

**Connecting Children to Nature
in a Montessori Primary Environment**

By

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Abstract

Children are inherently connected to nature and fascinated by living things; there is a significant body of research discussing the benefits of children interacting with nature on a regular basis. Due to a variety of factors, including increased academic pressures in schools, overscheduling of extracurricular activities, increased reliance on technology for entertainment, and fear of children being left alone outdoors, children are spending more time indoors than ever before in our history. Connection to nature and inspiring wonder are an integral part of the Montessori Philosophy and Method. The Montessori Method also stresses that immersion in nature is imperative for proper physical and psychological development. In Montessori classrooms, there is an intrinsic connection between nature and many of the primary materials. In an action research project with a class of 39 children ages 4-6, a Montessori guide studied ways to integrate nature exploration via a Montessori primary curriculum, inside and outside of the classroom. The guide incorporated daily outdoor exploration in or around the woods, seasonal nature-related activities, access to Montessori botany and zoology and materials, live insect and small animal observation opportunities, daily read alouds related to nature, and gardening in a greenhouse. Data was collected through two parent surveys, children's nature journals, photos of the children interacting with nature inside and outside, and anecdotal records. The research showed that by providing regular access to the outdoors along with multiple opportunities inside the classroom to explore nature and nature-related materials, the children became more connected with nature. For the future, the research suggests that increasing children's interactions with nature will influence environmentally responsible lifestyles and support children's development as young naturalists.

Keywords: *Montessori, nature, outdoors, children, environment*

Introduction

This past year I had the opportunity to be a part of a brand new Montessori Children's House. After 8 years as a 'school within a school,' a local public Montessori charter school, grades 1-6, finally received school board and state approval along with some federal grant money to expand to include children ages 4-6. The original school had been in operation using 4 classrooms in a larger local elementary school building. Last spring, a local county park offered the school district a small school building nestled in the park, and the consensus was to relocate the Montessori public charter school to this building, enabling the school to create its own identity in an ideal natural setting.

As I was contemplating my research project, I decided that this would be the perfect opportunity to explore ways for our new program to integrate nature throughout the curriculum, utilizing the amazing resource of the 257 acre scenic county park. The park includes hiking trails through the woods, a small swimming lake, a children's farm, disc golf, winter sledding hills and cross country ski trails. I have fond memories of my own childhood growing up in a rural area with access to farmland, ponds, swamps, lakes and woods – all in my own backyard. I didn't realize what a treasure I had until adulthood. The disconnection of today's children from the natural world is a growing concern for me, other parents, educators and mental and physical health professionals throughout the country. I wanted to explore the benefits children derive from spending time in nature and the outdoors, including reduced stress, an increase in curiosity, creativity and problem-solving abilities, and improved physical and emotional health. My goal with this action research project was to provide regular access to the outdoors, along with some guided Montessori classroom work, in order to connect the children back to nature.

Literature Review

Teachers of young children have an obligation to connect children to nature. As Maria Montessori once said, “The land is where our roots are. The children must be taught to feel and live in harmony with the earth,” (Gilder, 2009, p.35). Montessori's theories truly complement nature as a source of inspiration for learning. She believed children are fascinated with nature and recognized the importance of the natural world and its relevance to the child, (Gilder, 2009). Polk Lillard (1996) explained that Montessori felt that students’ sense of independence, growth, self-confidence and creativity could be greatly enhanced simply by going outside. Richard Louv (2008) writes, “When children have regular contact with nature, in an unstructured way, they are more attentive, observant, creative and self-content,” (p.49). Nature stimulates powers of observation; nature fosters creativity; nature instills a sense of peace and being at one with the world, (Crain, 2001).

Vision and Values for Outdoor Play

All children have the right to experience and enjoy the essential and special nature of being outdoors. Young children thrive and their minds and bodies develop best when they have free access to stimulating outdoor environments for learning through play and real experiences. Knowledgeable and enthusiastic adults are crucial to unlocking the potential of outdoors. Young children need practitioners who value and enjoy the outdoors themselves. The outdoors should be a dynamic, flexible and versatile place where children can choose, create, change and be in charge of their play environment. Many children relate much more strongly to learning offered outdoors rather than indoors. Through outdoor play, young children can learn the skills of social interaction and friendship, care for living things and their environment, be curious and

fascinated, experience awe, wonder and joy, and become 'lost in the experience.' They can satisfy their deep urge to explore, experiment and understand and become aware of their community and locality, thus developing a sense of connection to the physical, natural and human world (Warden, 2002, pp. 52-57).

While exploring the outdoors, it's critical for teachers and other adult guides to practice the art of questioning. It's very important not to provide the answers for the children. Let them take the time to express their ideas and thoughts. As Thoreau once said, "I never go out knowing what I am going to find. The interest is in finding what I didn't know I was going to find," (Walker Leslie, 2010, p. 6). "When young children participate in outdoor education and go "beyond the walls," it sets them on a path of lifelong stewardship for their community and the environment. Through outdoor education, children learn to take greater care of the environment, each other, and themselves. To gain self-confidence, children need to love nature and feel a sense of belonging in nature, a connection," (Gilder, 2009, p. 36).

Children are fascinated by living things. Chalufour and Worth (2003) believe that teachers need to help children expand on that fascination to become young naturalists, encouraged to see the outdoors as an authentic place to explore living things as they exist in nature, as well as the indoors as a place to re-create small parts of the outdoors and look more closely at temporary plant and animal visitors. According to Chalufour and Worth (2003), the goals of this exploration are to provide opportunities for children to observe life around them more closely, build an understanding about what is living and nonliving, develop science inquiry skills including wondering, questioning, exploring and investigating, and "develop scientific dispositions including curiosity, eagerness to find out, an open mind, respect for life, and delight in being a young naturalist," (p. 4).

As stated by Louise Chawla (2002) nature is the prepared environment that fosters an intense sense of cosmic harmony – a sense of the world which was such an important element of Maria Montessori’s larger goal for education. Other research emphasizes that it is nature and culture together that give these experiences their meaning. In her landmark work, *The Sense of Wonder*, Rachel Carson (1998) wrote:

If a child is to keep alive his inborn sense of wonder . . . he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement, and mystery of the world we live in. . . . For the child, and for the parent [teacher] seeking to guide him, it is not half so important to know as to feel. If facts are the seeds that later produce knowledge and wisdom, then the emotions and the impressions of the senses are the fertile soil in which the seeds must grow. (p. 45).

Benefits to Children from Contact with the Outdoors and Nature

Time spent outdoors supports many aspects of children’s health. There is a large body of research linking children’s time spent outdoors to increased physical activity, healthy development, and overall well-being. Children need regular access to the outdoors in order to reap those benefits. Nature in or around the home, or simply a room with a view of a natural landscape, helps protect the psychological well-being of children, (Louv, 2008). Nature alleviates the impact of life stress on children and helps them deal with adversity. Wells & Evans (2003) conclude that the greater the amount of nature exposure, the greater the benefits.

Children who regularly have positive personal experiences with the natural world show more advanced motor fitness, including coordination, balance and agility, (Fjortoft, 2001).

Another benefit according to Moore (1996) is that children who play together in nature have more positive feelings about each other.

Children with disabilities gain enhanced body image and positive behavior changes through direct interaction with nature. Studies of outdoor-education programs geared toward troubled youth — especially those diagnosed with mental-health problems — show a clear therapeutic value. Children as young as five show a significant reduction in the symptoms of Attention-Deficit Disorder when they engage with nature, (Louv, 2008; Munoz, 2009).

Unlike earlier generations, many of today's parents see the outdoors as a dangerous place. Fears— of strangers and kidnappings, of gangs and drug dealers taking over parks and vacant corner lots, of encroaching wildlife from mountain lions to virus-bearing mosquitoes and ticks—while genuine, have also been sensationalized by the media (Louv, 2008). Brooks (2004) says that a childhood of unsupervised loitering, wandering and exploring has been replaced by a childhood of adult supervised and scheduled improvements.

Alman (2009) explains that another key fear of parents is they are afraid of accidents in play and want to minimize risk. Yet playgrounds that offer genuine risk tend to have fewer accidents than traditional playgrounds. “Give children real risk and they rise to it; they learn how to handle it. Give them sanitized play spaces, and children often are less conscious of risk and have accidents, or take outlandish risks for the sheer excitement of it all,” (p. 43).

As a result of all of the above, children are exhibiting what Louv (2008) has labeled “*Nature-Deficit Disorder*.” Louv uses this term to describe a set of symptoms linked to our separation from nature. These include an increase in Attention Deficit Hyperactivity Disorder (ADHD) and childhood obesity, lack of creativity and curiosity, ignorance of local flora and

fauna, loss of respect for nature and the living world, and a diminishing sense of community (Munoz, 2009).

Regular Access to Outdoors

There are children in Scotland and other Scandinavian and European countries who attend nature kindergartens and forest schools. These children, ages 2-5, spend between 70-100% of their school day outdoors with open-ended play opportunities. The methodology that is used is based upon the premise that children are capable, competent, and trustworthy individuals. Children should be consulted so that they are part of the learning process (Warden, 2010). For example, in Claire Warden's school, if children are interested in a certain topic, the adults support the children with their exploration of that topic. When the children were interested in fire, the adults set up the outdoor environment to encourage safe exploration of fire, in particular with charcoal. The children had the opportunity to investigate, experiment, and make mistakes as they learned about fire. Another example Warden (2010) wrote about is that after they determined a study of root vegetables for their school garden, the children expressed a sense of wonder about potatoes. Therefore, they proceeded to do some intense study or research with potatoes in their garden. They sorted potatoes using different criteria, sliced them to see how many pieces they could slice in one potato, and planted them exploring how potatoes grew underground, sometimes digging them up too early and learning how to wait until they were big enough to harvest.

