and activities, the results of these programs that they either do or don’t see within their children, and the sustainability programs in place at their facility. I foresee a couple of potential limitations with this type of research. Since I am essentially collecting secondary data in which another observer is providing the information, there may be some inconsistencies in the data due to the fact that each observer will have their own perspective and set of opinions. Furthermore, the sample size of daycares is relatively small, with only six participating. This limited data set will limit the correlations and assumptions that can be made from the results of the survey.

Some important terminology that will be used throughout my research includes: Environmental Education teaches children and adults how to learn about and investigate their environment, and to make intelligent, informed decisions about how they can take care of it (North American Association for Environmental Education, n.d.); Nature Play brings nature to children's daily outdoor play and learning environments by incorporating the surrounding landscape and vegetation (National Wildlife Federation, n.d.); Sustainability “creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations” (United States Environmental Protection Agency, n.d.).
Conclusion

As a working mother with a child in daycare full time, I am looking forward to learning about the types of environmental education that take place in child care settings. It will be interesting to see how Isabel’s daycare compares to others and if I conclude my research feeling as satisfied with her child care option as I was before I began my capstone. I’m also excited for the things I may glean from the daycares participating in my study as I hope to identify some activities and teaching methods that I can incorporate at home to further Isabel’s exposure to and appreciation for nature.
CHAPTER TWO

Review of Literature

Human History with Nature and Biophilia

Humans have been a part of nature for all of our three to five million years on this planet. Regardless of where we live, our human species is a part of the surrounding ecosystem. Of course the ways in which we interact with nature and our level of dependence on our ecosystems has evolved, however we are and always have been inextricably linked to our environment. Renowned Harvard biologist E.O. Wilson argues that our affinity for nature is deeply rooted in our biology. In Wilson’s book *Biophilia* (1984), he defines the term as "the innate tendency to focus on life and lifelike processes" (pg. 1) and suggests that “to the degree that we come to understand other organisms, we will place a greater value on them, and on ourselves” (pg. 2). The word literally means "love of life or living systems” and Wilson claims that it is the essence of who we are as humans and is what binds us to all other living things (Wilson, 1984). Biophilia can explain the restorative feeling we experience after being in a park, the joys we can have from domestic companion animals, the popularity of hobbies like gardening and bird-watching, and also the fears we may have of shadows and heights.

To understand Wilson’s theory of biophilia, it’s important to examine our long history with nature, how it has evolved and how that has shaped human attitudes about
the environment. Human beings have lived for most of our two million year history on
the savannas of East Africa (Kahn, 1997). This type of landscape is believed to have
provided better chances for individual and group survival (Kahn, 1997). For example, the
vast grasslands of the savannas offered wide open, sweeping views so that humans could
view wildlife and identify threats such as animals or weather. Low growing tree species
could be climbed in order to access views of approaching threats while the taller trees
didn’t obscure the views. Freshwater for drinking could be found in bodies of water,
which also created a natural perimeter for defense purposes. Certain species of animals
made for a natural source of food while flowers helped to indicate plant food sources.
The population was made up of hunter-gatherer societies, which is how we as humans
have spent most of our evolutionary history (Orland, 2004). Hunter-gatherer societies live
in very close connection with their natural ecosystems and obtain all of their food through
hunting of wild animals and collection of wild plants (Orland, 2004). Clearly this type of
relationship and dependence on one’s environment requires an intimate knowledge of the
species within the ecosystem. Not only would men need to understand animal behavior in
order to have a successful hunt, but the women gatherers need to be experts in plant
identification to know what’s edible and what may be poisonous. This deep connection
and dependence meant that hunter-gatherers generally viewed themselves as inseparable
from their natural ecosystems and shaped their spiritual beliefs about animals and their
rituals around natural events (Orland, 2004).

Hunter-gatherer societies spread throughout Africa and around the world followed
by the agricultural revolution around 10,000 years ago (Orland, 2004). The early agrarian
societies raised livestock and planted crops, but also still relied on their natural ecosystems to some extent for hunting and foraging (Orland, 2004). These societies were still somewhat dependent on nature, however they also disrupted their surrounding ecosystems by raising livestock that competed for food with native animals and growing crops that diminished the natural biodiversity of areas. As societies evolved, technologies were introduced to create more efficiency in planting and harvesting which helped to increase yields, but created an even greater negative impact on ecosystems (Orland, 2004). The more advanced agrarian societies attempt to control and manipulate their environment for food and interact much less with the natural ecosystem. This increasing disconnection from nature and a focus on control coincides with a set of religious beliefs that declares humans to be superior to animals and claims it to be God’s will that humans dominate the natural world and use it for their benefit (Orland, 2004). It’s no surprise that this type of belief system combined with the environmental manipulation inherent in the more modern agrarian societies results in more severe and considerable negative impacts to wildlife and natural ecosystems.

Next in our human history is the rise of the industrial era and the move to greater urbanization and even less of a connection with the natural world (Orland, 2004). The invention of the steam engine and other machines makes the production of food and other goods much more efficient and results in societies made up of manufacturers often living in larger cities. The general attitude toward nature is that it’s something to be dominated and sold on the open market as part of the new market-based economy (Orland, 2004). This results in widespread decimation of wildlife populations for human use and benefit.
At the same time, Darwin’s theory of evolution and the work of Romantic philosophers and naturalists such as John Muir lay the foundation for the conservation movement in the US and northern Europe (Orland, 2004). The idea of protecting wildlife and nature starts to take hold and the National Park Service is created in 1916 to conserve natural resources for the enjoyment of current and future generations (National Park Service, n.d.). Parks become destinations that allow people who are becoming increasingly separate from nature to reconnect with it. People in early industrial societies generally have very little direct contact with nature and their daily activities do not appear to depend on it, which is likely a significant contributing factor to the growing attitude at this time that people are separate from nature (Orland, 2004). As technologies become more advanced and the industrial economy grows, the impacts on nature and wildlife become more severe. Rapid consumption of resources, rising populations, and a greater emphasis on the economy rather than natural capital lead to societies that are seemingly buffered from the natural world (Orland, 2004).

In spite of the tremendous negative environmental impacts from our modern industrial society, the majority of our time as humans has been spent more intimately connected to nature. Research has shown that the current beliefs and preferences of both children and adults favor the conditions in which earlier human societies evolved. For example, it’s been shown that in general people prefer natural environments over built environments and like for built environments to include natural features like vegetation and water features (Kahn, 1997). An article by Wells (2003) cites several examples of previous studies that found a preference for outdoor environments within both children
and adults. In a study that asked urban children aged 9 to 12 to draw their favorite places, 96% of the drawings were of outdoor places and included features like trees, parks, and lawns. Another study of British children who lived in both public and non-public housing found that respectively 75% and 45% of the children said their favorite thing about the place where they lived was the outdoor play areas (Wells, 2003). Wells cites another study in which 97% of surveyed adults stated that an outdoor area was the most significant or favorite place of their childhood (2003). An article by Kirkby (1989) states that children prefer play areas with areas to hide and spaces that provide an element of safety. She suggests this may be linked to human evolutionary history and the need to find shelter or hide while monitoring the surrounding landscape. This would also seem to support Wilson’s theory of biophilia fulfilling basic biological needs and desires.

If we consider again that biophilia means an affinity for other living beings, how then do we explain phobias and moreover, examples of sadistic behavior toward living beings? Animal cruelty is a sad reality in many societies, so if we’re to believe that our long history with nature results in a deep-seated biological instinct to protect living systems, what’s to be said about the individuals who find some sick sense of pleasure in hurting animals or harming ecosystems? Sadly we see many examples of animal abuse, neglect, and cruelty in our modern society, primarily directed at domesticated animals but wild animals are by no means excluded. Furthermore, traditional and indigenous cultures are not exempt from this type of behavior either. An article by Kahn (1997) cites a vivid account that author Jared Diamond recites of his experience living with native peoples in New Guinea:
I found men intentionally inflicting pain on captured live bats for no other reason than amusement at the reactions of the tortured animals. The men had tied twenty-six small Syconycteris blossom bats to strings. They lowered one bat after another until it touched the red-hot embers of a fire, causing the bat to writhe and squeal in pain. The men raised the bat, lowered it again for another touch to the red-hot embers, repeated this process until it was dead, and then went on to the next bat, finding the whole proceedings funny. (p. 19).

This kind of behavior leaves one to wonder how it is that individuals or entire groups of people can torture animals while supposedly having a tendency toward biophilia.

When considering the belief of many anthropologists that humans prefer savanna-like landscapes due to our evolutionary history, other questions arise. For example, Kahn (1997) points out that many people spend lots of money and travel great distances to vacation on tropical beaches, or hike in the rainforests of Costa Rica, travel to alpine resorts or go on Alaskan cruises. We may see among our own family and friends that people’s preferences for natural settings vary and are diverse, which would seem to disconfirm the savanna hypothesis. On the other hand, perhaps some human behavior can be explained by this hypothesis, such as logging of the Amazon rainforests. As a landscape, the rainforest presents far more risks than the savanna due to the spatial enclosures, so it’s possible that the clear-cutting of forests can be explained by the savanna hypothesis and people’s biological need to create more open and safer environments (Kahn, 1997).
Children’s Disconnection with Nature

In 2005, author Richard Louv coined the term “Nature-Deficit Disorder” in his book, *Last Child in the Woods: Saving Our Children from Nature Deficit Disorder*. In the book, Louv describes the term as the lack of nature in today’s generation of digitally-engaged children and goes on to attribute recent rises in childhood obesity, depression, and attention disorders to reduced time spent outdoors (2005). The rise in nature-deficit disorder has happened primarily over the last 30 years due to factors such as: the proliferation of electronic communications; poor urban planning and disappearing open space; increased street traffic; diminished importance of the natural world in public and private education; and parental fear magnified by news and entertainment media (Children and Nature Network, n.d.). Following the publication of his book, Louv co-founded a nonprofit organization called the Children and Nature Network which has a mission to “connect all children, their families and communities to nature through innovative ideas, evidence-based resources and tools, broad-based collaboration and support of grassroots leadership” (Children and Nature Network, n.d.).

The Children and Nature Network provides an abundance of tools and resources to educators and community leaders who are part of a growing “Leave No Child Inside” movement. The organization’s website also offers a great deal of research and publications representing the collection of scientific evidence that nature-deficit disorder contributes to a range of negative impacts on children. Some of these effects include a diminished use of the senses, attention difficulties, obesity, higher rates of emotional and
physical illnesses, and weakened ecological literacy and stewardship of the natural world (Children and Nature Network, n.d.).

There have been numerous studies with results indicating an increasing disconnection between children and the outdoors and less time for free play in nature among today’s children compared to previous generations. One researcher surveyed over 800 mothers in the United States to determine how much time their children play outdoors. Of those interviewed, Clements found that “70% of the mothers reported playing outdoors every day when they were young, compared with only 31% of their children” (2004, p.72). Clements found that children not only spend less time outdoors than their parents did, but their general activities differ in that they’re involved in more organized sports and they participate in more indoor play. The obstacles most mentioned by mothers to creating more time outdoors for their children included television and computers and concerns about crime and injuries while playing outside (Clements, 2004).

Results from another study documented the amount of discretionary time for children under the age of 13, in other words time not spent in school or childcare. The study by Hofferth and Sandberg (2000) reports that “In 1997, 55% of an average child’s week was spent eating, sleeping or in personal care, with an additional 15% spent in school or daycare. This leaves only 30% of children’s time as discretionary” (p.12). Not surprisingly, the study also found that children spend more time in daycare if their mothers work and that this results in less time for all activities, both structured and unstructured play activities (Hofferth & Sandberg, 2000).
A survey by England Marketing that studied 1,150 adults and 502 children found that “Children spend less time playing in natural places, such as woodlands, countryside and heaths than they did in previous generations. Less than 10% play in such places compared to 40% of adults when they were young” (2009, p. 5). The most popular places for play differ between the generations, with 62% of children citing their indoor home environment as the place where most play occurs and 42% of adults reporting the outdoors as having been their most frequent play area (England Marketing, 2009). Some of the results seem paradoxical, such as 41% of the children saying that they prefer to play indoors but 81% expressing a desire for more freedom to play outside (England Marketing, 2009). This may be due to the limitations imposed by parents, who generally feel the need to supervise their children when they’re playing outdoors and cite fears of strangers and road safety as barriers to more unsupervised time outside (England Marketing, 2009). In some cases this fear extends to the children, with nearly 25% of them saying they are worried about being outside alone (England Marketing, 2009).

A study by Dr. Christine Tandy (1999) further illustrates these points when surveying 421 children ages 5-12 and 165 parents in Australia. Tandy found that children spent the majority of their play time at home indoors in a controlled and monitored environment (1999). Even so, the children’s drawings illustrated outdoor activities and natural areas as a favorite place for play (Tandy, 1999). Again, this inconsistency is likely due to the parental controls, their fears related to children’s safety, and desire to supervise play activities.
Several studies indicate that children today spend less time in recess or engaged in activities like walking or riding their bikes to school, and more time in front of a screen or being driven around to their various activities. A 2009 paper on recess by Jarrett and Waite-Stupianky discusses a downward trend in the amount of time children are afforded for recess. The decrease began in the late 1980s when many schools chose to have more classroom time and the passage of No Child Left Behind in 2001 accelerated the trend (Jarrett & Waite-Stupianky, 2009). Jarrett and Waite-Stupianky find that “20% of the school systems have decreased time for recess, averaging cuts of 50 minutes per week” and “only 14% of first graders and 15% of third graders had only 1-15 minutes of recess per day” (2009, p. 66). There also appear to be significant racial and economic disparities in recess times. The article reported that 39% of African American students did not have recess compared to only 15% of white students. Forty-four percent of students living below the poverty line did not have recess while only 17% of those above the poverty line went without it (Jarrett & Waite-Stupianky, 2009).

Not only are children receiving less recess time outside, but they’re also spending less time outdoors on the way to and from school. The Centers for Disease Control and Prevention reports that among children who live within a mile of school, the percent who walk or bike as their primary means of transportation has declined almost 25% over the last 30 years. The most commonly cited barriers to walking or biking include the distance to school, weather conditions, traffic hazards, and crime (“Kids Walk-to-school,” 2006).

Another unfortunate likely consequence of nature-deficit disorder is a growing number of young people who lack basic knowledge about biodiversity and species
indigenous to their regions. A study of advanced level high school biology students in the United Kingdom found that none of the students was able to correctly identify 10 common wildflowers and 86% of the students weren’t able to name more than three of the species (Bebbington, 2005).

Another study conducted in the United Kingdom surveyed 1,500 children between the ages of five and 10 and their parents to assess knowledge about biodiversity. Children were asked to complete a picture survey to test their knowledge of species and nature in general while their parents were questioned about their children’s experiences in nature. Findings of the study by Airbus showed the following:

- 40% of children could not tell the difference between a bee and a wasp
- “30% of children had no idea what a mouse looked like, with 6% getting it confused with a gerbil”
- “25% of youngsters didn’t know what a beaver looked like, 21% of those thought it was an otter, while 2% believed it was actually a badger”
- 83% of children said they enjoyed learning about nature
- 70% of parents said they were concerned that their child does not know enough about nature
- “69% of parents worry that their child spends too much time indoors playing computer games” (2009, p. 1).

Sadly it seems that this decrease in knowledge about local species and biodiversity also may lead to general apathy when it comes to youth’s feelings about the environment and willingness to take action to help protect it. An extensive study by Wray-Lake, Flanagan, and Osgood (2009) published in Environment and Behavior analyzed trends in adolescent attitudes, beliefs, and behaviors related to the environment
over 30 years, from 1976 to 2005. A significant amount of information was collected from the study subjects, including information about their own behaviors and beliefs about the role of consumers, government, and personal responsibility when it comes to environmental issues. Results of the study found increases in positive environmental attitudes and behaviors in the early 1990s but overall there were declines over the remainder of the 30-year period. The researchers found a steep decline in environmental behaviors such as energy conservation and a trend in the adolescents being more likely to support government actions and responsibility to protect the environment rather than take person action (Wray-Lake et al., 2009).

Childhood obesity is becoming an epidemic with nearly 18% of children between the ages of 6 and 11 now considered obese, which is an increase from just 7% since 1980 (Centers for Disease Control and Prevention, 2014). Many studies have been done in childcare centers and preschools to observe activity levels and the differences between indoor and outdoor play in order to form recommendations about how to potentially prevent or reduce childhood obesity. One study observed children between the ages of three and five in South Carolina preschools and found that children are primarily sedentary spending most of their time indoors (Brown et al., 2009). Brown et al. found that during their observations indoors, “children’s physical activity levels were overwhelmingly sedentary in nature with 94% of total intervals recorded as sedentary” (2009, Results para. 2). During time outdoors, 56% of the children’s activities were considered sedentary and only 17% were moderate to vigorous (Brown et al., 2009). Brown and colleagues also found that the outdoor spaces most conducive to high levels
of physical activities were open spaces rather than traditional playground equipment (2009).

A similar study of childcare centers in Europe examined the relationship between the centers’ environments and physical activity of two to three year olds. Similar to the study done in the U.S., these researchers found that 59% of the indoor activities and 31% of outdoor activities were sedentary. The children engaged in more moderate to vigorous physical activities outdoors; 21.3% compared to only 5.5% indoors (Gubbels et al., 2011).

Results of the previous two studies are important to consider in efforts to address childhood obesity. This is particularly evident when reviewing the numerous other studies that have been done showing that access to parks and greenspace and more time outdoors combined with less screen time can be linked to lower body mass indexes (BMIs) in children. For example, in a study of five-year old children by Kimbro, Brooks-Gunn and McLanahan, it was found that “On average, children played outside about 2 hours per day, and watched more than two and a half hours of television per day” (2011, Results para. 1). Kimbro and colleagues also found that children who spend more time playing outdoors have lower BMIs while the children who watch more television have higher BMIs (2011). The higher the ratio of outdoor time to television time, the lower the BMI (Kimbro et al., 2011). Furthermore, a study of nine to ten year olds in Southern California found that children who had a park within 500 meters of their home were at a reduced risk of being overweight or obese by the age of 18 (Wolch et al., 2011).

Importance of Learning through Nature Play

All children should have the right to play. In fact in 1989, the United Nations
adopted the Convention on the Rights of the Child, which stated in Article 31 that all children have the right “to rest and leisure, to engage in play and recreational activities appropriate to the age of the child and to participate freely in cultural life and the arts” (United Nations, n.d.). This viewpoint is also shared by organizations focused on environmental education. According to the North American Association for Environmental Education (NAAEE), play is considered the “premier activity” of early childhood and children should be encouraged to play frequently and spontaneously (2010). This is because, like many people, children enjoy play the most when it can be freely chosen and initiated, however that’s not to say that play can’t be adult-led in order to facilitate even greater learning. In this respect, the NAAEE views play on a continuum from child-initiated to adult-led and sees environmental education as being conducive along the entire continuum (2010).

As Randy White points out, children have played in wild places for most of human history (2004). Society is becoming increasingly urbanized, however two hundred years ago, most children spent their time playing in fields, farms, and truer wilderness settings (White, 2004). The natural world provided children with their first, and sometimes only, toys and even to this day, nature sparks the curiosity of many children by compelling them to play with plants, animals, rocks, and water (NAAEE, 2010). These natural elements and phenomenon can serve as the basis for early environmental education by facilitating nature play and the cultivation of knowledge, understanding, compassion, and ultimately stewardship (NAAEE, 2010).

In Stephen Kellert’s book, *Designing for Life*, he provides an overview of the
ways in which children experience and learn from nature and how that can be reflected in the six stages of cognitive development (2005). According to Kellert, children can learn from nature through direct experience such as hands-on interaction, indirect experience such as managed or human-influenced environments like zoos or botanical gardens, and lastly through vicarious experiences such as stuffed animals, books, or videos (2005). Kellert goes on to discuss the ways in which environmental education are relevant to the six stages of children’s cognitive development, which include: knowledge, comprehension, application, analysis, synthesis, and finally evaluation (2005). For example, in the first stage of knowledge acquisition, children form basic understandings of facts and terms, learn about causal relationships, and create basic classification systems (Kellert, 2005). Learning through nature play supports this stage by offering children engaging opportunities to identify and name objects and assign categories to elements of the environment such as trees, flowers, birds, and mammals. Another example of the importance of environmental education to cognitive development can be seen in the second stage of comprehension. In this stage, children learn to translate and interpret facts and ideas and validate the information through their own observations and experience (Kellert, 2005). Nature play supports this developmental stage by allowing children to observe natural events or phenomena like the fact that snow falls at certain temperature and rain at others, trees grow in soil, and ducks are found in aquatic habitats (Kellert, 2005).

Nature play is a subject that’s increasingly being studied within the landscape architecture profession. A 2005 paper focused on therapeutic garden design presents
many recommendations for creating garden spaces that nurture environmental learning and healthy development of infants and toddlers. The authors emphasize the importance of these environments in the first year of life and state that “nature must be seen as an essential component of the experiential world of childhood, designed into every childhood habitat, providing daily immersion in nature, putting children in close touch with the biosphere” (American Society of Landscape Architects (ASLA), 2005). For example, just a few square meters of play gardens for infants and toddlers can spark their sense of wonder and allow them to observe and explore new objects, ask questions like “will the grasshopper hop?”, and start to develop language and counting skills (ASLA, 2005). Guidelines for designing these types of spaces include:

- Site the garden on level terrain that conserves the natural elements and orients the space so that there are areas that receive some shelter from wind and precipitation.

- Locate the garden so that it can be viewed from the children’s indoor play spaces and if possible, public viewing areas.

- Provide as many options as possible for children to experience nature through their senses and/or through hands-on activities.

- Provide opportunities for planting and harvesting.

- Provide natural movable items that will engage children in their use of the garden. (ASLA, 2005).

According to ASLA, by following the above guidelines and ensuring that adults are present to facilitate activities, therapeutic gardens can be places for playing and learning and developing an affinity for the natural world (2005).

Another helpful resource in designing nature play spaces is a set of guidelines written by Robin Moore called Nature Play & Learning Places: Creating and managing
places where children engage with nature (2014). This document discusses intrinsic motivations to learning and presents the “6Cs” that apply to nature learning including curiosity, choice, content, collaboration, challenge, and context. The guidelines state that infancy, toddlerhood, and preschool years are the most important period of human development, therefore early childhood experiences with the natural world need to be positive (Moore, 2014). During the toddler years, nature can provide a wide variety of materials and “stuff” for the children to carry around, stack, sort, and take apart, which are all activities that toddlers enjoy (Moore, 2014). The guidelines recommend that nature play and learning spaces for toddlers can be an extension of the infant play areas. By preschool, it’s recommended that children be allowed to confidently explore nature and play in a more open-ended way (Moore, 2014). Children want to construct things and engage in sensory stimulation, which is critical during this phase of rapid brain development and can be supported through materials found in nature (Moore, 2014). Age-appropriate engagement in nature play activities can help contribute to the development of environmentally literate individuals who make informed decisions and take action to protect the environment and societies.

Education writer David Sobel emphasizes the importance of nurturing children’s tendency toward empathy with the natural world in early childhood (1998). According to Sobel, young children do not differentiate between the self and the other, so early childhood is a wonderful window in which to cultivate a sense of connectedness to the natural world and others (1998). These connections can later serve as the emotional foundation for learning about more abstract environmental issues and concepts. Since
children naturally feel drawn to animals, Sobel recommends activities that encourage relationships with animals as a way to foster empathy during early childhood (1998). Allowing children to run like a deer or slither like snakes, to be clever as a fox and quick like a bunny – these are activities that can build on children’s affinity for animals and enhance their understanding of the natural world while allowing them to play as young children should (Sobel, 1998). Sobel states:

If we want children to flourish, to become truly empowered, then let us allow them to love the Earth before we ask them to save it. Perhaps this is what Thoreau had in mind when he said, ‘the more slowly trees grow at first, the sounder they are at the core, and I think the same is true of human beings (1998, Allowing time for nature para. 4).

Sobel shares an example of the power of animal connections and learning through nature play from a camp experience. The activities were part of the camp’s bird curriculum and began by helping children to cut bird wings out of cardboard boxes, which they could use as their own individual wings. The children wore their wings and pretended to fly through the forests and explore the outdoors as birds, which included building nests. According to Sobel, this resulted in hours of dramatic play, but the activities did not end there. Next the educators encouraged the children to observe the color patterns on real birds and paint their wings accordingly. Now while wearing their wings, the children could compare their markings and painted color patterns to those of actual birds, leading to further education through bird books. Sobel considers this series of activities a success because it started with a natural fascination, the development of
empathy through their play activities, and ultimately the acquisition of knowledge about different species of birds (1998).

A 2003 study of school grounds as sources of play and environmental learning presents the importance of nature play to children’s development. Authors Malone and Trantor discuss the benefits of nature play in terms of its contribution to creativity, cooperation, communication, and interpersonal problem solving (2003). Also sited is the preference of many children to play in more natural and wild spaces, which was reinforced by the results of the authors’ study of the physical properties and associated environmental learning in five different primary schools. Results of their study showed that it was the most unstructured environments that included spaces like forests and garden beds that were most conducive to learning (Malone & Tranter, 2003). This was particularly evident in one school that was surrounded by a large forest accessible to the children. The forest provided an environment that the children could explore and manipulate with materials like logs, twigs, and stones to encourage more cognitive play which was not observed at the schools with more structured or manufactured playgrounds (Malone & Trantor, 2003). The authors conclude that many school grounds may be over-designed and regulated, diminishing the potential for environmental learning and cognitive development (Malone & Trantor, 2003).