In the nature kindergartens and in many ideal Montessori environments, access to the indoors and outdoors occurs simultaneously. This is the ideal environment for young children. When children are allowed to play for very long blocks of time in a naturalistic wild space, it

encourages active, motivated thinkers who will take risks with their learning. According to Pyle (2002) exposure to natural environments improves children's cognitive development by improving their awareness, reasoning and observational skills. The more you spend time outdoors, the less novel it becomes, and students and teachers are more able to pay closer attention to the details that surround them (Nett, 2011).

In addition to having access to the outdoor environment, Dowdell, Gray & Malone (2011) discuss how a supportive teacher provides a richer environment for learning and influences children's opportunities for social interactions and natural play. Wilson (2008) identified that in order to reap the benefits of outdoor play, teachers need to alter their mindset in regards to viewing time outdoors as a break from teaching or "down time." Instead, it's important that teachers value the outdoors for the opportunities it provides for interaction and exploration of the environment, and hands-on learning about the life cycles of plants, animals, the seasons and the weather. Dowdell, Gray & Malone (2011) state that it is evident that teaching strategies for engaging children's interest in the outdoor environment assist in fostering children's love and excitement of nature.

Child-led Inquiry and Nature Journals

It's important to allow children to draw, record or document their nature experiences or observations. Children often record spontaneous, unassigned observations in nature journals (Nett, 2011). After children have the opportunity to go out into nature on a regular basis, they become more patient in making observations. They spend more time drawing, and show an increased attention to detail in their drawings. With experience, older children use a wider

variety of sources for information including field guides, general reference books, posters, as well as the Internet (Nett, 2011).

A naturalist is a person who studies living things, especially by direct observation of animals and plants. According to Chalufour & Worth (2003), it is the teacher's role to create an environment and culture in the classroom that supports and encourages children to be young naturalists – the classroom must convey the excitement and wonder of observing and learning about living things. The characteristics of this type of environment must include: a respect for living things, an emphasis on inquiry, sharing observation and ideas, documentation and recording, and a focus on actual living things.

Wilson (2008) emphasizes that teachers need to encourage children to get their hands dirty and experience their environment and the changing seasons, including the enjoyment of jumping around in piles of leaves or exploring with snow. This hands-on interaction with the environment is important as “young children don't learn by having someone telling them about the world around them. They learn and construct meaning through their own physical and mental activities,” (p. 35). In addition, Wilson (2008) concludes that young children learn more about attitudes and values from their observations of adults' behaviors than they do from what adults say. “It is the teacher's enthusiasm and interest in nature - more than his or her scientific knowledge about the natural world – that will have the greatest impact on arousing children's curiosity and engagement,” (p. 62).

Wilson (2008) goes on to state that “children have an inborn sense of wonder and a strong desire to explore the world around them, yet they need an interested adult to provide encouragement, support, and guidance to keep their spirit of inquiry alive” (p. 35).

Nature also inspires children's art and poetry. Two researchers, Rogers and Chucovsky, collected poems from young children. They discovered that approximately 85 percent of the poems were about aspects of nature and the natural world. Many of the poems were written down by the children's parents when they heard their children recite them – from children as young as age 2. Many of the poems were about sounds, including the sound of the wind, water, and animals (Crain, 2001). One four-year old child who grew up to be an adult poet, speaks directly to a flower in her poem:

Sparkle up, little tired flower

Leaning in the grass!

Did you find the rain of night

Too heavy to hold?

By: Hilda Conkling (Rogers, 1979, p. 34).

An alternative to a nature journal might be a talking and thinking book (Warden, 2010). In this format, children collaborate with adults to determine the process of their play by recording their ideas in an oversized book. Children are consulted with every step, which results in higher self-esteem, more positive attitudes, increased intrinsic motivation, and a mutual respect between the adults and the children they are working with.

School Gardens

At all levels, the Montessori prepared environment encompasses indoor and outdoor areas in which children have the freedom to choose their work. Connection to nature and

inspiring wonder are an integral part of the Montessori philosophy and method. Maria Montessori stressed that immersion in nature is imperative for proper physical and psychological development. She observed that “when individuals develop normally, they plainly feel a love for all living creatures,” (Montessori, 1972, p. 76). A school garden offers opportunities for the absorption of these ideas easily and experientially (Johnson, 2013).

A gardening curriculum that includes small animals as a focus encourages scientific attitudes, process skills, and content knowledge as a natural part of investigation. Caring for insects and small garden animals in the classroom allows children to experience the wonder and curiosity of these important creatures, (Hachey & Butler, 2012).

Acquiring firsthand experience through observing and/or handling small creatures helps children develop a healthy and curious attitude toward them, rather than one of fear or disgust. Because insects often go through distinct stages, bringing them and other small creatures into the classroom provides an excellent opportunity for observing the stages of development in their life cycle. Such experiences allow children to take on the role of biologist at their level of cognitive development (Hachey & Butler, 2012).

Most children and many adults have detached relationships with nature. Through school gardens, a guide can incorporate a Montessori economic geography curriculum along with a holistic nutrition program. School gardens provide an opportunity for children to get excited about not only healthy eating, but also about connecting to their food on deeper botanical and environmental levels (Johnson, 2013).

A teacher must assume the role of an influential naturalist by creating relevant nature experiences that inspire and delight children. Fortunately, the Montessori philosophy and prepared environment encourages and supports this. Current research suggests that nature

experience and the cultivation of environmental literacy among students contributes to creative thinking, improved academic performance, and positive relationships with the natural world (Oregon Environmental Literacy Task Force, 2013).

With school gardens, there are many positive outcomes. Students' engagement in the garden is connected to their engagement in science class and their overall engagement in school as well as to their academic self-perceptions, including a sense of relatedness to school, perceived competence, intrinsic motivation, and autonomy orientation. It is possible that students' engagement in the garden transfers some of their excitement about learning to science class and to school in general, perhaps by meeting students' fundamental needs for relatedness, competence, and autonomy, as determined by measures of their academic self-perceptions (Skinner & Chi, 2012).

Conclusion of Literature Review

A Montessori primary environment is the perfect place to integrate nature exploration. The Montessori philosophy and method emphasize connecting to nature and inspiring wonder in children. Many of the classroom materials support nature discovery and research for connecting the outdoor environment with the indoor, especially in the areas of natural history, economic geography, botany and zoology. Maria Montessori (1994) stressed that immersion in nature is imperative for proper physical and psychological development and stated,

"When the child goes out, it is the world itself that offers itself to him. Let us take the child out to show him real things instead of making objects which represent ideas and closing them in cupboards...There is no description, no image in any book that is capable of replacing the sight of real trees, and all the life to be found around them, in a real forest. Something emanates from those trees which speaks

to the soul, something no book, no museum is capable of giving. The wood reveals that it is not only the trees that exist, but a whole, interrelated collection of lives. And this earth, this climate, this cosmic power are necessary for the development of these lives. The myriad of lives around the trees, the majesty, the variety are things one must hunt for, and which no one can bring into the school. How often is the soul of man - especially that of the child - deprived because one does not put him in contact with nature?" (Montessori, 1994, pp. 19-20).

Montessori guides know first-hand the importance of going out and exploring nature. The fresh air along with children's natural desire to explore their surroundings is much more beneficial than staying inside the classroom. Montessori (1967) emphasized that the child is a spontaneous observer of nature. Childhood feelings of calm and connection may strengthen a person for life. In a study of thirty-eight 20th-century autobiographies, Louise Chawla (1986, 1990) found that those authors who said they had benefited from childhood experiences with nature most commonly referred to a lasting sense of peace and rootedness in the world. To delight in the wonder of the natural world at such a tender and impressionable age is to become a steward of the earth in the years to come.

Goals of the Study

The purpose of my action research project was to observe and record the effects of integrating nature exploration via the Montessori primary curriculum. I believe that children are intrinsically connected to nature, and that it is our role as adults and teachers to allow them the

opportunity to freely explore natural areas on a regular basis. I believe we should trust children as capable and competent learners, and to use their interests as a guide for expanding their knowledge and skills. I think there is an inherent connection between nature and many Montessori materials, and that by encouraging nature exploration inside and outside of the classroom, we will enrich the children's lives and empower them to direct their own learning. Overall, my research aimed to answer, "How can I integrate nature exploration through the Montessori Primary Curriculum?" Specifically using the results of previous research performed on how to incorporate nature exploration in early childhood classrooms, focusing on Montessori environments, my research explores:

- How will nature exploration influence or impact classroom behavior?
- How will nature exploration vary throughout the seasons?
- How can I provide or implement more freedom for outdoor nature exploration?
- How will I allow the children to direct their own learning with nature explorations?
- How will I use nature journals?
- How can I make direct connections with the Montessori primary materials?