Best Practices of Early Childhood Environmental Education within Daycares

Environmental education within child care settings can run the gamut from single projects led by a passionate staff member to comprehensive and holistic programs that not only incorporate a robust environmental curriculum but also include more sustainable
operations. The richness of the environmental programs can depend on many factors such as budget and resources, staff capacity and interest in the material, and support from parents and management. A review is included below.

In considering approaches to early childhood environmental education in a childcare setting, it’s important to start with the fundamentals and an understanding of the goals behind environmental education. Ruth Wilson, author of *Fostering a Sense of Wonder* (2003), is an expert and pioneer in the field of early childhood environmental education. In her book, Wilson provides six goals for early childhood environmental education, which can be of use to many childcare settings in developing appropriate content (2003). The goals are as follows:

- **Goal 1:** Develop an awareness and enjoyment of the beauty and wonder of the natural world.
- **Goal 2:** Become aware of the concepts of cycles, diversity, and interconnectedness in nature.
- **Goal 3:** Develop a sense of appreciation and respect for the integrity of the natural world.
- **Goal 4:** Develop a sense of caring for Planet Earth and an understanding of how different types of pollution might harm the Earth.
- **Goal 5:** Develop an awareness that people are a part of the natural world, not separate from it.
- **Goal 6:** Develop an understanding of how to contribute to the well being of the Earth. (Wilson, 1993)

Wilson goes on to present an extensive set of guidelines for developing environmental education (EE) programs specifically for pre-schoolers. Her guidelines include:

- **Begin with simple experiences.** When introducing children to nature, start with the most immediate environment so that children feel safe and comfortable.
Watch a bean sprout before tending a garden, or walk barefoot in the grass before wading in a stream.

- Keep children actively involved. Facilitate children’s interactions with adults, materials, and their surroundings, allowing their interest, curiosity, and need to know to drive activities.

- Provide pleasant, memorable experiences. The enjoyment of an EE experience is just as important as the content.

- Emphasize experience versus teaching. For effective learning, young children need to be involved in sharing and doing versus listening and watching.

- Involve full use of the senses. Children need to engage with the natural world at the sensorimotor level.

- Provide multimodal learning experiences. Provide opportunities to learn through more than one avenue or channel of information.

- Focus on relationships. Promote cooperation, communication, and trust between people by encouraging cooperative learning in the outdoors. Help children feel comfortable in the natural environment in order to build independence and self-concept.

- Help children understand that all parts of the natural world are interconnected and that they are a part of it, as well.

- Demonstrate a personal interest in and enjoyment of the natural world, and model caring for the natural environment. Young children learn more about attitudes and values from their observations of adult behavior than they do from what adults say to them.

- Maintain a warm, accepting, and nurturing atmosphere. Young children need to know that they are valued and that they can trust the adults who work with them.

- Introduce multicultural experiences and perspectives. Use art, literature and visitors from different cultural backgrounds to introduce children to a variety of cultures.

- Focus on the beauty and wonder of nature. The most important thing young children can learn about the Earth is that it is full of beauty and wonder.

- Go outside whenever possible. If young children are to develop a sense of love and caring for the natural world, they must be given time to experience it.
- Infuse EE into all aspects of an early childhood program. EE should be integrated into all aspects of early childhood programs rather than being considered an add on. (Wilson, 1993).

These guidelines can translate into the following types of activities, per Wilson’s recommendations:

- Nature-related materials and activities in learning centers.
- Animals and plants as part of the classroom environment.
- Nature-related books for children.
- Nature-related art, music, and movement activities.
- Celebration of the four seasons with special nature-related activities.
- Using foods to show our connection to the natural world.
- Nature-related themes in group activities.
- Nature-related art and art projects made from materials from the natural world.
- Field trips.
- Utilizing and developing the schoolyard to foster learning about wildlife and nature.
- Parent participation in nature-related activities. (1993)

Another noteworthy resource for guidance on early childhood environmental education is the North American Association for Environmental Education (NAAEE), which is a network of professionals, students, and volunteers working in the field of environmental education throughout North America and in over 55 countries around the world. NAAEE encourages early EE programs to allow children to freely discover nature on their own terms and to focus primarily on facilitating positive experiences that foster
connections with nature and the creation of individual perceptions and attitudes (NAAEE, 2010). Similar to Wilson’s recommendations, NAAEE suggests that very young children should be allowed to explore nature through activities like climbing rocks, building with sticks, exploring woodlands, and stomping in puddles (2010). This helps to foster the development of children’s relationship with the natural world and allows them to gradually learn how to interact with nature at their own pace and comfort level. NAAEE provides much more detail and many recommendations for early childhood EE programs in their “guidelines for excellence”, which are as follows:

Key Characteristic 1: Program Philosophy, Purpose, and Development
- Focus on nature and the environment
- Focus on education of young children
- Culturally appropriate goals, objectives, and practices
- Environmental literacy: board, staff, and providers
- Health and safety
- Ongoing evaluation and assessment
- Partnerships
- Interpersonal and intergenerational relationships

Key Characteristic 2: Developmentally Appropriate Practices
- Based on research and theory
- Authentic experiences
- Child-centered and inquiry-based
- The whole child
Key Characteristic 3: Play and Exploration
- Use of the natural world and natural materials
- Play and the role of adults

Key Characteristic 4: Curriculum Framework for Environmental Learning
- Social and emotional growth
- Curiosity and questioning
- Development of environmental understandings
- Skills for understanding the environment
- A personal sense of responsibility and caring
- Physical health and development

Key Characteristic 5: Places and Spaces
- Spaces and places to enhance development
- Natural components
- Comfortable for both children and adults
- Maintenance and usability
- Health, safety, and risk
- Environmental sustainability

Key Characteristic 6: Educator Preparation
- Foundations of early childhood environmental education
- Professional responsibilities of the educator
- Environmental literacy
- Planning and implementing environmental education
- Fostering learning
- Assessment and evaluation

(NAAEE, 2010).

The guidelines are included in a comprehensive document published by NAAEE along with examples and things to look for within each guideline. In addition, NAAEE developed the Early Childhood Environmental Education Rating Scale to accompany these guidelines. The tool can be used for evaluation purposes and making enhancements to environmental education curriculum in early childhood programs such as center-based child care or family daycare settings.

Given the recommendation by experts to focus on outdoor nature play and exploration, an easy place for many daycares to start their environmental education program may be in the play yards or playgrounds. Many standard playground areas, especially in urban areas, can be gray and bleak, devoid of natural features and made primarily of plastic or metal equipment. Areas may be landscaped with shrubs or perennial flowers, however the essence of the play area lacks any sort of wild or natural feel. Randy White and Vicki Stoecklin of the White Hutchinson Leisure and Learning Group attribute the barren design of many playgrounds to a paradigm that focuses more on low-maintenance of the grounds, easy supervision of the children and a desire among staff to get a break, rather than on healthy stimulation of the children (n.d.). White and Stoecklin describe newer naturalized play environments that are planted rather than built and rely on the landscape and its vegetation for designing a play setting and materials (n.d.). According to White and Stoecklin,
Children's idea of beauty is wild rather than ordered. A discovery play garden that plans for wildness, and provides openness, diversity, and opportunities for manipulation, exploration and experimentation, allows children to become totally immersed in play. Children's discovery play gardens are very different than landscaped areas designed for adults, who prefer manicured lawns and tidy, neat, orderly uncluttered landscapes. Discovery play gardens are much looser in design because children value unmanicured places and the adventure and mystery of hiding places and wild, spacious, uneven areas broken by clusters of plants (n.d., Designing outdoor spaces for children para. 4).

White and Stoecklin recommend including some of the following components in a naturalized play environment:

- Water
- Plentiful indigenous vegetation, including trees, bushes, flowers and long grasses that children can explore and interact with
- Animals, creatures in ponds, butterflies, bugs
- Sand, and best if it can be mixed with water
- Diversity of color, textures and materials
- Ways to experience the changing seasons, wind, light, sounds and weather
- Natural places to sit in, on, under, lean against, climb and provide shelter and shade
- Different levels and nooks and crannies, places that offer socialization, privacy and views
- Structures, equipment and materials that can be changed, actually, or in their imaginations, including plentiful loose parts (n.d.).
Studies cited on White’s website showed that the naturalized playgrounds have the following attributes:

- Positively impact children’s development of environmental values
- The combination of both formal learning and informal play in the naturalized environments were found most associated with the development of children’s environmentally responsible behaviors.
- The greater the diversity of natural landscapes, the greater the children’s appreciation of nature and experiences in it.
- Playgrounds best suited to environmental learning were unstructured designed for children’s play. (White Hutchinson Leisure and Learning Group, n.d.).

The NAAEE offers some recommendations for outdoor play spaces specifically for infants and toddlers in order to ensure a safe environment. Some examples include:

- Soft, level surfaces with good drainage. Grass is best for toddling and crawling and wood mulch works well under “fall zones.”
- Eliminate possibilities for entrapment.
- Regularly monitor the area for dangerous items babies may be included to put in their mouth.
- Provide a drinking fountain and shaded areas.
- Provide visual and auditory stimulation such as wind chimes. (2010).

Natural play areas don’t necessarily need to be limited to the outdoors. Boyle recommends incorporating flora and fauna in both indoor and outdoor play areas. Daycares can simply use natural materials such as logs and rocks to delineate play areas and indoor and outdoor plants that children can help care for. The thoughtful selection of animals or pets suitable to a daycare environment can also be a component of an environmental education program. Children can be involved in taking care of the animals, which can strengthen the natural affinity children often have toward animals (Boyle, 2006). The American Society of
Landscape Architects goes a step further and recommends that schoolgrounds and childcare centers should be managed as urban wildlife reservations and cite the National Wildlife Federation’s Schoolyard Habitat programs as evidence of this growing movement (2005).

Trancik argues that children need restorative environments to compensate for mental fatigue and help them recharge for further learning and skills development. These kinds of environments can include variations in vegetation, wind, sun, smell and physical scale – all of which will contribute to children’s fascination and imaginations (Trancik, 1995). It’s the elements found in nature such as sand, water, and snow that provide materials conducive to creative play that can open an imaginative world for children. Trancik also discusses children’s fascination with animals and the importance of including them as part of the restorative environment. He says, “Children do not need much encouragement to spend time peering into a fish bowl or holding the classroom guinea pig. Since nature captivates our fascination and imagination it is the most commonly used example of a restorative environment” (1995, p. 50). Trancik recommends designing the daycare space in a way that allows children to feel close to nature even in inclement weather. This can be done through low windows at children’s eye level, covered porches or patios, and even greenhouses (Trancik, 1995).

The daycare may also be designed in a way that incorporates sustainable and recycled or reused materials, environmentally conscious operations, and even green building practices. Georgia McKay lays out a step-by-step plan for “going green in childcare services” in response to the sustainability movement and growing trend to incorporate green principles within childcare. It’s recommended that sustainability be
viewed as a “whole service” approach that respects the values of all families and involves stakeholders such as parents, teachers, and staff members. A good starting place for a center that wants to develop a comprehensive sustainability and environmental education program is to create a sustainability management plan that includes set goals and targets by which the plan’s impact and progress can be measured (McKay, 2009). McKay recommends the following tasks for development of the plan:

- develop a policy
- establish targets for a reduction in energy and water consumption
- re-examine purchasing practices
- implement a recycling program
- re-examine waste management
- review cleaning practices and minimize the use of toxic chemicals
- develop a garden or vegetable patch
- communicate achievements with the local community and seek their input
- participate in conservation activities conducted by the local community

(2009).

In some cases, larger daycares may find value in appointing a sustainability officer or even a green committee to help lead some of the activities, develop new ideas, and ensure all stakeholders are consulted (McKay, 2009). It’s important to consider staff roles within the program and make sure the daycare center staff are guided through the program goals and objectives and that they have tools available to them, such as a resource library, to help build their capacity and help them learn about new activities to
incorporate in the curriculum (Boyle, 2006). McKay also cautions about approaching environmental education or even sustainability as just an additional project and recommends that it be incorporated into the center’s operations, practices, and daily programs (2009).

Examples of environmental education activities cited in some of the research seem easy to incorporate into a center’s practices, because they can be based on or easily become daily routines. McKay recommends involving younger children in activities like composting and recycling and having discussions around those topics with slightly older children. Boyle suggests play, discovery, and exploration as the basis for very young children and games that use natural items such as seed pods or sticks for older children. Simple things like nature walks can also easily become part of the daily activities and help encourage children to explore and learn about the natural world around them (Boyle, 2006).

Finally, the World Forum – Nature Action Collaborative for Children published a document that includes recommendations for early childcare and education to reconnect the world’s children to nature (2008). Their recommendations for early child care programs and staff include:

- Become better informed about nature learning and the benefits it offers to children.
- Strive to provide children with access to the out-of-doors for significant amounts of time every day for both intentional learning experiences and unstructured play.
- Enact policies (e.g., standards) that support a broad and nature-integrated curriculum that is multi-disciplinary, multi-sensory, and emergent.
- Plan specific activities related to learning about the natural world every day.
- Expose children to men and women who work in scientific or related fields (e.g., naturalists, geologists, biologists, nature writers).

- Plan nutrition education experiences that help children see the —roots to table connections of the food they eat.

- Include families and elders to share their oral traditions, cultural histories, and experiences to offer children stronger links to the land and to their families.

- Continually emphasize with teacher candidates the importance of learning about the natural world and the role of nature learning experiences in their professional practice. (World Forum, 2008).

Many of these best practices come together in a case study presented in Davis’s article “Educating for sustainability in the early years: Creating cultural change in a childcare setting” (2005). In this example, the daycare center decided to embark on a Sustainable Planet Project, which was initiated as a common interest of many staff members and a way for them to add value to their work life. Initially projects were inspired by staff interests and hobbies such as gardening, wildlife conservation, and recycling which led to activities like worm farms, composting, vegetable gardens and native plantings, responsible cleaning practices, and litter-less lunches. The center did experience some challenges initially in implementing their program. One issue was inconsistency in the pace of activities stemming from variable levels of knowledge among staff. This illustrates how a resource library could be useful or the appointment of a program champion. Another challenge was a lack of commitment from some parents related to projects like litterless lunches, which required them to pack lunches with extra thought (Davis, 2005).

Davis states that overall the center’s program did end up being successful and the daycare came to operate with an environmental ethic as part of its culture. This was
particularly true for the center’s water conservation project, which taught children about Australia’s drought and water issues. By learning about the issues, children developed a heightened awareness about the need for water conservation and observed ways in which water was wasted. As a result, children created signs and messages to post throughout the daycare promoting water conservation and they taught their parents about the issues and worked to limit water use at home. Some tangible results of the center’s various activities include a 65% decrease in paper usage, reduction in solid waste by 150%, and enhanced play spaces and restored habitat (Davis, 2005). In this example change started slowly, but as Davis states:

> Chaos-complexity theory informs us that at some indefinable, critical point, small changes become magnified and cascade upwards through the system. Furthermore, these critical points are everywhere. As a result, small wins can set in motion further processes for continued small wins – a strategy that strengthens organisational capacity and the ability to solve larger-scale problems (2005, p. 54).

Pitfalls and What to Avoid in Early Childhood Environmental Education

In developing environmental education programs, it’s important to keep in mind the children’s ages and cognitive abilities in order to select activities and a curriculum that is age-appropriate and will result in the cultivation of a healthy environmental ethic, rather than development of a phobia or fear of environmental issues. Randy White cautions against the premature introduction of abstract concepts such as rainforest destruction or acid rain as it can result in dissociation (2006). This can happen when children are taught something that exceeds their cognitive abilities and causes them to
become anxious or even worse, results in a phobia of the environment or the issues (White, 2006). This biophobia is the opposite of Wilson’s biophilia and can mean that children or people in general have a fear of the natural world, of environmental problems, or of even just being outside (White, 2006).

According to David Sobel, a common problem among environmental education programs is that they try to develop in young children the knowledge about issues and sense of responsibility before children have even had time to develop an affinity and appreciation for the earth and natural world. Many environmental issues are beyond the understanding and control of young children and Sobel cautions that this can cut them off from the possible sources of their strength (1998). Sobel cites the example of distancing techniques, which children can learn in response to physical and mental abuse and says “My fear is that our environmentally correct curriculum will end up distancing children from, rather than connecting them with, the natural world. The natural world is being abused, and they just don't want to have to deal with it” (1998, para. 6). Sobel recommends avoiding this potential problem by supporting children’s biophilia, or natural tendency to bond with the natural world by simply allowing them to be outdoors with nature and responsible adults (1998). Rather than asking children to learn about distant ecosystems and environmental problems, we should be helping them become more deeply connected and familiar with their own local flora and fauna, starting with their own backyard or the woods behind their school (Sobel, 1998).

Benefits to Children

Outdoor enthusiasts and nature lovers likely have an intuitive sense that regular
access to the natural world offers many benefits, but there’s actually a great deal of evidence that supports this notion. Extensive research has been done to document how experience in the outdoors or even simple views of the natural world can benefit adults’ physical and mental health and also their intellectual capacities. In a decades old study by E.O. Moore, research on the health care demands in prisons found that prisoners who had more natural views from their windows visited the infirmaries less often (1981). Dr. Roger Ulrich, a professor of architecture specializing in healthcare design, has conducted several studies looking at the effects of nature on physical and psychological well-being, particularly in healthcare settings. In a 1984 study, Ulrich found that patients who had more natural views from the windows in their hospital rooms experienced speedier recoveries following surgeries and requested pain medicine less frequently than patients with views of a more built environment.

Studies have also shown a link between views of nature and intellectual performance in adults. Tennessen and Cimprich researched undergraduate students in a dormitory environment and found that those students with more natural views from their windows had a greater ability to direct their attention (1995). Another study looked at proofreading performance among three different groups of backpacking enthusiasts who were sent on three different types of vacations. The group that went on a wilderness backpacking trip showed improved proofreading performance compared to no improvement in the group that went on an urban vacation and the group that had no vacation at all (Hartig, Mang, & Evans, 1991). These studies, along with many others, provide compelling evidence around the benefits shown in adults who have contact with
nature, but given the focus of my research, I wanted to look closely at any related research focused specifically on children.

Again, I found a significant number of research papers that documented a range of benefits to children from environmental education, nature play, and improved natural surroundings within their environments. Interestingly, I found that this area of research includes representation from a range of professional fields including environmental psychologists, landscape architects, and educators. Some of the research summarized below took place in pre-school settings, others in primary schools, and some within a home environment with school age children. Similar to the adult studies, the research on children showed evidence of enhanced mental and emotional well-being from exposure to nature, but the studies also documented important benefits specifically related to children such as fine and gross motor skills and social behaviors.

Researchers in Sweden studied the effect that two different daycare settings have on children’s development and behavior (Grahn, Martensson, Lindblad, Nilsson, & Ekman, 1997). The first daycare was set in an urban area with a playground surrounded by tall buildings whereas a mature orchard and pasture, woodland area, and a wild and overgrown garden surrounded the second daycare. The second daycare also followed a theme of “outdoors in all weather” meaning the children spend significant periods of time playing outdoors every day. The researchers followed the children for periods over the course of a year, periodically testing their motor function, regularly testing their power of concentration, and measuring the time they were out sick (Grahn et al., 1997). Results of the research showed that the children in the “outdoors in all weather” daycare
outperformed the urban daycare students in all ten categories of motor function, especially those related to balance, agility, and strength of hands, arms, and trunk. The power of concentration was measured by the Attention Deficit Disorders Evaluation Scale test and results showed that children in the nature nursery scored significantly lower, meaning better concentration abilities (Grahn et al., 1997). Lastly, children in the urban nursery were out sick at a normal level, but children in the nature nursery had a very low sick rate (2.8% compared to 8%) which is statistically significant (Grahn et al., 1997).

A similar study was carried out by Fjortoft in Norway to examine the impact of outdoor play activities on pre-primary school children (2001). A concept central to Fjortoft’s research is that of affordance, which he describes as “an awareness of the environments and their functional significance, or their functional meaning” (2001, p. 111). An example of this is a highly branched and stemmed tree that can afford climbing. Fjortoft studied five to seven-year old children in an environment of mixed woodland that was near a kindergarten with a traditional playground area. Results of the study showed a strong relationship between the diversity of the landscape and the affordance of play with children who used the forest as a play area rather than the playground, performing better in motor fitness tests and balance and coordination (Fjortoft, 2001).

Environmental psychologist Nancy Wells has done several studies on the impact of built and natural environments on human well-being and the benefits of natural areas in providing a buffer effect to life stress. In a study conducted by Wells and Evans, it’s theorized that exposure to nature and its potential buffering effects is likely to have an
even more profound effect on children due to their greater plasticity and vulnerability (2003). The results of studying 337 rural eight through 11 year olds showed that greater the amount of greenery surrounding a home environment, the more resilient children were against stress and adversity (Wells & Evans, 2003). In fact, Wells and Evans found that “the impact of stressful life events on psychological distress is weaker under conditions of high nature than under low nature conditions and the difference in levels of psychological distress between low nature exposure and high nature exposure was particularly pronounced among children who experienced the highest levels of stressful life events” (2003, p. 320).

In another study, Wells examined the effect varying amounts of naturalness surrounding a home environment can have on a child’s cognitive functioning (2000). Wells studied 17 seven through 12-year old low-income urban children as they transitioned from living in rundown urban housing to neighborhoods with more natural yards (2000). Results of the study found that the children who experienced the most improvement in greenness or natural areas around their new home environment had highest directed attention capacity, suggesting that it is the degree of change in naturalness or restorativeness of the environment rather than the absolute level that can predict cognitive improvement (Wells, 2000).

There is also evidence that greener play areas lessen the severity of Attention Deficit Disorder (ADD) symptoms. In a study focused on children with ADD, Taylor, Kuo, and Sullivan examined the relationship a child’s exposure to nature during leisure activities in a variety of settings and their attentional functioning (2001). Results of the
study found that ADD symptoms were milder for children who spent more time in greener play settings and in general, the children functioned better than usual after activities in green play settings (Taylor et al., 2001). Children who spent more time playing indoors in windowless settings had the most severe ADD symptoms. Interestingly, when looking at the children’s home environment, the authors found that “measures of overall greenness, grass cover, and tree cover in the front and back yards were not significantly related to severity of symptoms” (2001, p. 67).

MaryAnn Kirkby investigated the relationship between types of play environments and the level of creative and imaginative play in children (1989). The study was conducted in a preschool’s play yard and looked at refuges or places to hide, which are generally preferable to children (1989). Kirkby found that the areas with the highest amount of natural refuges resulted in the most creative and dramatic play. Furthermore, the areas with more natural features such as leaves and branches had the most dramatic play themes (Kirkby, 1989).

Louise Chawla has done extensive research on the benefits of nature for children’s health and development. In one of her studies, Chawla investigates people’s motivations for taking action to protect their environment and the sources of influence in their lives (1999). She conducted structured but open-ended interviews with environmentalists representing a broad range of professions and interests. A total of 56 people are interviewed including 30 from Kentucky and 26 from Norway (1999). Chawla found that “most people described childhood as the foundation of their relationship with the environment but added later formative circumstances as well” (1999, p. 17).
Furthermore, Chawla found a similar set of sources of influence or motivations among the majority of respondents, which included extended time spent outdoors in natural areas during their childhood; parent, family member, or teacher role models; and involvement in environmental organizations. The predominant experiences occurred during childhood with only three of the respondents not beginning their explanations of their commitment with an event from their childhood (Chawla, 1999).

Studies have also shown the benefits of environmental education and access to nature play in reducing violence, bullying, and vandalism. For example, in a three-year study conducted by Malone and Tranter, students from five different schools were observed in order to understand the role of play as a source of learning and the role of the physical space of school grounds (2003). Results of the study found that the density and diversity of the school ground when it comes to natural areas related to the incidence of aggressive behavior (Malone & Tranter, 2003). In fact, the one school that intentionally restricted outdoor play areas reported bullying as a substantial issue in the school. In this school, conflict over the limited space and the boredom resulting from lack of a diverse play area appeared to be correlated with social conflicts and aggressive behavior (Malone & Tranter, 2003). Furthermore, Malone and Tranter found that the only school in the study to not report bullying as a problem followed a Waldorf philosophy with a highly interactive and engaging environment. The outdoor area surrounding this school included a mature pine forest that was accessible to the children, multiple play areas and a wide variety of wooden play equipment. This school also reported fewer incidences of littering and vandalism, which were attributed to the pride and responsibility children felt for their
school grounds and being good stewards of the area. Malone and Tranter conclude that school grounds with sufficient play areas and diverse activities and environments can provide a way to reduce aggressive behavior and conflict in schools (2003).

Opposition and Barriers to Environmental Education

Even though there is a growing movement toward more time for nature play and environmental education and strong evidence supporting its benefits, there are many pressures preventing schools and to some extent families from dedicating time to environmentally themed activities. The effects of the No Child Left Behind Act combined with safety and bullying concerns present significant obstacles to incorporating environmental education and nature play into a typical school day. It’s quite likely that these pressures extend into the world of preschools and pre-K childcare settings as childcare providers feel pressured to prepare children for kindergarten.