Methodology

Participants and Setting

The participants in this study were 20 four-five year old children attending school half days, and 20 five-six year old children attending school full days in a public charter Montessori Children's House classroom in the upper Midwest. The group consisted of 11 four-year old boys and 9 four-year old girls, along with 6 five-year old boys and 14 five-year old girls. Out of the

40 students, 4 children had attended a private Montessori Children's House for at least one year prior, and the remaining 36 students were new to a Montessori environment. Over the period of this study, three students withdrew and one new student enrolled. Data was included for all of these children.

In this particular public Montessori charter school there are 160 students from age 4 (preschool) through grade 6. This school has one brand new Children's House classroom, two existing Lower Elementary classrooms, grades 1-3, and two existing Upper Elementary classrooms, grades 4-6. This action research took place inside and outside of the Children's House classroom, throughout the areas of the school grounds and an adjoining county park. The classroom is approximately 1200 square feet, with multiple windows on two sides facing a natural setting or views of trees and the woods (Figure 1). The classroom has 5 doors: one leads to the school hallway, one leads to the playground, one leads to a small outside area with bird feeders that will eventually be a classroom garden, one door leads to the greenhouse, and the last door leads to the driveway or pick-up lane for families. One particular outside area where the children explored was the path directly outside the classroom through the woods to a small shelter with a playground and a large 5-acre field surrounded by trees (Figures 2-3). The children also spent time outdoors on the school playground which has a large, grassy fenced-in area with a small play structure in a gravel area (Figures 4-5). In addition, the researcher utilized the classroom greenhouse which is adjacent to the classroom (Figure 6). There was a door entering the greenhouse from the inside of the classroom. Based upon children's areas of interest outdoors, materials in the classroom were developed to support and extend their interest.



Figure 1 – Classroom indoor environment



Figure 2 – Hiking path entrance to trail that leads to our sit spot



Figure 3 – Hiking path in the woods



Figure 4– Playground area with gravel



Figure 5 – Sledding on the playground



Figure 6 – Greenhouse connected to the classroom

There were two lead teachers and one paraprofessional working with the 40 children. Both of the lead teachers were either Montessori certified or in the process of obtaining certification. The Montessori guide who was performing the action research was pursuing a Master's Degree in Early Childhood Montessori education and also holds a state elementary teaching license along with a Master of Arts in teaching elementary education.

Materials

A variety of materials were used to conduct this action research project. Inside the classroom, most of the materials used were basic Montessori science, botany and zoology curriculum materials, including:

- Differentiation between living and non-living things, objects and cards
- Differentiation between animals and plants; basic characteristics, objects and cards
- Observation of nature (including animals inside and outside, and a nature tray with items the children brought back from hikes like turkey feathers, a rabbit tail, leaves, and seeds, and a magnifying glass)
- Land, air and water materials
- First puzzles representing the biological parts of flowers, root systems, and trees, along with the anatomical features of common animals. These are first used by very young children as puzzles, then as a means to learn the vocabulary, then they are related to

photos and/or the "real thing," then traced onto paper, and finally with labels as a reading experience. These include leaves, flowers, trees, fish, frogs, turtles, birds, horses.

- Nomenclature Cards for botany: identifying, naming, and labeling the parts of plants, trees, leaves, roots, and flowers.
- Nomenclature Cards for zoology: identifying, naming, and labeling the external parts of insects, fish, birds, and other animals (vertebrates and invertebrates)
- Botany Leaf cabinet – 24 insets of various leaf shapes
- Weather and Season work, including measuring indoor and outdoor temperatures and recording observations in a nature journal.
- Caring for the Environment, including composting, picking up litter, and recycling

Many other materials inside the classroom were related to Montessori Practical Life curriculum work, including:

- Watering and caring for plants
- Flower arranging
- Apple work: polishing, cutting and serving apples; making applesauce; life cycle of an apple; matching and identifying different varieties of apples, and apple tasting (all using apples we picked during a field trip to an apple orchard)
- Sunflower seed work (pulling off the seeds of the sunflower heads with a tweezers – the sunflowers were donated by our local Montessori middle school garden) Extension work with art related to Van Gogh's 'Sunflowers' and spring planting of the dried sunflower seeds.

- Colored corn work (pulling off the corn kernels with a tweezers – we collected the corn cobs from a local pumpkin farm during a field trip), feeding the deer and squirrels in the park.
- Pumpkin work: scrubbing pumpkins and gourds; scooping out guts and washing seeds; cooking and tasting pumpkin seeds; carving pumpkins; life cycle of pumpkins (using pumpkins and gourds donated from a local pumpkin farm).
- Leaf work: rubbing leaves; collecting and sorting leaves; and making art work using dried leaves from the woods.
- Snow and cold exploration: ‘making snow’ with boiling water experiment, and blowing bubbles in sub-zero temperatures.
- Parts of a seed, dissection and exploration with lima beans
- Planting sunflower and speckled pea seeds and growing plants in the greenhouse
- Bird watching and feeding: Scooping, pouring and filling a bird feeder with bird seed outside our classroom; observing backyard birds with binoculars; and identifying local birds and matching their calls.
- Composting: daily composting of leftover snack and food preparation waste. Children transported indoor compost bin to an outdoor composting area.

The children also observed and cared for many insects and small animals over the course of the study. As the live creatures were introduced, the researcher created materials to support the learning about each animal’s life cycle. There were live insects and small animals to observe in a habitat, models of each stage of the creature’s life cycle, drawing or sketching paper, and 3-part nomenclature cards and booklets. The children had the opportunity to observe, learn about and care for the following:

- Monarch caterpillars and butterflies (donated from a local butterfly garden, and fed with milkweed from the meadow near our playground)
- Painted lady caterpillars and butterflies
- Betta fish and snails (donated from a local pet shop)
- Frogs (from the woods)
- Ladybugs (released into the greenhouse to help the flowers growing for the county park)
- Earthworms (dug up from the ground outside the classroom)
- Chicks (fertile eggs and incubator donated by a local young farmer who shows chickens for 4H)

In addition to daily read alouds using nature-related literature, the children had the opportunity to record any nature observations in a personal nature journal. This was not a required activity, but rather a choice based upon interest. The books used for read-alouds were almost all non-fiction and always related to the nature work available in the classroom, nature observed outdoors, and/or the various seasons of the year.

Outside of the classroom, the material or resource used was daily outdoor access in or around the woods near the classroom. The school and the county park have a wonderful working relationship, so all of the hiking trails through the woods as well as the shelter areas were available for use. The researcher chose one particular ‘sit spot’ or consistent natural area that they would visit that involved a short hike through the woods to a large 5-acre field surrounded by trees. The other outdoor areas utilized were various hiking trails through the woods, as well as a school playground outside the classroom with a fenced-in large grassy area next to a small play structure in a gravel area.

The researcher used a school iPad and personal camera to document student interaction with nature outside, and student use of the nature-related Montessori materials in the classroom and greenhouse. She also took anecdotal records while observing the children.

Procedures and Gathering the Data

Before the process began, the researcher sent home a permission letter to the students' parents to get the approval for their children to take part in the action research study (See Appendix A).

Outdoor exploration

The researcher made a concerted effort to get the children outdoors every day for a minimum of 30 minutes. The school district had a policy that limited some outdoor time during the winter months. When the temperature or wind chill was 0 degrees Fahrenheit or below, the children were not allowed to go outside. This particular research time period experienced an extremely bitter cold winter, so the children were not able to go outdoors every day. Over the course of late fall and winter, there were over 50 sub-zero days, making it the coldest winter on record for the past 30 years according to the local meteorologists. The children did get out as much as possible to explore the snow during late fall and winter, weather permitting (Figures 7-8).



Figure 7 – Hike on the first day of snow in November



Figure 8 – Our sit spot in late fall

Classroom nature-related work

Each week during the research period, the researcher introduced new nature-related work inside the classroom. Most of this work was related to the respective seasons and was introduced gradually as the children gained experience working with the materials. All of this work was sensorial in nature, encouraging the children to experience the materials with all of their senses. The teacher also used her knowledge of the scope and sequence of the Montessori Primary Science and Practical Life curriculum in order to present materials at a progressive rate, noting that almost all of the children had not been in a Montessori classroom before this school year. In addition to introducing materials from simple to complex, the researcher used the level of interest from the children to dictate some of the development of materials. Following Montessori Philosophy, the researcher introduced and made available all of the nature-related work, but the children had freedom to choose whether or not they wanted to work with the materials.

Early in the study the researcher introduced monarch butterflies because they were acquired from a local butterfly garden, and early fall was the natural season for monarch caterpillars to go through their metamorphosis and migrate south. The researcher placed the monarch caterpillars in a butterfly habitat with milkweed for food, and situated the work on a low table in the classroom for the children to observe. In addition to the habitat, there was a tray with replicas of each stage of the monarch life cycle: butterfly, eggs, caterpillar, and chrysalis. There was also a control paper with a visual of the monarch life cycle, and then some blank sheets of paper along with some blackline masters of the life cycle available for the children to work on. The children were able to observe the caterpillars as they formed their chrysalises, and

emerge as butterflies. After they emerged, the class released the adult butterflies in the meadow next to the playground so they could go back to nature.

Because of increased student interest, the researcher acquired some painted lady caterpillars to raise inside the classroom to extend the children's learning about butterflies. The subsequent nature-related work was paired along with the local fauna and flora seasonally. The sunflower work was introduced at the time our local sunflowers had gone to seed. The apple work was introduced during late September and early October, the time of year that apples are ready to pick in this geographic region of the country. The pumpkin-related work was introduced in late October, again the time of year when pumpkins are ready to harvest in this region. The chick work was introduced in the spring, which was the ideal time for the children to learn about embryology and new life.

Parent Surveys

The researcher created two parent surveys and distributed one of the surveys at the beginning of the study, and the other at the end of the study. Both surveys were administered over e-mail using SurveyMonkey®.

The first parent survey was related to the parent's experience with nature in comparison to their child's experience with nature. It was strongly connected to Richard Louv's work on nature deficit disorder. In Louv's book, Last Child in the Woods, (2008) Louv hypothesizes that human beings, especially children, are spending less time outdoors resulting in a wide range of behavioral problems. He calls this nature deficit disorder.

The following survey was based upon a survey that an 8th grade teacher, Dave Wood, compiled to find out if his students were experiencing nature deficit disorder (accessed online

from http://www.childrenandnature.org/news/detail_print/1809/). The researcher decided to alter the aforementioned survey slightly to fit the Children's House parents and children. There were 10 questions posed altogether, but the researcher asked the parents to first read the newspaper article "Growing up Denatured," (McKee, 2005) before answering question 8.

The survey asked parents to answer the first six questions to the best of their ability, thinking about if they spent more time, less time, or about the same amount of time as their children do doing the following activities:

1. Amount of time spent indoors
2. Amount of time spent outdoors
3. Time spent in adult-sanctioned activities (e.g. classes, scouts) and sports (e.g. Little League, soccer league)
4. Time spent inventing outdoor games, making forts, etc.
5. Time spent being chauffeured in a car.
6. Time spent observing nature. (walking in the woods, going to nature preserves, hiking, etc.)

The next four questions required a written response:

7. If you spent more time in free play and time outdoors than your child does now, did you value these things? Why or why not?
8. After reading the article "Growing up Denatured," would you describe yourself or your child as a person who experiences nature deficit disorder? Explain.
9. Do you feel that most of your child's peers experience nature deficit disorder? Explain.
10. Do you think that nature deficit disorder is something we should be concerned with? Why or why not?

The second parent survey asked parents to reflect upon their children's experience in the Children's House over the course of the school year, in particular, their interactions with nature outdoors and inside the classroom. There were 10 questions posed with yes or no answers, and some opportunities to include a written comment:

1. Overall, does your child express more interest or enthusiasm in spending time outdoors exploring?
2. Does your child talk to you about our outdoor experiences at school, such as taking hikes in the woods?
3. Does your child talk to you about our wildlife observations of deer, turkeys, birds, squirrels, chipmunks and rabbits?
4. Does your child share with you about other nature discoveries, such as finding nests, rabbit fur, sticks, rocks, feathers, bugs and animal tracks in the snow and mud?
5. Has your child's interest in nature resulted in your family seeking out more outdoor or nature-related activities at home and in the community?
6. Has your child's interest in nature resulted in seeking out nature-related literature, in particular, non-fiction books about animals, seasons or plants?
7. Did your child enjoy our class fieldtrips to the apple orchard and pumpkin farm?
8. Inside the classroom, we introduced numerous Montessori lessons related to nature and science this year. Has your child talked to you about any of the following experiences?
Please elaborate in the comment section.
 - a. Flower arranging
 - b. Watering and caring for plants

- c. Practical life work with sunflower seeds and colored corn
 - d. Life cycle of the pumpkin
 - e. Feeding and caring for our fish and snail
 - f. Life cycle of the monarch and painted lady butterfly
 - g. Life cycle of the frog
 - h. Life cycle of the ladybug
 - i. Weather and seasons
 - j. Exploring and recording temperature (on below-freezing days)
 - k. Bird watching and feeding
 - l. Identifying and matching local backyard birds to their calls
 - m. Botany cabinet (identifying and exploring different types of leaves and leaf shapes)
 - n. Botany puzzles (parts of a leaf, flower and tree)
 - o. Nature journal
 - p. Parts of a lima bean seed
 - q. Planting bean seeds
 - r. Composting
9. Do you feel like your child is more connected with or more in tune with nature in general as a result of his/her school experiences?
10. Please share any additional comments or feedback about your child's school experiences with nature. Thank you!

Daily nature-related literature read aloud

Every day, the researcher would start the morning with a read aloud, using non-fiction literature related to the seasons and nature study in the classroom (Figure 9). For example, when the children were studying and learning about monarch butterflies, all of the literature supported that learning. There were books about monarch migration, monarch life cycles, and how to raise monarch butterflies. Some of the books were more appropriate for the researcher to read aloud, but there were picture books and early reading books available for the children to explore and read on their own as well.



Figure 9 – Read aloud of The Listening Walk, by Paul Showers

Nature Journals

The researcher introduced the idea of a nature journal for the children to record and write about their nature observations, inside and outside of the classroom. The children each drew a picture for their cover, and then kept their journal pages in a personal file to collect over the

research period. The children had the opportunity to draw pictures and label or write about their nature experiences. The children were encouraged to document discoveries as well as ask questions about what they wanted to learn about. The children were allowed to take a clipboard with a journal page outdoors during our nature walks, but also worked on them in the classroom during work time. Many children recorded some of their botany work in their nature journals (figures 10-13).

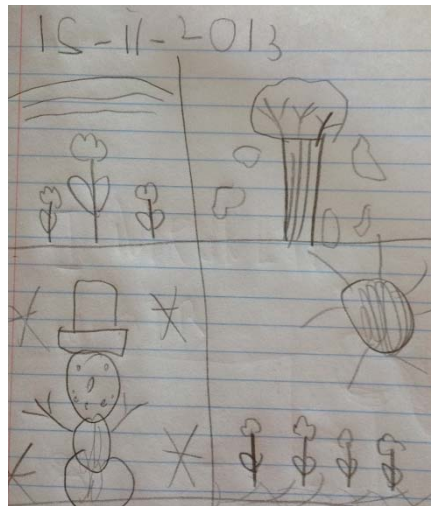


Figure 10 – Nature journal, seasons



Figure 11 – Nature journal, leaf

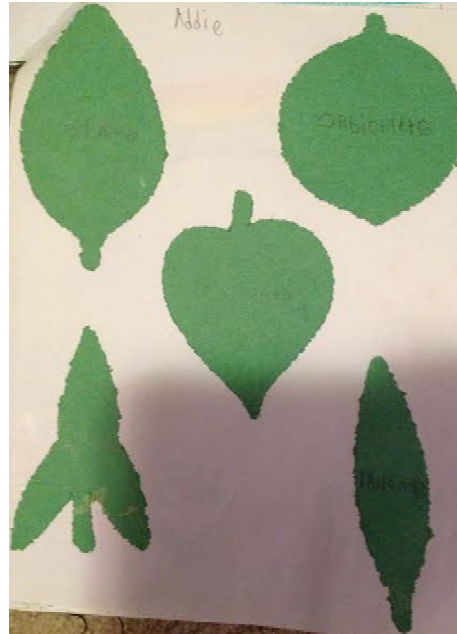


Figure 12 – Nature Journal, botany cabinet punching leaf shapes



Figure 13 – Nature Journal, parts of a leaf

Photos

The researcher and her colleagues regularly took photos of the children using the classroom iPad and personal cameras. The photos were used to document the children's

interactions and experience working with nature-related materials in the classroom, along with nature experiences outside.

Anecdotal Observation Records

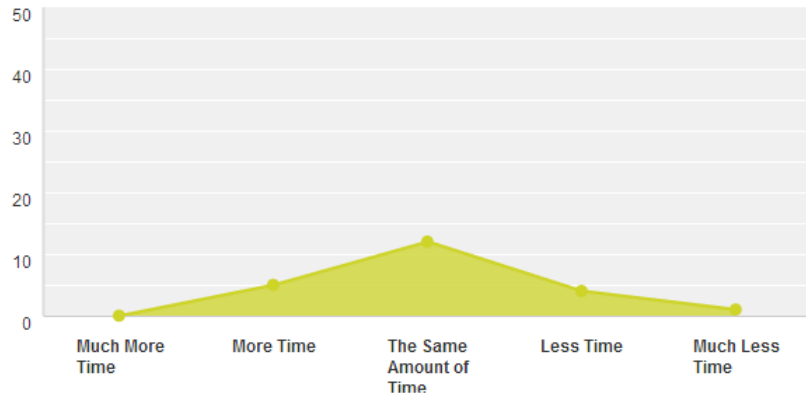
As part of the researcher's attempt to document the children's interactions and experience working with nature-related materials in the classroom and nature experiences outside, the researcher kept handwritten observation notes twice weekly throughout the study period.