No Child Left Behind (NCLB) was signed into law in 2002 with bipartisan support and a goal to close the achievement gap in America and introduce standards, particularly in the areas of math and reading, that would help improve student performance for certain demographic groups (Great Schools, n.d.). Effects of the law are seen in the tests students are required to take, the way teachers are trained, how money is spent on education, and what students are taught (Great Schools, n.d.). Those in favor of the law support the notion that it helps to level the playing field for schools and students, holds schools and teachers accountable, and provides students with access to better schools and tutors (Great Schools, n.d.). Proponents of NCLB can cite evidence of the law’s effectiveness as well. In 2007, the nonpartisan Center for Education Policy
conducted a comprehensive study of test scores in all 50 states since NCLB took effect and found that student achievement in reading and math has gone up in most states since 2002 (Center on Education Policy, 2007). The study also found more evidence of achievement gaps narrowing than widening and average yearly gains in test scores increasing after NCLB (Center on Education Policy, 2007). These are certainly encouraging results, yet the focus on teaching to rigid standards and tests has led to declines in other areas. The increased instructional time in specific subjects governed by NCLB has been a contributing factor to diminishing recess time and less time spent in other subjects.

The Center on Education Policy has also conducted surveys of school districts to track instructional time and recess as a way to assess the effects of NCLB. A 2007 survey found that since the enactment of NCLB, 62% of surveyed school districts increased instructional time in the areas of math, English and language arts and 44% decreased the time spent in other subjects (Center on Education Policy, 2007). Some of the decreases were seen in areas where nature play and environmental education are the most likely to happen, such as a 20% decrease in recess time and a 28% decrease in science (Center on Education Policy, 2007).

Another study found that “nearly forty percent of the nation's 16,000 school districts have either modified, deleted, or are considering deleting recess” (Sindelar, 2002, para. 3). Evidently some school districts are even building new schools without playgrounds due to demands to improve test performance and spend more time focused on academic performance. Some schools are electing to remove recess for other reasons
such as liability, safety, and bullying concerns. Administrators have concerns about a shortage of teachers for student supervision during recess leading to worries about injuries, bullying, and kidnapping. Since recess is often the only time during the school day that children are exposed to the outdoors, the decrease in recess time has implications for nature play. Furthermore, decreases in time spent on science also can limit children’s exposure to nature and have the potential to hinder their natural biophilia.

In spite of these statistics and the pressure to conform to NCLB, many districts and parents are pushing back and advocating for adequate recess time. This is in part due to the drive to combat childhood obesity and sedentary lifestyles but it’s also resulting from the strong evidence that students, like adults, perform better academically and emotionally when they have breaks in the day and opportunities to release energy and engage in play activities. In 2013, elementary schools in Washington D.C. cut recess to just 15 minutes a day and parents protested, resulting in a compromise of 20 minutes a day which still left parents unsatisfied (Brown, 2013). Many administrators are feeling the pressure to make these decisions in order to make room for academic performance and meeting standards, yet the parents feel blindsided and left out of the conversation (Brown, 2013). This can mean that parents need to be even more attentive to the curriculum in their children’s schools and how their time is spent during the day in order to advocate for the things they believe are in the best interest of their children.

While environmental laws and policies like NCLB may be a competing force against nature play and environmental education, there is also a set of individuals who are philosophically opposed to the idea of teaching children about environmental issues. In
general, these critics tend to politicize environmental education and claim that it is based on flawed science and biased information. Furthermore, they assert that it spreads fear and doom and gloom and discourages consumption and capitalism. Likely the most prominent and outspoken critic of environmental education is Michael Sanera whose 1996 book, *Facts Not Fear: A Parent’s Guide to Teaching Children about the Environment*, reviews 14 environmental issues such as recycling and global warming in non-technical language to help parents address their children’s concerns about the environment. Sanera contends that most environmental education textbooks are one-sided and factually inaccurate and that environmental educators are indoctrinating children with a set of beliefs that inflate the seriousness of the issues (Smith, 2000). In a report authored by Mr. Sanera, he wrote, “With few exceptions, I found that textbook treatment of environmental issues is influenced by an ideological view that presents human beings as evil and blames the United States in particular and Western industrial societies in general for every environmental ill” (Cushman, 1997).

Critics of environmental education tend not to differentiate between environmentalism and environmental education and politicize both (Disinger, 1997). But individual critics such as Michael Sanera tend to have their own biases and are often associated with organizations that have ties to and are funded by manufacturing and extraction industries that are responsible for environmental destruction and pollution (Smith, 2000). Conservative think tank organizations with innocuous names such as The Claremont Institute and the Center for Environmental Education Research are often the source of funding for leading critics and they work to weaken environmental education.
laws and standards at the state level around the country (Smith, 2000). Fortunately many of these efforts have failed thanks to the vigilance of dedicated environmental education communities (Smith, 2000).

Conclusion

By designing play areas and curriculums in a way that incorporates environmental education and nature play, child care centers can help nurture several aspects of early childhood development that will result in many benefits for children. A rather large collection of research has shown that exposure to the outdoors can lead to improved physical coordination, enhanced social skills, less anxiety, improved intellectual performance, and a stronger environmental ethic. These are traits that inarguably every parent would like to see in their children. But since children today spend less time outdoors and have less exposure to wild natural areas, their opportunities to learn about nature and environmental issues are limited. This combined with the fact that many children spend a significant amount of time in daycare makes it even more critical for child care centers to help children experience nature and learn about issues impacting the environment we all depend on.

There are many simple ways for child care centers to create an atmosphere that’s conducive to environmental learning, from the outdoor play areas to the indoor curriculum. Integral to the success of any program is involvement and proper training of staff, a holistic approach rather than creating an “add-on” project, outdoor play areas with natural features and moveable parts, and a focus on animals when possible to cultivate children’s natural biophilia. Child care centers that take this approach can help cultivate a
new generation of children that has an appreciation for nature and a respect for the environment while also realizing some of the many benefits when it comes to early childhood development.
CHAPTER THREE

Methods

In this chapter, I will describe the research methods used to conduct a study on the types of environmental education being done in pre-kindergarten child care settings. The purpose of my research is to learn how environmental education within a daycare setting can impact early childhood development. I have not found any research that explores this question broadly to learn about the range of environmental education activities being done in different daycare settings and the associated benefits. There is a fairly large body of research on nature play specifically, which examines particular benefits or developmental attributes within children such as physical agility, obesity, fine motor skills, intellectual performance, or stress levels. Much of this research was done with children ages four and over and the research studied one or two specific outcomes of nature play. My research is looking at environmental education and nature play targeting pre-school age children from infants to age five. It also is looking more holistically at environmental education, including both indoor and outdoor activities, and is attempting to identify a broad range of benefits from the various activities being done within the daycares.
Research Questions

The main research question I will attempt to answer is: How does environmental education and nature play in child care settings benefit children? There are several other important research questions to support this topic, including: What types of environmental activities are done with which age groups of children within the daycare?; How does time spent on environmental education or nature play correlate with stress levels, social interaction, motor development, intellectual performance, and overall wellbeing?; What are the daycare’s sustainability practices and what is the staff’s level of involvement in these programs?

Hypothesis

Based on the review of literature and the many studies I read which showed that people from various age groups and demographics can benefit in multiple ways from exposure to nature, I have the following hypotheses:

1. Children who attend daycares that offer more time for outdoor play and that provide a wider variety of both indoor and outdoor nature-based activities will demonstrate more positive physical and social developmental skills.

2. Children who attend daycares that offer more time for outdoor activities will exhibit less stress and improved intellectual performance.

3. Daycares that offer a more sophisticated environmental education curriculum and programming will report higher levels of environmental awareness within children and staff.
4. Daycares that offer less time for outdoor play or that have the most traditional “manmade” playgrounds will report more negative behaviors for the children during indoor play time.

Subjects

Subjects of my research are the Managers or Directors at several Twin Cities area child care centers. The daycares selected for the study represent a range of child care settings and teaching philosophies. Some daycares are larger corporate owned centers while others are smaller programs that are privately owned and operated within churches or local corporations. I intentionally selected daycares that represent a range of teaching philosophies. There are Waldorf and Montessori programs as well as traditional pre-school models. The daycares were all invited to participate in my research through a letter that was sent via email to describe the project and what would be required of the research subjects (See Appendix A). All daycares that agreed to participate were then asked to sign a consent letter, which described the research procedure and ramifications of participating in greater detail (See Appendix B). Subjects were assured that their participation in the survey and the resulting data would be kept confidential and that the actual names of the child care centers would not be included in the final capstone paper.

Methods – Survey

The primary instrument for my research is an online survey completed through the website Survey Monkey. The survey includes 28 questions that collect general information about the daycare and the ages of children served, outdoor play areas and use of nature play, indoor environmentally themed activities, sustainability programs within
the daycare, and the observed or perceived benefits to children of the environmental education programs. Data collected through the survey is primarily qualitative and is secondary data since it is provided by the daycare managers. Survey questions were mainly multiple choice to make it easier for the subjects to complete and to have a consistent data set. Several questions included space for the subjects to elaborate or provide more qualitative information. The complete survey can be found in Appendix C.

Procedure

Once the survey was developed, a link to the website where it would be completed was sent to all study participants along with a short set of instructions for completing the survey. Subjects were reminded again that their participation was completely voluntary and confidential and that all data and results from their completed surveys would be kept in my control via password protected documents. Subjects were told that they could consult with other staff from their daycare when completing the survey in the event that the individual subject did not have direct knowledge or observation of some of the environmental activities or age groups within the daycare. The subjects were given two weeks to complete the survey and a reminder was sent one week before the deadline to those who had not yet completed it.

Similar Studies

Many of the studies that I read used research methods similar to those I will be following. For example, Hofferth and Sandberg (2000) used a survey to measure the amount of time children spend outdoors while England Marketing and Tandy used them to learn about the types of play environments where children spend most of their time.
These surveys primarily involved the parents as the subjects. Another survey done by Airbus in the United Kingdom surveyed both parents and children to assess their knowledge of biodiversity. This survey was done using pictures and was actually more of a test to determine how many species could be correctly identified and drawn by the subjects.

Other studies that I reviewed were done to examine similar topics such as the benefits of nature play, however their methods were different than those I plan to follow. Many of these studies involved direct observations by the researchers who watched children play and interact in different settings and made their own conclusions. Brown et al. and Gubbels et al. observed children to categorize their activity levels in outdoor versus indoor play areas. Malone and Trantor also used first hand observation methods to study the types of play environments that were the most conducive to creativity, communication, problem solving, and learning. These are things I’ll be studying, however I’m hoping to get the results through the survey rather than first hand observation. Part of the reason I’m not able to follow similar methods using observation is due to the fact that my research is taking place over the winter when children will be spending far less time outdoors. If the research had taken place during the summer months, it would have been easier for me to observe first hand the children playing outdoors and any associated perceived benefits.

Some studies involved pre and post tests such as Grahn, Martensson, Lindblad, Nilsson, and Ekman’s research which followed children in two different daycare settings for more than a year and periodically tested their intellectual and physical performance to
evaluate the effect of the play environment. Wells also tested children’s intellectual performance following a move to a greener neighborhood. This also would be an interesting method to use in child care settings and would just require much more time for the research to take place.

Lastly, some studies, such as that done by Louis Chawla, involved interviews in order to learn about people’s level of environmental awareness and literacy and their reasons for being more environmentally concerned. This is a component of my survey, however the result will come through in the response to the survey question, not an in depth interview.

Data Analysis

The survey was completed by six daycares. I will compare the data and responses of subjects to look for trends and correlations in the number of environmentally themed activities conducted within the daycare and the number of developmental improvements or benefits reported in the children. I will evaluate the richness of the daycares’ environmental education curriculum and favorability of the facilities’ setting to environmental learning in order to look for associations with categories such as fine and gross motor skills, intellectual and social development. For example, I’ll be interested to see whether the daycares that report children spending more time outdoors and greater frequency of nature-based play activities report improved developmental attributes within the children.

Another area that I will be focused on will be the level of reported environmental awareness of the daycares’ staff, children, and parents. For each daycare, I will compare
this response to the number of environmental activities and overall richness of their environmental programs to look for a possible association.

Lastly, I will look at the richness of the daycare facilities’ sustainability programs to identify any correlations with the types of nature play and environmental education activities conducted for the children. This could be an interesting correlation, but won’t help to answer which came first: the environmental curriculum or the sustainability program.

In order to compare the data, I will transfer some of it to tables in Excel spreadsheets. This will help me to narrow in on the results of some specific questions while comparing the responses of all subjects. I will also create charts with some of the data in order to visually compare the daycares’ responses.
CHAPTER FOUR

Results

In this chapter I will present the results of the survey conducted among six Twin Cities area child care centers. I will explain the results in order to answer the primary research question regarding the ways in which nature play and environmental education benefit children in child care settings. I will also review the data to answer the following supporting research questions: What types of environmental activities are done with which age groups of children within the daycare?; How does time spent on environmental education or nature play correlate with stress levels, social interaction, motor development, intellectual performance, and overall wellbeing?; What are the daycare’s sustainability practices and what is the staff’s level of involvement in these programs? Results of the surveys will be analyzed to determine whether it supports the hypotheses presented in chapter three.