Exploring the Data/Results and Findings

Parent Surveys – Survey 1:

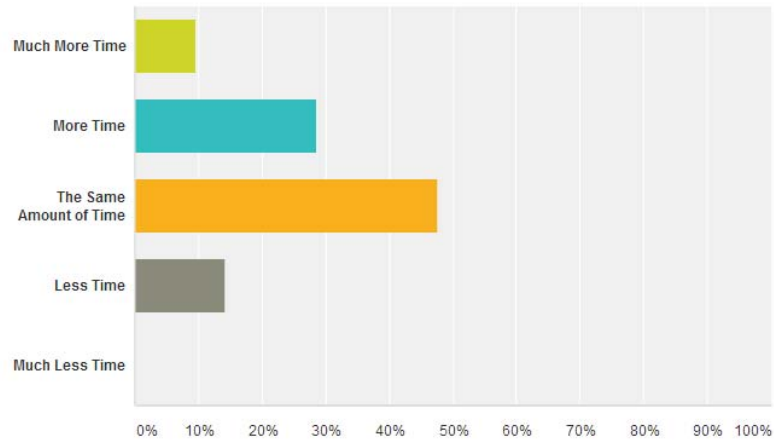
For the first parent nature survey, 21 out of 40 parents responded. The results showed that the majority of the parents felt that their personal childhoods were not that different than their own children's currently. Regarding questions 1, 2, 3, and 5, the majority of the parents (57%, 47%, 61% and 42%, respectively) responded that they spent about the same amount of time as their children currently do indoors, outdoors, in adult-sanctioned activities and inventing outdoor games and in time spent being chauffeured in a car (figures 14- 17). In effect, the parents expressed that there was not a large difference between their childhood and their children's current childhood experiences.

Figure 14 – Question 1: Time Spent Indoors



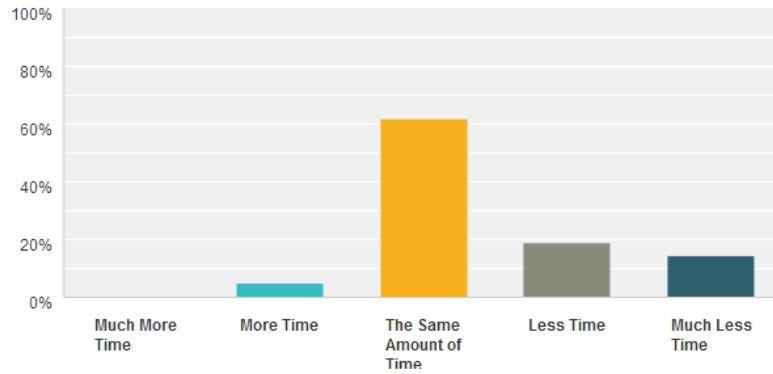
Answer Choices	Responses	Count
▼ Much More Time	0.00%	0
▼ More Time	23.81%	5
▼ The Same Amount of Time	57.14%	12
▼ Less Time	19.05%	4
▼ Much Less Time	4.76%	1

Figure 15 – Question 2: Time Spent Outdoors



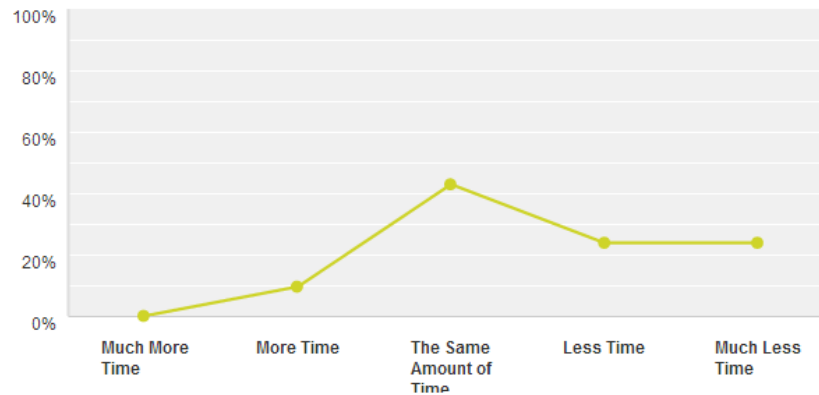
Answer Choices	Responses	Count
▼ Much More Time	9.52%	2
▼ More Time	28.57%	6
▼ The Same Amount of Time	47.62%	10
▼ Less Time	14.29%	3
▼ Much Less Time	0.00%	0
Total Respondents: 21		

Figure 16 – Question 3: Time spent in adult-sanctioned activities



Answer Choices	Responses
▼ Much More Time	0.00% 0
▼ More Time	4.76% 1
▼ The Same Amount of Time	61.90% 13
▼ Less Time	19.05% 4
▼ Much Less Time	14.29% 3
Total Respondents: 21	

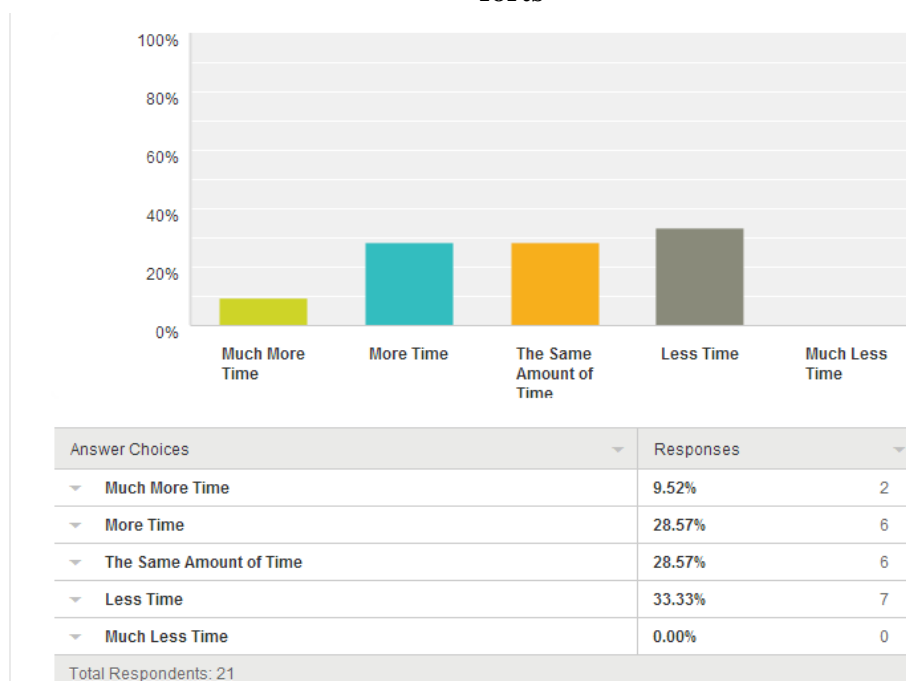
Figure 17 – Question 5: Time spent being chauffeured in a car



Answer Choices	Responses
▼ Much More Time	0.00% 0
▼ More Time	9.52% 2
▼ The Same Amount of Time	42.86% 9
▼ Less Time	23.81% 5
▼ Much Less Time	23.81% 5
Total Respondents: 21	

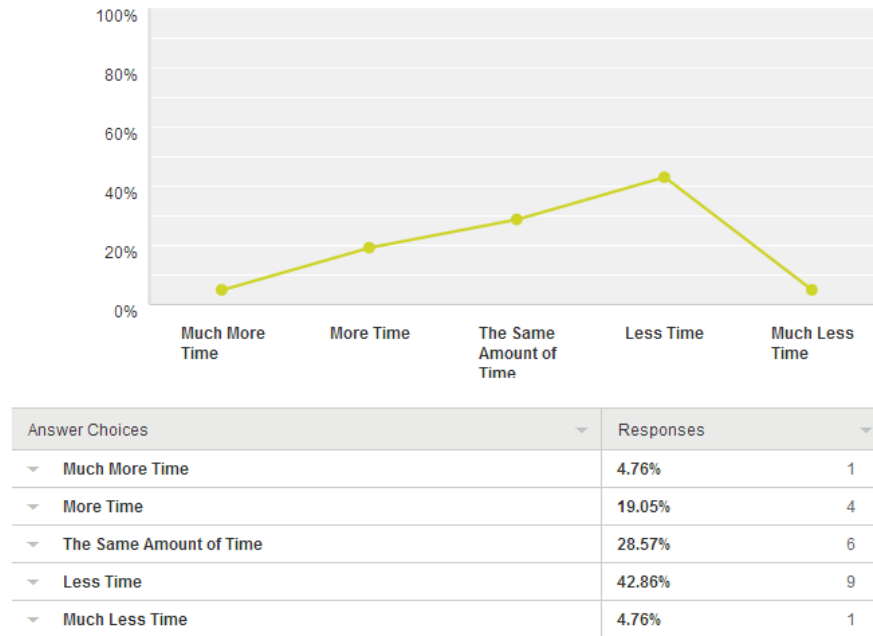
For question 4, regarding time spent outdoors inventing games and building forts, the results were more even across the board. There were 28% of parents who responded that they spent more time outdoors with this activity than their child; 28% of parents responded that they spent the same amount of time outdoors with this activity as their child; and 33% of parents responded that they spent less time outdoors with this activity than their child (figure 18). Only 9% of parents responded that they spent much more time than their children participating in these types of activities.

Figure 18 – Question 4: Time spent inventing outdoor games, building forts



For question 6, regarding how much time the parents spent outdoors observing nature doing things like hiking and visiting nature centers, a slight majority of the parents (42%) expressed that their children actually spend more time out in nature than they did as children.

Figure 19 – Question 6: Time spent observing nature. (walking in the woods, going to nature preserves, hiking, etc.)



Although the first group of questions in this survey doesn't suggest that the parents spent more time in nature than their children do now, question 7 responses indicated that the parents do value free play and time outdoors for their children. Twenty-one or 100% of the respondents stated that they do value these opportunities and encourage their children to have time for free play and time outdoors exploring. The difference between the parents' childhood and their children's childhood seemed to reflect some of what Louv (2008) talked about in regards to fears about letting children outdoors in natural areas on their own and increased reliance on technology for entertainment :

- *“Yes, I value it. However, our world does not seem to lend itself to it. There seems to be so much time spent on being places and organizing.”*

- *“...there were not as many concerns about safety. I can't really let my kids free play at their age like I did. However, I did value this time.”*
- *“I think there are too many electronic distractions nowadays and we need to limit them.”*
- *“Yes, I did value these things - in retrospect. At the time, the 'free play' was enforced by parents doing their own thing outdoors, and thus felt boring and out of my control. But, looking back, it also helped me value my time outside.”*
- *“I valued time outdoors because I felt free from rules and restrictions. I also worked outdoors, delivering newspapers, cutting grass, weeding the garden.”*

For question 8, after parents read the article “Growing Up Denatured,” by Bradford McKee, they were asked if they would describe themselves or their children as people who experience nature deficit disorder. Nine out of 21 respondents or 42% said that they (parents) felt that they have nature deficit disorder. Eleven out of the 21 respondents, or 52% said that their children experience nature deficit disorder. Once again, there were comments regarding the fear of letting children outside on their own, “I do have that fear of abduction, and I know that we do have some registered sex offenders near the neighborhood park.” There were also comments about having large quantities of structured time that didn’t allow the children to have time for free outdoor play, “Although I value spending time outdoors, we find ourselves in the car a lot after school, or in the house, rather than outdoors.” Many of the families commented that they spend more outdoor time in the summer, “Summertime we are outdoors more when the schedule is less structured and the weather is warm.”

Some of the parents discussed the variety of outdoor opportunities their children have access to, “Although we aren't the most "outdoors" family, we do spend plenty of time in the North woods of our state, at the local nature preserves, and exploring the trails in the wooded park by

our house, and “We do take the kids fishing and we are outdoors quite a bit - especially when it is warmer. We do have a high fenced-in backyard where we do let the kids run around and do whatever without us interrupting year-round. We grow a garden there that they help with as well.”

A few parents commented on how although their children are allowed to watch television or use an electronic device, that they have strict limits, “Our kids love their devices - but are limited in amount of time they can spend on them. We try to make sure they're outside every day and have at least one true outdoors adventure each week (not just in the neighborhood park).”

Another parent remarked, “We also do a fair amount of exploring and only allow our kids a max of 1hr of TV (even during the summer). Another family had even stricter limits, “TV is an event, separate from daily life. My kids watch maybe 2 hours a week, as adults we watch about the same.”

Regarding the first survey’s last question, ‘Do you think that nature deficit disorder is something we should be concerned with? Why or why not?’ the participants largely agreed that it is a major problem that our society needs to be concerned with. Twenty out of the 21 respondents answered yes, or 95%. Many parents expressed that they themselves need to work on being a better role model for their children in terms of not being constantly ‘plugged in.’ One parent made this thoughtful comment,

“I would make sure that parents and children are aware of this and not getting lost in all our technology and material acquisitions. Our technology is increasingly more vivid and visual which can be very attractive for many people. If the technology is interactive it can offer some level of challenge to the mind/body, but is no substitute for nature and direct interaction. Humans are part

of nature and an animal. The absence of connecting and seeking to understand nature I think causes us to lose touch with the nature that gives us life. I need to spend more time with nature myself.”

Another parent commented on how disabled we feel when we don’t have access to our electronic devices,

“...a great example (of nature deficit disorder) is when the power goes out for more than a few minutes. No one wants to be inconvenienced. I believe that most people have forgotten how nice it is to be outdoors, plant a garden/flowers to see life cycles in action, explore wildlife, There is something magical about stopping to see how the world is moving around you. Staring at clouds, taking a nap outside, and feeling the warmth of the sun on your skin are just a few of wondrous things that people take for granted.”

Overall, the first survey demonstrated that the families of the children in the researcher’s classroom value the opportunity for their children to spend time outdoors exploring freely and connecting with nature. Although most of the families didn’t feel their children currently experience nature deficit disorder, many expressed that they fear the risk will come as their children get older and more connected to and reliant on technology for daily life. Almost all of the families recognize that nature deficit disorder is a legitimate concern for our society and that we need to do something to change it.

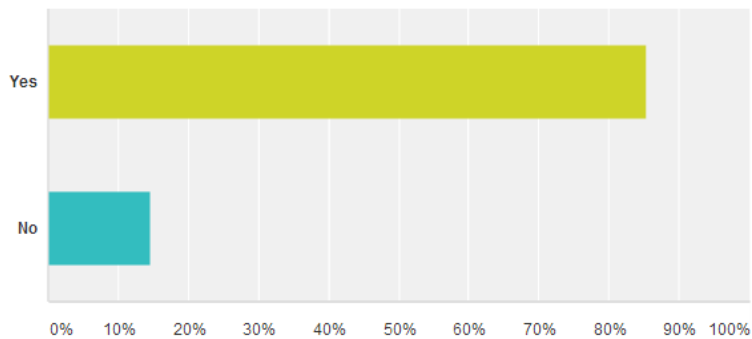
Parent Surveys – Survey 2:

The second parent survey was administered at the end of the research study, with 34 out of 40 parents responding. The parents resoundingly indicated that their children communicate with them about their school-related nature experiences, and that they became more connected with nature over the course of the research study period. Eighty-five percent of the parents commented that their children expressed more enthusiasm or interest in exploring outdoors (Figure 20). Ninety-four percent of the parents responded that their children talk to them about their outdoor experiences at school such as taking hikes in the woods or exploring in the snow. Eighty-eight percent of the parents said that their children told them about their wildlife observations and other nature discoveries like animal tracks.

Figure 20 – Question 1:

Overall, does your child express more interest or enthusiasm in spending time outdoors exploring?

Answered: 34 Skipped: 0



Answer Choices	Responses
Yes	85.29% 29
No	14.71% 5
Total Respondents: 34	

With question 5, the researcher wondered if the children's interest in nature at school resulted in families taking advantage of nature-related activities at home and in the community. A little more than half (53%) answered yes, and 47% answered no. Some of the parents commented on how they now come as a family to explore at the county park next to the school:

“We actually went out last Sunday and hiked in the woods at school. The kids showed us the different paths that they take, pointed out "Old Baldy", and they were looking for deer tracks. They are teaching us a lot about the things they have learned, and it's really neat how much they are able to take in and explain to us. Thank you :). Also, when we were recently on a beach, their interest in finding different animals, shells, etc., was really neat.”

One parent made a note stating how since now their child is more engaged outdoors, they as a family are more likely to plan outdoor adventures knowing the children won't complain. Another parent talked about joining a local nature club:

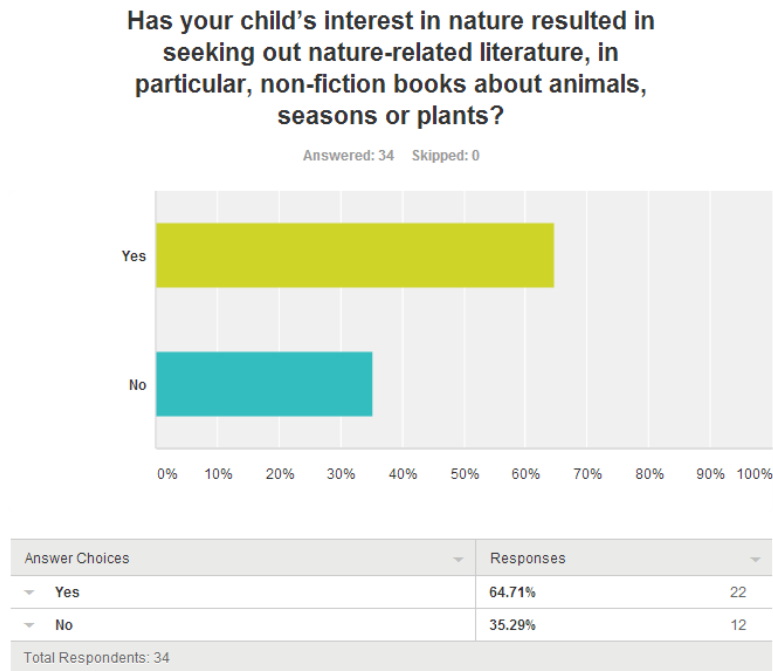
“Our family ended up joining a local nature program for children ages 5-12. It's been an amazing experience with monthly activities related to the time of year, such as snowshoeing in January, birds in February, maple syrup in March, and frogs in May. Thank you for letting us know about the program!”

Regarding question 6 (Figure 21), the researcher wanted to find out if the daily read alouds had made an impact on the children becoming more interested in non-fiction and on looking for books about topics like animals, seasons or plants. Sixty-five percent of the parents

responded that yes, their children were seeking out more non-fiction nature-related literature.

Anecdotally, many of the parents commented that their children talk about needing to go to the library to find more books about the topics they are interested in researching.