Survey Subjects

All six of the child care centers invited to participate in the survey did in fact complete the survey via Survey Monkey. The 28-question survey was completed by the subjects within one week and on average it took them 16 minutes to complete, which was less time than I estimated. Subjects answered the vast majority of the questions with very
few left blank and several added their own comments or clarifying information to the multiple choice questions.

Demographics of Child Care Centers

The first three survey questions gathered basic information about the number of children and age groups represented at the different centers, the teacher to child ratio, and the amount of time on average that children spend in the center each day. Interestingly, the majority of the centers were rather large with the majority reporting that greater than 15 children from each of the age groups of interest attend their daycare (Figure 1).

![Figure 1. Number of children from different age groups.](image)

One hundred percent of the children in the six studied child care centers spend more than six hours per day in daycare, with the majority actually spending greater than eight hours. This supports the statistics from Child Care Aware regarding the significant amount of time today’s children spend in child care and reinforces the importance of this environment as a place for children to become more exposed to nature and aware of
environmental concepts. Most of the centers have a low teacher to child ratio, particularly for the younger ages of children, with the majority reporting a ratio of 1:8 or lower. This can be particularly conducive to nature play and environmental education as there should be adequate staff to supervise children outdoors and facilitate hands-on learning opportunities in nature.

Outdoor Play Activities

Several questions within the survey were asked to learn about the amount of time children spend outdoors and their type of play environment. Results showed that children over the age of 12 months spend a minimum of one hour outside during warmer months with most actually outdoors between one and two hours (Figure 2). Even the infants all spend at least 30 minutes outdoors when the weather is warm. One respondent reported that often times the classrooms go outside three times per day, which can amount to over two hours, but this doesn’t necessarily happen every day.

![Figure 2. Time spent outdoors during warmer months.](image)
During the colder months, children over the age of 12 months spend a minimum of 30 minutes outside with the majority actually outdoors longer for one hour or more (Figure 3). Somewhat surprisingly, 40% of the respondents reported that children under 12 months also spend at least 30 minutes outdoors during the colder months. One stated that they really make an effort to get the younger children outdoors, even if just for 10 minutes.

![Figure 3. Time spent outdoors during colder months.](image)

For many of the children in the studied childcare centers, their time outdoors involves walks around their campus or neighborhood. When the weather permits, 100% of the infants are taken on daily walks in strollers and the majority of children over 12 months go on walks at least weekly, if not daily. Interestingly, a third of the respondents reported that toddlers aged 12-36 months don’t go on walks at all while the younger and older children do. Perhaps this is due to a lack of strollers conducive to toddlers or a sense among staff that they don’t have adequate control over the one to three years olds compared to older children. Respondents cited that many types of environmental or
nature themed activities happen during these walks such as watching for wildlife, collecting bits of nature for projects, visiting gardens, and talking about the weather.

In terms of more formal or structured outdoor activities, over 80% of the child care centers reported gardening, picnics, and water activities as part of their outdoor curriculum (Figure 4). In addition, respondents talked about activities like base fitness lessons to encourage gross motor skills, visits to a butterfly garden, and water days with sprinklers or water tables.

![Figure 4. Types of structured outdoor activities reported.](image)

Many of the outdoor play areas of the centers surveyed include elements within the primary outdoor play areas that are in line with recommendations for more natural playgrounds, such as those recommended by White and Stoecklin. The majority (83%) cited having playground equipment made from wood opposed to plastic or metal and 67% include both vegetable and flower gardens in their play areas (Figure 5). Sixty-seven percent of the play areas have a minimum of 20% tree cover or canopy and 33% have water features. Some of the more advanced design elements for natural play areas
were not frequently mentioned. For example, none of the play areas include nature trails or unmanicured types of paths and only 33% include natural play structures such as rustic benches, hay bales, or wood forts.

When asked about the types of positive physical and social early childhood developmental traits observed during children play outdoors, the subjects responses overwhelmingly indicate that outdoor play time is beneficial for child development (Figure 6). Over 50% of the subjects confirmed that all of the positive traits listed in the question were observed in their children. In terms of the physical benefits, 100% of the subjects reported observing improved physical agility and balance and coordination – the two physical traits listed as possible responses – during children’s time playing outdoors. This supports research by Fjortoft (2001) and Grahn et al. (1997) that showed improved motor function in children whose schools or daycares had more natural play areas. Healthy social interactions and cooperative play between children were the two social traits listed as possible responses and, respectively, 67% and 83% of respondents reported
improvements in these two areas. Improved mental acuity and intellectual performance also was reported to improve with 83% of respondents reporting improvements in problem solving, creative thinking and play, and attention span. Interestingly, one respondent from a Montessori child care center commented that “lots more dramatic imaginative play occurs outdoors as opposed to the work time in a Montessori classroom” which supports Kirkby’s research that showed children engage in much more dramatic and creative play when they have exposure to wilder natural play areas (1989). Another respondent reported that the children eat and sleep much better when they can engage in outdoor activities.

Figure 6. Percent of daycares reporting improvement in various developmental categories after time spent outdoors.

The majority of subjects also reported improvements in the areas of stress, health, and intellectual performance after children play outdoors (Figure 7). One hundred percent reported improved stress and anxiety levels while 67% reported improved health and
83% saw improved intellectual performance. One center reported that children “seem more relaxed once they get their wiggles out” and that this is particularly noticeable after days when weather prevents children from playing outdoors, which “creates more stress and unwanted behaviors in the classroom.” Another reported that children are “more focused and calmer after their morning outdoor time.”

Somewhat paradoxically, 67% of the subjects reported negative behavioral issues when children play outdoors compared to indoor play. This seems almost counterintuitive given the fact that the majority of respondents also reported healthy social interactions and more cooperative play during outdoor play. Responses indicate that more rough and aggressive play can happen outdoors with one subject reporting that “for aggressive children, the playground can be a disaster” and another stating that more injuries happen outdoors. Perhaps these responses indicate that the negative behaviors are observed more frequently outdoors in those children who are aggressive and more likely to exhibit
negative behaviors when not kept under closer supervision rather than an overall trend that outdoor play results in more aggressive behavior in general.

Indoor Environmental Education Activities

The survey included eight questions regarding indoor environmental activities and their perceived associated benefits. Nature or environmentally themed books are frequently read to children of all ages with the majority of respondents reporting that they read these types of books on a weekly basis to toddlers and three to five year olds if not daily (Table 1).

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<th>Daily</th>
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<td>6 wks – 12 mths</td>
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<td>12 - 36 mths</td>
<td>16.67%</td>
<td>83.33%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3-5 years</td>
<td>16.67%</td>
<td>83.33%</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1. Frequency of nature-based books read to children.

Nature-based arts and crafts projects that utilize natural objects such as leaves, pine cones, or plants are also common among the centers surveyed. Eighty percent of subjects coordinate these activities monthly for infants and a third do weekly nature-based arts and crafts with children older than 12 months (Table 2).

<table>
<thead>
<tr>
<th></th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Not at all</th>
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<tbody>
<tr>
<td>6 wks – 12 mths</td>
<td>0</td>
<td>0</td>
<td>80%</td>
<td>20%</td>
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<tr>
<td>12 - 36 mths</td>
<td>0</td>
<td>33.33%</td>
<td>50%</td>
<td>16.67%</td>
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<tr>
<td>3-5 years</td>
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<td>33.33%</td>
<td>66.67%</td>
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</table>

Table 2. Frequency of nature-based arts and crafts activities.

Environmental lessons on subjects such as recycling and energy conservation are also a frequent part of the centers’ curriculums, particularly for the older children (Table 3). Fifty percent of respondents reported featuring environmental topics in their curriculum
on a daily basis for three to five year olds and one third feature them daily for the 12-36 month age group.

<table>
<thead>
<tr>
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<th>Weekly</th>
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<td>6 wks – 12 mths</td>
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<td>40%</td>
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<tr>
<td>12 - 36 mths</td>
<td>33.33%</td>
<td>33.33%</td>
<td>16.67%</td>
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<tr>
<td>3-5 years</td>
<td>50%</td>
<td>50%</td>
<td>0</td>
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</table>

Table 3. Frequency of environmental issues within curriculum.

When asked about the children’s level of engagement in the nature-themed books and changes in fine motor skills during arts and crafts, the subjects reported generally seeing no difference (Figure 8). Only one center reported higher levels of engagement when reading nature-themed books and two centers reported observing improved fine motor skills after arts and crafts activities that use natural elements. None reported that children were less engaged or exhibited less fine motor skills with these activities.

Figure 8. Children’s responses to nature-themed books and arts and crafts activities.
When asked about behavioral or developmental issues observed during indoor play, 67% of respondents reported more negative issues when indoors. One subject stated that the children “are more energetic and antsy when we can't go outside” and another reported more colds when they can’t go outdoors. Another subject reported that “some children require more large muscle play than others and when they don’t get it they may be more aggressive and/or have a higher energy level than desired indoors.”

The subjects were also asked to rank the level of environmental awareness of their center’s children, parents, and staff on a scale of one to ten with ten being the most aware. The weighted average for children and parents is approximately 5.5 and interestingly the average for staff is 6.17 (Figure 9). These results would seem to indicate that in general the centers feel that their staff have a higher level of awareness or are more informed about environmental issues than parents of the children who attend their center.

![Figure 9. Environmental awareness of children, parents, and staff.](image)
The final five questions of the survey were designed to learn about the child care centers’ sustainability initiatives and understand how these programs may relate to the types of environmental activities being incorporated into the curriculum. Sixty percent of the child care centers reported having sustainability programs in place or that they incorporate initiatives to operate in a more environmentally conscious way. The most common sustainability initiatives cited include recycling, green purchasing programs, vegetable gardening, use of organic foods, use of green cleaning products, and energy conservation programs. Over half of the subjects reported that their centers carry out these types of initiatives (Figure 10).

Figure 10. Percent of daycares incorporating various sustainability initiatives.
None of the centers have a green team in place, in fact the centers that reported having a formal sustainability program cited that their efforts are led by individuals including the Director of Operations in one case or the Kitchen Manager and Director in another. One center reported that their recycling and water and energy conservation programs do help to reinforce these topics within the environmental curriculum used for the children. None of the others respondents reported a strong link between their sustainability programs and the prevalence of these topics within their curriculum. One reason for this may be that some of the areas like green purchasing or green cleaning products may be irrelevant to the students or more difficult for them to grasp than everyday things like turning off the lights or putting your waste in the correct bin.

**Differences in Results Between Teaching Philosophies**

The six subjects of this research represented a variety of child care settings with different teaching or programming philosophies. Three of the six were more traditional corporate-owned daycare center franchises, with two of these falling under the same corporate umbrella. These three centers promote their teaching philosophy as one that offers a diverse curriculum and there doesn’t appear to be a special focus on nature or environmental education. The locations of these three centers are all suburban. Two of the subjects represent the Montessori education method, which generally promotes independence and respect for children’s natural development with few limits. One of the Montessori centers promotes some of their sustainability and nature play attributes on their website, including use of organic food, frequent outdoor play and visits to local parks and farmers markets. Both Montessori centers are based in a more urban
environment. The final subject was a Waldorf model child care center based on a suburban corporate campus for children of the employees. The Waldorf teaching method in early childhood education emphasizes sensory-based and hands-on experiences and plenty of time for creative play that nurtures the head, heart, and hands. This was the smallest of the daycares to participate in the study, but is also that which talked the most about nature play activities and environmental programs within its promotional and parent education materials. In analyzing the results of the survey, it is interesting to compare the responses of these different teaching methods, philosophies, and program structures.

Of all six subjects, the one that appears to have the strongest outdoor nature play program and environment is the Waldorf center. This center reported spending the most time outdoors in all seasons while there were insignificant differences in the outdoor play time reported by the remaining five centers. The Waldorf center also reported the most diverse and natural play area of all the centers with features like moveable natural play structures, a primarily natural play surface rather than concrete or asphalt, gardens and a sandbox. The more environmentally-focused Montessori program came in closely behind the Waldorf center in terms of the “naturalness” of their primary outdoor play area. Somewhat surprisingly, one of the larger traditional centers reported the highest number of formal outdoor activities with gardening, nature hikes, wildlife watching, picnics, and water activities all part of their program along with several other additional activities reported.
Interestingly, the center that appears to have the most robust indoor environmental program is one of the traditional centers, which reports to include environmental issues in their curriculum on a daily basis with monthly nature-based arts and crafts and nature-themed books read weekly. The more environmentally-focused Montessori center and the Waldorf location also appeared to have strong indoor environmental education programs and also both reported improved engagement and fine motor skills from their children in association with these activities.