Figure 21 – Question 6:

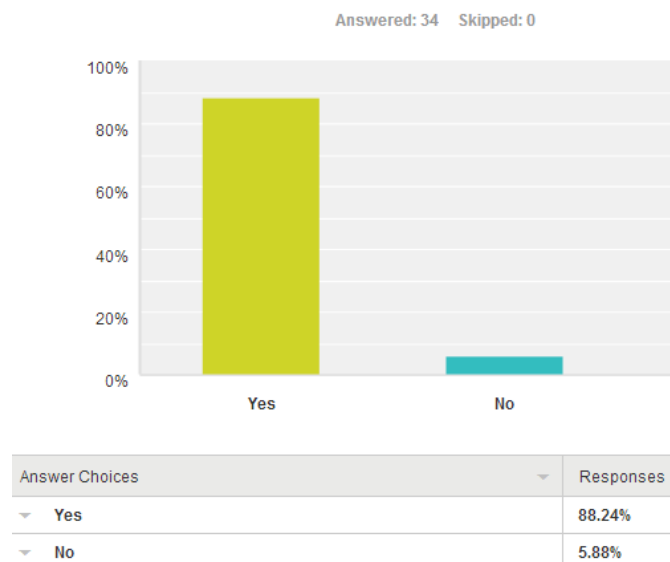


Question 8 (Figure 22) included almost all of the classroom nature-related materials and activities utilized during the research period. The first part of the question asked if the child talked to the parent about any of the experiences, and then the second part of the question asked the parent to elaborate on which activities were of most interest. Eighty-eight percent of the parents indicated that their children talked to them about their classroom nature experiences. Eighteen parents commented on which activities were favorites or highlights. In general, all of the life cycles were favorites (61% of the respondents mentioned them), “I most recently remember the ladybug and butterfly lifecycles. Our child was very in depth about explaining it to

us.” All of the activities and lessons were mentioned at least once, and many families expressed that their children love these types of experiences at school, “Where to begin ... every day we've gotten a full report of experiments and what has been done in the class. My child... absolutely LOVES all the nature-related learning!”

Figure 22 – Question 8:

Inside the classroom, we introduced numerous Montessori lessons related to nature and science this year. Has your child talked to you about any of the following experiences? (see pages 29-30 for full description) Please elaborate in the comment section.

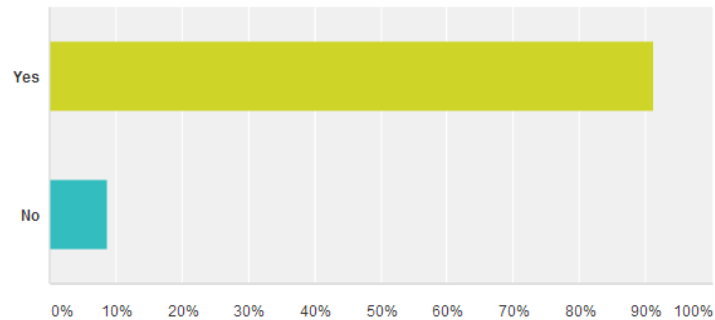


In question 9, (Figure 23) the researcher asked the ultimate question: “Do you feel like your child is more connected with or more in tune with nature in general as a result of his/her school experiences?” The response was a resounding yes – 31 out of 34 parents (91%) answered yes.

Figure 23 – Question 9:

Do you feel like your child is more connected with or more in tune with nature in general as a result of his/her school experiences?

Answered: 34 Skipped: 0



Answer Choices	Responses
Yes	91.18% 31
No	8.82% 3
Total Respondents: 34	

The final question of the second survey basically asked parents to share any additional feedback. Eleven parents (32%) chose to respond to this question. Overall the comments were positive and supportive of the researcher’s nature focus in their child’s classroom: “You do a wonderful job of connecting outdoor hikes with nature and bringing it back into the classroom for the children. The time spent outdoors is purposeful and gives children an opportunity to appreciate their surroundings.” Another parent expressed their gratitude in the following comment:

“I am so grateful that my children have the opportunity to spend so much time connected with nature both in and out of the classroom. They value and enjoy this time, and their enthusiasm for it carries into other parts of their lives. It is so fun to help unpack backpacks in the evening and find collections/evidence of a growing love of the outdoors; piles of bark, acorns, beans, rocks, corn, etc. have

become treasured items. When both parents work, and children are involved in afterschool activities, it is often very difficult to get outside on weekdays. We greatly appreciate that this is a vital, healthy part of our children's school day! Thank you!"

Daily Nature-related Read Alouds

Regarding the literature utilized and the children's responses to this literature, the researcher believed that the children had an overall positive response to this daily experience. Every week, the researcher would gather new books from her personal collection and from the public library that reflected the changing seasons and the current nature work in the classroom. She would select one book to read aloud each morning, but would also keep a collection of related books available in the classroom reading corner for the children to explore on their own. This exercise increased the children's interest and motivated them to learn more about each topic. The researcher encouraged the children to ask questions and then figure out a way to discover the answers on their own, with support. The researcher noticed anecdotally that about 25% of the children would regularly re-visit the daily read aloud book during work time.

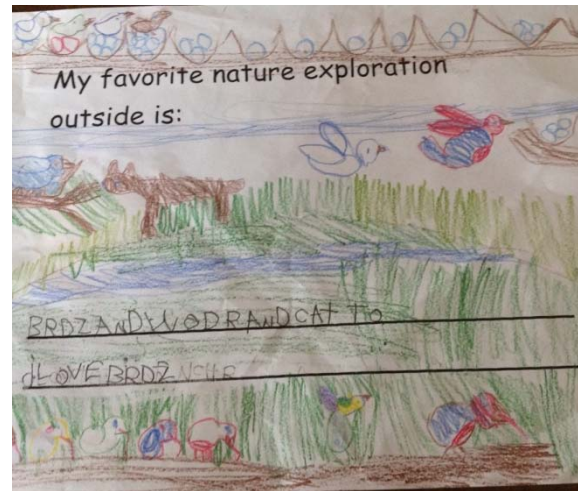
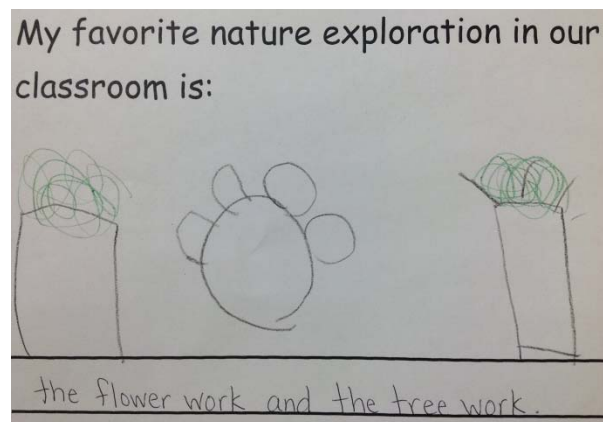
Another outcome from the daily read aloud involved the twenty all-day children's experiences visiting the public library twice a month. During their visits, the children would ask to research whatever the current nature topic was in the classroom. For example, when the practical life work of flower arranging and flower matching was introduced in the classroom, several of the children asked to learn about different varieties of flowers by finding books about them at the library and subsequently writing down descriptions and facts. In addition to researching the current nature topic, many of the children expressed interest in researching all sorts of animals which led them back to some of the zoology work in the classroom. All of this

work contributed to and enhanced the children's language development in both reading and writing.

Nature Journals

The children overall seemed to enjoy the opportunity to record their nature experiences in the nature journals. Seventy-five percent, or 30 out of the 40 children chose to create and work with a nature journal. Approximately half of the children (45%) wrote about and drew about what they discovered outside on hikes in the woods, like signs of the changing seasons, pinecones, deer tracks, moss, leaves, evidence of a rabbit killed, snow, animal bones, ants, pill bugs, worms and birds. Slightly more than half of the children, 62% or 25 out of 40, chose to record their botany work in their nature journals. This included things like parts of a flower, leaf and tree, pin punched leaf shapes from the botany cabinet, parts of a seed (lima bean) and many pictures of the life cycles of the insects and small animals in the classroom (butterfly, frog, ladybug, earthworm.) About 17% or 7 out of the 40 children chose to record in their nature journal daily throughout the research study period and beyond.

At the end of the research study period, the researcher asked the children to draw about what their favorite nature work was inside and outside of the classroom, to use as a child survey. The researcher did not notice a pattern with any of the responses, but did see all of the Montessori botany and science materials noted along with some of the children's personal observations from the hikes (Figures 24-25).

Figure 24 – Child Nature Survey**Figure 25 – Child Nature Survey**

Photos and Anecdotal Observation Records

Between the researcher and her two colleagues, they collected hundreds of photos over the course of the research study period. The photos were used to document the children's interactions and experiences working with nature-related materials in the classroom, along with nature experiences outside. As a result of taking these photos, the researcher compiled a visual timeline documenting the children's nature work over the course of the study period. The

researcher plans to share the children's personal photos with their respective families at the end of the school year on a CD.

The photos capture the beauty of the natural area of the county park connected with the school. In addition, the photos demonstrate the children's looks of wonder, concentration and enthusiasm as they interacted with all of the nature-related Montessori materials as well as the outdoors (Figures 26-28).