The strongest or most comprehensive sustainability programs were reported by the Waldorf center, one of the traditional centers, and the environmentally focused Montessori center. These three subjects conduct the most sustainability initiatives of all six subjects and they also have a minimum of one staff person in place to help run the programs. The assigned staff person is generally the Director of Programs or Operations, and in one case there was additional support from the Kitchen Manager and in another it was reported as a whole team effort.

Support for Hypotheses

Results of the survey generally support the first hypothesis, which is that children who attend daycares that offer more time for outdoor play and provide a wider variety of both indoor and outdoor nature-based activities will demonstrate more positive physical and social developmental skills. The Waldorf center and the environmentally-focused Montessori, which both had diverse outdoor play environments and programs as well as frequent indoor environmental activities, reported the most physical and social benefits related to outdoor play and more engagement and improved fine motor skills with indoor
nature activities. Perhaps the strongest support for this hypothesis is the fact that the center reporting the fewest physical and social benefits observed within the children is that which has the least diverse outdoor play environment and conducts the fewest formal outdoor or indoor activities.

The second hypothesis was that children who attend daycares that offer more time for outdoor activities exhibit less stress and improved intellectual performance. This was supported by the subjects’ responses, however it was difficult to compare or analyze the results because all but one center reported improvements in these two areas. Also, the differences in the amount of time that children spent outdoors was fairly insignificant between the subjects. Given that the vast majority of centers reported improvements and that they also provide adequate outdoor play time for their children, it is hard to identify an argument to this hypothesis within the survey results.

The third hypothesis was that daycares that offer a more sophisticated environmental education curriculum and programming will report higher levels of environmental awareness within children and staff. This hypothesis was strongly proven by the subject representing the Waldorf center, which of all centers appeared to have the most comprehensive environmental curriculum, both for indoor and outdoor activities. This center reported the highest levels of awareness among children, staff, and parents. Their staff was rated at the highest level of ten, parents at eight, and children were scored a six. This was also the only center to indicate that their initiatives were a team effort. This center happens to be based on the campus of a corporation that is heavily focused on sustainability, which may be part of the reason for the higher level of awareness and
dedication of all staff to the environmental initiatives. Interestingly, responses of the less environmentally-focused Montessori center argue against the hypothesis. This subject reported high levels of awareness among all three groups of children, parents, and staff yet the center does not have a formal environmental or sustainability program in place and conducts the fewest initiatives of any of the subjects. Part of the reason for this may be due to the demographics of the urban neighborhood where this center is based. It is located in an area where the population tends to be more active outdoors and with a population that is more supportive of environmental programs.

The final hypothesis was that daycares that offer less time for outdoor play or that have the most traditional “manmade” playgrounds will report more negative behaviors for the children during indoor play time. This hypothesis was also somewhat challenging to analyze because not many subjects reported negative indoor behaviors. Furthermore, there is not an association between those that did report these behaviors and the types of outdoor play environments they offer. One of the traditional daycares with a diverse outdoor play environment and plenty of time for outdoor activities did report that children tend to get more colds when they can’t go outside, but this does not appear to be associated with a lack of diversity or time spent in their outside play area. Another traditional center reported that the children are more energetic and antsy when they can’t go outdoors. This particular center does appear to have a fairly bland and manmade play environment, yet they do spend adequate time outdoors. Further, the response isn’t necessarily an indication of negative indoor behavior like aggression, but rather suggests that the children have a strong desire to be outdoors and are naturally more energetic.
when weather or other factors prevent them from going outside. Another traditional center reported more colds when they can’t go outside. Finally, the Waldorf center, which again reported the highest amount of time spent outdoors of all centers and has the most natural play area stated that “Children have more negative physical contact with other children when they can’t get outside daily. Some children require more large muscle play than others, when they don’t get it they may be more aggressive and/or have a higher energy level than desired indoors.” This is strong support for the idea that children need plenty of outdoor time to release energy and practice gross motor skills, but it doesn’t show a relationship between this daycare’s outdoor play activities and indoor behaviors since this center generally does provide a very rich outdoor environment for the children. If anything it shows that even those centers that have the best nature play areas still have challenges with indoor behavior issues if weather or other factors prevent children from going outside.

Along a similar theme to the final hypothesis, there also doesn’t appear to be an association between the centers that reported negative outdoor behaviors and the type of outdoor play area or activities. In fact, the Waldorf center with the strong outdoor program reported a negative outdoor behavior of younger children being a bit apprehensive or afraid initially of the play area. This statement doesn’t necessarily indicate that the play area or amount of time spent in it is causing a negative behavior, but rather likely has more to do with the age of the children and their initial apprehension around exploring a new environment. The only other comments around negative outdoor
behaviors were related to aggression and they did not have any relationship to the type of outdoor or indoor play activities conducted at the center.

Conclusion

In conclusion, the study subjects that have stronger indoor and outdoor environmental education or nature-based programs and curriculums indicated that their children demonstrate more positive physical, social, and mental capabilities. The responses of these centers prove that environmental education and nature play can be tremendously beneficial for children and provide opportunities to encourage and nurture important aspects of early childhood development such as physical agility, coordination, social interactions, cooperative play, and problem solving. Additionally, the subjects with strong environmental programs also reported higher levels of environmental awareness among their population, which should be considered a positive outcome given the environmental challenges faced by our planet and society. Overall, each of the six subjects reported some degree of environmental programing within their curriculum and encouraged as much outdoor play time as possible. Given the diversity of centers and teaching philosophy, these results can be seen as a positive indication of the quality of environmental education within child care centers and the direction that it may be going in the future.
CHAPTER FIVE

Conclusions and Recommendations

I conducted this study in part as a way to learn about best practices in early childhood environmental education. As a parent, I was particularly interested in finding out the kinds of nature play and environmental education activities offered at a variety of child care settings so that I might be able to implement some of the practices at home for my own children. As a student in the Natural Science and Environmental Education program, I was interested in identifying any correlations between environmental education and early childhood developmental traits and milestones so that perhaps my research could help to document and further strengthen the case for children to have greater exposure to nature and more time spent playing outdoors or with natural materials. And lastly, as a professional in the environmental field, I was interested to learn about sustainability practices and programs happening within the daycare facilities. In the end, I feel that I’ve satisfied all of my learning objectives and also learned a bit about myself through the process.

Overall Conclusions

Overall the research study proved that environmental education and nature play are beneficial to children. The research also showed that daycare centers, regardless of the size or teaching philosophy, seem to be embracing these concepts and working to
integrate them into their curriculum and in many cases their operations. The scope of activities are still very much on a continuum, yet it was impressive and somewhat surprising to find that all of the centers studied were using environmental education in their programs and based on their comments, that they seemed to have an awareness about the importance of it. This is encouraging and seems to indicate that some of the negative consequences of No Child Left Behind and curriculum standards that place pressures on K-12 schools likely do not impact pre-kindergarten daycares to the same extent.

There’s likely much more that could be learned from the six child care centers studied in my research if I had conducted the study using interviews or included a more detailed and extensive list of questions in the survey. For example, some of the questions in my survey about improvements noticed within the children or negative behaviors were asked in such a broad way that the responses didn’t always help to reveal associations or relationships between the subjects’ responses. Had some of the questions been posed differently, or additional detailed questions asked, there likely would have been more relationships shown between the advantages or disadvantages of certain activities and practices within the various centers studied. The broad nature of some of the questions made certain data difficult to analyze and without more context from the subjects, few conclusions could be drawn.

**Noteworthy Results**

In analyzing the survey results, I was most impressed by the fact that all subjects of the research have incorporated environmental education in some way within their
program curriculum or outdoor play environment. I had expected that at least one of the subjects, most likely one of the larger and more traditional daycare centers, would have had minimal if any environmental themes within their programs. It was surprising to me that the larger centers had stronger environmental programs than one of the Montessori centers given the Montessori philosophy of independent play.

Another noteworthy result was the number of benefits that were reported in association with outdoor play regardless of the type of outdoor play environment. All subjects reported at least three developmental attributes that improved after outdoor play, and even some of the centers with less diverse or natural outdoor play areas reported many improvements in physical or social traits. This result suggests to me that outdoor play or recess in general is beneficial in any type of setting, although it did make it hard to rank the importance of the actual environment or types of play structures for the purpose of my research.

Lastly, I found it worth noting that the center with the least strong program was one to report some of the highest levels of environmental awareness among its population. This result pointed out that there are some inherent flaws in the research methodology because it is dependent on independent biases or perspectives that may not be the most objective. Furthermore, it shows that there may also be reasons behind this type of response that could not be gleaned from a survey and would have required more in depth questions or interviews.
Connections to Previous Research

Results from my survey showed some strong connections to the literature that was reviewed in preparation for the study. For example, the centers in my study that offered the most natural play settings reported the greatest benefits in terms of physical and social attributes within the children, linking with research by Grahn et al. that documented the higher performance in these areas for children that attended an “outdoors in all weather” daycare in a more rural and natural setting (1997). Furthermore, the centers in my study with the strongest programs also reported improved intellectual performance and attention spans, which supports Hartig, Mang, and Evans research that found improved proofreading performance after subjects spent time in the wilderness (1991).

Research by Wells and Evans that showed the power of nature and greenspace when it comes to reducing stress was also very much aligned with my research results with 100% of my subjects reporting improvement in this area (2003). However, my results of my research in this area was difficult to compare to that of Wells and Evans since I did not ask subjects to rank or score the degree of improvement.

Finally, I also found that many of the comments from subjects of my research were connected to Malone and Tranter’s findings that diversity of natural play areas reduce incidence of aggressive behavior (2003). While many of the child care centers reported that outdoor play time can lead to some rough games and injuries, there were also comments that too much time indoors can lead to pent up energy and aggression.
My Research Experience

When I began this project, I was very excited to learn more about early childhood environmental education, as the subject is very relevant to me on a personal level now that I have a young child. I was also hopeful that I’d find some resources and educational tools that would be useful to me as a parent and could help me to incorporate more experiences in nature and environmental learning that are age appropriate for my daughter. In the end I feel that my research experience did in fact introduce me to several resources that I’ll reference periodically as I strive to raise environmentally literate and active children. Organizations like the North American Association for Environmental Education and the National Wildlife Federation offer many tools that are useful to both educators and parents and books such as *Last Child In the Woods* by Richard Louv and *Fostering a Sense of Wonder During the Early Childhood Years* by Ruth Wilson will be helpful to me over the years. I also will likely use some of the nature play design principles gleaned from references such as the White Hutchinson Learning Group and the American Society of Landscape Architects to create an engaging and educational play area in our yard that helps maximize my children’s exposure to and interaction with nature.

In designing my research project, I originally planned to spend time on site at the participating child care centers and envisioned myself doing more in-person observations and interviews with daycare staff. But given the realities of the timing of my study and the fact that research was taking place over the winter months when children spend less time outdoors, I decided to change my research approach and conduct a survey instead.
This way I could gather data from another first-hand observer who would hopefully be able to recall their observations of children over a longer time period involving all four seasons rather than limiting it to the winter months exclusively. Of course this approach was more conducive to my research timing constraints, however it did create some limitations. For example, the data was all secondary, meaning it could be somewhat skewed by the various perspectives and biases of the many different observers rather than having one consistent observer for all of the daycares. Also, the survey format limited the amount of information I was able to capture. I specifically designed the survey to be easy for the observers to complete in the hopes that it would help increase the participation rate, therefore questions were primarily multiple choice, however I did always leave space where appropriate for additional comments. While this would provide a way for the subjects to include additional information, very few elaborated on their responses in a substantial way. If I had conducted my observations on site and done in person interviews, I would have been able to ask follow up questions and potentially gain additional information to help identify correlations and associations.

I also was a bit disappointed that I was unable to find both an at-home daycare and an environmental learning center to be part of the study. I invited both to participate, however they either declined or did not respond to my request. Having an environmental learning center as part of the study could have helped to provide some best practices in environmental education within child care settings but also potentially document some strong correlations between their activities and positive development attributes and benefits for the children. I also was very interested to see what differences might exist
between formal child care settings and structured programs compared to at-home models that perhaps may be a bit more casual and less structured. In hindsight I could have pursued this piece a bit more aggressively and reached out to additional at-home daycares to find a willing participant.

Recommendations for Future Studies

The results of this study were interesting and helped to further document some of the connections between time spent outdoors and positive childhood physical, social, and mental development. I do see some opportunities for additional research and studies in the area of pre-K environmental education in child care settings. One area that does not seem to have been intensively studied with great focus is that of indoor environmental activities within daycares. Since my survey was broader and looked at the daycare centers’ entire suite of environmental activities and due to the fact that it also involved secondary data, I was unable to really focus in on any one subject area. I think it would be interesting to observe first-hand the indoor environmental activities such as arts and crafts and reading to look for environmental themes and possible enhanced fine motor skills or increased engagement when children are exposed to these types of activities.

Another area that would be interesting to hone in on more is that of environmental education curriculum within daycares for 3-5 year olds. My study did not dive deeply into the specific types of formal environmental lessons and curriculum for older children; rather it looked more broadly at the diversity of activities offered within the child care centers. A research study that looks more closely at the actual lesson plans and levels of engagement could be very interesting. The use of pre and post tests over an extended
period of time may help to measure the impact of these activities on environmental literacy of children within the daycares. This type of study could provide documentation of the role of child care centers and benefits of introducing children at an early age to environmental concepts that can lead to heightened awareness and concern for the planet. Again, this is an area for which I did not find extensive previous studies whereas exposure to the outdoors and nature play does have a fairly wide body of research in child care and elementary school settings.

Conclusion

Many sources of statistics show a trend toward children spending less time outdoors resulting in a nature-deficit that can lead to a decrease in appreciation for or understanding of nature. There are many factors that influence this trend including screen time and more “virtual” experiences, overscheduled children and parents, and changing education standards. While this trend seems to be seen in many age groups and geographic areas, there is a large body of research demonstrating that exposure to nature and more free time for recess outdoors can be very beneficial for children. This evidence is strong enough that the trend should start reversing, with parents, schools, and child care centers all taking a more active interest in getting children outdoors, helping to foster their natural affinity for living beings and cultivating a deeper appreciation for and sense of awareness about their impact on the world around them.

I began my research for this project with the assumption that many child care centers did not have adequate resources to implement environmental education programs and also that there would be significant differences among the centers surveyed in my
study. I was surprised to find that all of the centers had some form of an environmental curriculum or messaging to their students and that they also all provided plenty of outdoor play time for the children. I was also surprised that the different teaching philosophies or styles of daycares did not result in significant differences or trends in the types of environmental programs offered. I take this as a positive sign that child care centers generally are making an effort to teach children important lessons about how to be good stewards of the environment and are helping expose them to nature in ways that K-12 schools cannot. Not only does this give me hope that my own daughter will be well-served when it comes to environmental education in her daycare but also that children in general will enter school with a good foundation and understanding of environmental concepts.
Dear Daycare Center Manager,

My name is Katie Galloway and I am a graduate student at Hamline University working toward the completion of a Master’s degree in Education: Natural Science and Environmental Education. I’m currently completing my final capstone project focused on environmental education in daycare settings and I’d like to invite your organization to be a subject in my research.

Participants in my research study will be asked to complete a short questionnaire so that I can learn about the types of environmental education activities, nature play, and sustainability initiatives in place in various daycare settings. I realize that managing and running a daycare is a more than full-time job and that care of the children is always your priority. For that reason, I can assure you that your completion of the questionnaire should take no more than 20 minutes and the majority of the questions are multiple choice. I would greatly appreciate it if you could find this small amount of time to participate in my study, as it is critical that I have a sufficient sample size as part of my research. If you are interested, I would be happy to share with you several resources on early childhood environmental education and nature play, which may be useful in planning activities within your daycare. I’m also happy to share my final research paper with you should that be of interest.

I would like to conduct the research and receive completed questionnaires by January 31st. Please let me know if you are willing to participate or are open to learn more about what this project entails. If I don’t hear from you in the next couple of weeks, I will follow up with you the week of January 5th.

Thank you in advance for your consideration,

Katie Galloway
APPENDIX B: Daycare Consent Letter

January 10, 2015

Dear _____,

As I’ve previously communicated to you, I’m a graduate student working on a Master’s Degree in Education: Natural Science and Environmental Education at Hamline University in St. Paul. I’m currently working on my graduate capstone project, which will study environmental education in daycares in the Twin Cities. The purpose of this letter is to formally request your consent to participate in my study.

The purpose of my research is to learn about the types of environmental education and nature play being used in a variety of daycare settings and to find out how children respond to the activities and what potential developmental benefits may be observed by daycare staff. You will be asked to complete an electronic survey with 20-25 questions about your daycare, the environmental education and nature play activities within your facility, and responses from the children and perceived benefits following these activities. The survey should take approximately 20 minutes of your time and is asking for a historical recollection of your daycare’s activities; no additional work or coordination of educational activities will be required on your part.

Your participation in this research and all results from the survey will be confidential and anonymous. Pseudonyms will be used for all participants so that the name of your daycare and the names of any individuals mentioned in your survey responses will not be included in my capstone paper. All research material from the survey will be password protected and kept under my control. There is little to no risk if you choose to be interviewed and your participation in the survey is voluntary and you may withdraw from the project at any time or choose to have your results deleted from the capstone without negative consequences.

The research I am conducting is public scholarship and the abstract and final product will be cataloged in Hamline’s Bush Library Digital Commons, a searchable electronic repository. The capstone paper may be published or used in other ways. I have received approval from the School of Education at Hamline University and my advisor Dr. Renee Wonser to conduct this study. If it is of interest, I will share with you a copy of the
completed capstone along with a list of resources for early childhood environmental education and nature play.

If you agree to participate, please keep this letter and page 2 for your records and fill out the duplicate consent agreement to participate and return it to me by mail or copy the form in an email to me with your electronic signature. By signing this consent form, you are also agreeing to follow your institution’s guidelines and practices of consent. If you have any questions, please contact me via phone or email.

Sincerely,
Katie Galloway
4209 Colfax Ave S
Minneapolis, MN 55409
612-760-1707  katiegallowayt@gmail.com
INFORMED CONSENT TO PARTICIPATE IN QUALITATIVE SURVEY
Keep this full page for your records

I have read your letter describing the research study about environmental education in daycares and I agree to participate and follow the rules of consent for my organization. I understand what is being asked of me as a survey participant and I understand that participating in this survey poses little to no risk for me or my organization, that identities will be protected, and that I may withdraw from the survey at any time without negative consequences.

____________________________________
Name

____________________________________  _________________________
Signature                      Date

INFORMED CONSENT TO PARTICIPATE IN QUALITATIVE SURVEY
Return this portion to Katie Galloway at katiegallowayt@gmail.com or by mail at 4209 Colfax Ave S, Minneapolis, MN, 55409

I have read your letter describing the research study about environmental education in daycares and I agree to participate and follow the rules of consent for my organization. I understand what is being asked of me as a survey participant and I understand that participating in this survey poses little to no risk for me or my organization, that identities will be protected, and that I may withdraw from the survey at any time without negative consequences.

____________________________________
Name

____________________________________  _________________________
Signature                      Date
APPENDIX C: Daycare Survey

1. Approximately how many children from the age groups below attend your child care center?
   6 weeks -12 months: 0, 1-5, 5-10, 10-15, >15
   12-36 months: 0, 1-5, 5-10, 10-15, >15
   3-5 years: 0, 1-5, 5-10, 10-15, >15

2. On average, how many hours each day do you estimate children from the different age groups attend your child care center? (Use an average for all the children within each age group)
   6 weeks -12 months: 0-3 hours, 3-5 hours, 5-8 hours, >8 hours
   12-36 months: 0-3 hours, 3-5 hours, 5-8 hours, >8 hours
   3-5 years: 0-3 hours, 3-5 hours, 5-8 hours, >8 hours

3. What is the average teacher to child ratio in each age group?
   6 weeks -12 months: 1:2, 1:4, 1:6, 1:8, other
   12-36 months: 1:2, 1:4, 1:6, 1:8, other
   3-5 years: 1:2, 1:4, 1:6, 1:8, other

4. How many hours do the various age groups spend outdoors each day during the warmer months? (e.g. May through September)
   6 weeks -12 months: 0, ½ hour, 1 hour, 1-2 hours, 2+ hours
   12-36 months: 0, ½ hour, 1 hour, 1-2 hours, 2+ hours
   3-5 years: 0, ½ hour, 1 hour, 1-2 hours, 2+ hours

5. How many hours do the various age groups spend outdoors each day during the colder months? (e.g. October through April)
   6 weeks -12 months: 0, ½ hour, 1 hour, 1-2 hours, 2+ hours
   12-36 months: 0, ½ hour, 1 hour, 1-2 hours, 2+ hours
   3-5 years: 0, ½ hour, 1 hour, 1-2 hours, 2+ hours

6. Please check off the types of structures and elements included in the children’s outdoor play environment:
   Playground equipment made from plastic or metal
   Playground equipment made from renewable material like wood
   Play structures made from natural materials (e.g. wood forts or yurts, rustic benches or chairs made from tree stumps, hay bales, etc.)
Primary ground surface is concrete or asphalt
Primary ground surface is woodchips or other natural shredded material
Primary ground surface is turf grass
A minimum of approximately 20% tree cover (canopied or shaded area)
Nature trails or more “wild” and unmanicured paths
Vegetable garden
Flower gardens or planters
Water features (can be small fountains or kiddie pools)
Sandbox
Plastic or metal toys (e.g. scooters, cars, tricycles)
Other

7. When the weather permits, how often do the following age groups go on a walk around your campus or neighborhood? (can be in strollers for babies and younger toddlers)

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<thead>
<tr>
<th>Age Group</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 weeks -12 months</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>12-36 months</td>
<td></td>
<td></td>
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<tr>
<td>3-5 years</td>
<td></td>
<td></td>
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</tbody>
</table>

Comments:

8. Please describe the types of activities, conversations, or lessons that happen during these walks or hikes around the grounds?

9. Please list any of the more structured play activities that your teachers coordinate outdoors:
   - Gardening
   - Nature hikes
   - Picnics
   - Wildlife watching
   - Water activities
   - Other:

   Please feel free to describe or comment on any of these activities in more detail:

10. Please list any of the following developmental traits or behaviors observed more frequently or that appear to improve during outdoor play as compared to indoor play activities:
   - Physical agility
   - Balance and coordination
   - Healthy social interactions between children
   - Cooperative play between children
   - Problem solving
   - Creative thinking and play
   - Greater attention span and focus
   - Other:
Comments:

11. Does the stress and anxiety level of the children seem to improve or worsen after they’ve spent time playing outdoors?
   Improve
   Worsen
   No difference
   Not sure
   Comments:

12. Does the overall health (e.g. fewer missed days) of the children seem to improve or worsen when they have time to play outdoors?
   Improve
   Worsen
   No difference
   Not sure
   Comments:

13. Does the intellectual performance of the children seem to improve or worsen after playing outdoors?
   Improve
   Worsen
   No difference
   Not sure
   Comments:

14. Do you notice any negative behavioral or developmental issues when the children play outdoors as compared to indoor play?
   Yes
   No
   If yes, please elaborate:

15. How frequently do you read nature or environmentally themed books to the children from various age groups in your child care center?
   Daily      Weekly      Monthly      Not at all
   6 weeks -12 months:
   12-36 months:
   3-5 years:
   Comments:

16. Do the children seem to be more or less engaged in books that have nature themes?
   More
   Less
   No difference
17. How frequently do you conduct arts and crafts activities that utilize natural objects (e.g. leaves, pine cones, seeds, or plants?)

   - Daily
   - Weekly
   - Monthly
   - Not at all

6 weeks - 12 months:
12-36 months:
3-5 years:
Comments:

18. Do the children seem to demonstrate more or less fine motor skills during arts and crafts activities that involve natural materials?

   - More
   - Less
   - No difference
   - Not sure

Comments:

19. How often do you incorporate environmental issues or lessons into your curriculum? (e.g. recycling, water and energy conservation, composting)

   - Daily
   - Weekly
   - Monthly
   - Not at all

6 weeks - 12 months:
12-36 months:
3-5 years:
Comments:

20. If you include environmental issues in your curriculum, please describe the types of issues or lessons you teach?

21. On a scale of 1-10, with 10 being the most aware, how would you rate the level of environmental awareness of your:

   - Children:
   - Children’s parents:
   - Staff:

Comments:

22. Do you notice any negative behavioral or developmental issues when the children play indoors as compared to outdoor play?

   - Yes
   - No

If yes, please elaborate:
23. Does your child care center have a formal sustainability program or incorporate initiatives to operate in a more environmentally conscious way?
   Yes
   No
   Not sure

24. Please list the types of sustainability initiatives in place at your child care center?
   Recycling
   Composting
   Waste Reduction Program
   Water Conservation Program (e.g. water saving appliances)
   Energy Conservation Program (e.g. compact fluorescent or LED lighting, high efficiency HVAC systems, energy Star appliances and equipment)
   Vegetable gardening
   Green purchasing program (e.g. purchasing recycled content paper, biodegradable materials, less toxic materials)
   Use of green cleaning products
   Use of organic foods
   Other:
   Comments:

25. Who leads your center’s sustainability program/initiatives? (role or title)

26. Does your child care center have an environmental committee or green team?

27. In what ways do you use the sustainability initiatives as the basis for environmental themes in your curriculum?

28. Contact Information
   Name:
   Name of Child Care Center
   Email Address
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