Figure 26 – April snow hike



Figure 27 – First snow exploration



Figure 28 – Pumpkin Polishing

With the regular anecdotal observation records, along with the photos, the researcher was able to document the children's work relating to nature. The observations provided insight into which children were drawn to the nature-related materials in the classroom, as well as when the interest was waning. The researcher used this information to inform her practice as a Montessori guide, and to make changes and accommodations as necessary.

According to the researcher's observations, while outdoors, although the children were often noted scientifically observing and exploring the natural areas around them, they were sometimes engaged in imaginary play. On the playground, some of the children built and maintained fairy and leprechaun houses out of natural materials such as sticks, leaves, moss and grass. The sandbox was a favorite area where the children loved to dig up small balls of clay and pretended to find buried treasure. At the end of the brutal winter when the playground was still full of chunks of ice, the children proceeded to identify chunks of ice that resembled continents, countries and states, effectively creating their own cultural scavenger hunt. The researcher noticed an increased level of creativity and cooperation when the children were outdoors.

In the sit spot, the children pretended to be animals and birds, building a giant nest of sticks and leaves. During the winter months, the sit spot was a winter wonderland, sort of a secret playground for the children where they could build snow people and snow forts and come back the next day to find them untouched. The children constantly discovered new life outdoors – ants, worms, spiders, cicadas, leaves, flowers, trees and more. They occasionally had the opportunity to observe wildlife outside, including wild turkeys, deer, squirrels, chipmunks, migrating geese, birds and rabbits.

In the classroom, the researcher's notes described how frequently the botany, zoology and practical life nature-related curriculum materials were utilized. There was a high percentage

of work explored in all of these areas, with the notes detailing that over half the class interacted with the nature-related work daily.

Interpretation/Analysis of Results and Discussion

Parent Surveys

The evidence from the initial parent survey indicated that the majority of the families started out the school year already supporting and valuing outdoor exploration and nature study. They also concurred that nature deficit disorder is a valid concern for their children and society as a whole. However, the compelling part to me was from the final survey, where the results stated that although the parents already valued their children's experiences with nature, that they believed that all of the nature work done during the research study period strengthened their children's connection to nature. In addition, many of the families indicated that as a result of their children's renewed connection with nature that they as families were making efforts outside of school to find ways to be outdoors more frequently, and to allow their children more opportunities to interact with nature in general.

I was somewhat surprised initially upon reading the results of the first survey to discover that the parents did not find their personal childhood experience much different than their children's current experiences. I found this interesting considering how my own experience as a child was completely different than my children's experiences, but I surmised that it might be a generational difference as I am an older parent in this classroom. It also may be due to the fact that I experienced the majority of my childhood in a rural area, but now am raising my children in a suburban or small city environment.

Daily Nature-related Read Alouds

The daily nature-related read alouds definitely contributed to the children's nature and science literacy. They expanded their knowledge of living and non-living things, and learned more about the needs of living things. They developed a better understanding of life cycles and habitats. By discussing the read alouds, the children developed science inquiry skills including wondering, questioning, exploring and investigating, reflecting, and formulating ideas and theories.

Nature Journals

The nature journals helped the children learn to observe nature more closely, and the children seemed to sketch with more confidence as the research study period went on. Many children enjoyed narrating the changing seasons with their drawings. The nature journals provided an avenue for children who preferred to draw or write about their nature-related experiences. From my observations, it seemed like some of the children had an increased interest in the botany work when they discovered they could record some of it in their nature journals. Overall, the nature journals offered an additional experience for the children to interact with natural objects inside and outside of the classroom.

Photos and Anecdotal Observation Records

One common thread I noticed after analyzing the photos and written records, was that children who struggled inside the classroom with negative behaviors like biting, hitting and pushing seemed to undergo a dramatic shift when they were outdoors. When these specific children were outdoors, whether it was on a hike or just freely exploring the playground area or

our sit spot, they were calm, peaceful, and all of the typical conflicts seemed to disappear. I never heard them request to go home when we were outdoors. The outdoor environment seemed to provide a refuge for all of the children. It's challenging to describe in words, but they all truly seemed happier and more peaceful outdoors.

The peacefulness and calmness that affected the children outdoors seemed to additionally affect their work inside the classroom when the children interacted with 'real' nature objects, such as the live insects and small animals, flowers, plants and seeds.

The photos and anecdotal records also provided insight into who was choosing nature-related work, what work they were choosing, and how frequently they were working on it. All of the children seemed to gravitate toward the nature work in the classroom. It's challenging to discern whether it's partly because of my enthusiasm for the nature-related work, or if it was due to the fact that the bulk of that work was novel and changed from time to time, especially as the seasons changed.

Another pattern I noticed was that the nature-related classroom work was generally available and appealing to all of the children, regardless of their age or academic level. As a result, there was more evidence showing the children supporting one another – I often witnessed younger children giving older children lessons. The nature-related work provided sort of a bridge between ages and broke down some of the typical barriers between the more mature students and the very young students. This camaraderie was noted outdoors as well.

Action Plan/ Implications for further research and Limitations

One goal that I fell short on was to create a more natural way for the children to have equal access to our outdoor space and indoor space during work time. At this point it is

supervised, meaning that the children need to ask to go outside to feed the birds, or ask if they can check on their plants in the greenhouse. They aren't allowed to open these doors without permission due to safety issues. Next school year I hope to incorporate a method where the children can take more responsibility or ownership by approaching these types of work in the same way they do with the rest of the material in the classroom. With freedom and responsibility, I hope the children will take advantage of the outdoors when they need that exposure rather than having to wait until I control their access to it.

I also had visions of creating and starting a school garden this spring. With all of the construction renovations, along with everything else that goes with a school's first year in a new building, I believe this will have to happen starting next school year. We are starting a parent and staff committee to look into grant opportunities to develop an all-school garden. In the meantime, the children will enjoy their pots planted in the greenhouse along with our few bird feeders outside the classroom.

The bitter cold winter that we experienced certainly affected our ability to access the outdoors as much as I had anticipated. Working in the classroom with insects and small animals became a welcome classroom activity as a result. The children also used their nature journals more frequently indoors, either looking out of windows to observe nature, or recording nature-related classroom work.

One other concerning incident involved a student who hid in the classroom unnoticed as we ventured out on our daily hike in the woods. Typically we did a count of all the children, and for some reason that day we didn't do a count and did not realize she wasn't with us. After coming out of her hiding place about 15 minutes after we left, the child exited the classroom on her own, following the path into the woods searching for us. A neighbor was working out in her

yard and found our student lost and crying, and helped her back to school safely. This was a very scary incident that reinforced how vigilant we needed to be with keeping track of every child at all times. It also helped us remind the children about ways to stay safe in school and on nature walks.

Although my official research study period has ended, I feel compelled to continue to provide parent education and potentially staff education opportunities about the benefits of connecting with nature on a regular basis. I have been completely immersed in everything 'nature' and have sort of gone through a transformation as a teacher and as a parent. It has been a wonderful journey and I honestly feel like I've just begun!

Even though our school was placed in this amazing new natural setting, not all the teachers took advantage of the outdoor space. Over the course of this research, there were two teachers who only took their children outdoors (besides recess) one single time for a short hike to the sit spot area I mentioned earlier. Now I feel compelled to continue my research and keep the momentum going. I believe the teachers feel like they didn't want to take time away from the traditional uninterrupted block of work time inside the classroom, which is a critical component of any Montessori classroom. They also want to please the parents who occasionally balk at anything that takes away from the traditional block of work time inside the classroom.

The teaching staff at our Montessori school (all levels) took the opportunity for one staff development day to visit a premier private Montessori school set in a similar setting, and with a significant focus on nature study. This school had a practice where all levels of children spend the first half hour of school outdoors, whether it was visiting their farm, taking a hike or a walk, or working in the gardens. Their premise was twofold: that the children all benefitted from getting fresh air and exposure to nature, and that in effect, the children returned to the classroom

more focused and better able to sustain a longer work period. Our staff returned from this visit invigorated and willing to try to implement this new practice or routine, and hope to see similar results as the other school in terms of focus, concentration and stamina.

There were some limitations in this study, however, that I should note. First, it was incredibly stressful going through the process of starting a new Children's House program involving 40 children ages 4-6 and bringing three educators with different backgrounds together. We have come a long way and I have grown so much personally and professionally as a result. On top of that situation, it was a significant challenge to stay on top of my coursework responsibilities at UW-River Falls and to attempt to be emotionally and physically present and involved with my family at home.

In addition to the above, we had a child in our classroom this school year with significant behavioral and sensory special needs. We could not take our eyes off of him for a second due to several safety issues with himself and the other children. We ended up evacuating the classroom on a number of occasions in order to help him. When we would take nature hikes, he would consume leaves and dirt and crawl on the ground. Inside the classroom he ate non-food items in our practical life area such as sponges, soap, play dough and he also drank all the colored water. On a daily basis, he interfered with the learning of the other children by destroying their work and physically and verbally abusing them. He often damaged our classroom materials. We worked with several professionals outside of our school and attempted numerous interventions without success. In the end, after months of parent meetings and specialist support meetings, the child transferred to another school in the district with a smaller class size and three teachers (one regular-education teacher, one special education teacher, and one special education paraprofessional, along with regular access to other specialists.) This situation certainly played a

role in developing our classroom community and honestly took a tremendous amount of our energy on a daily basis.

The situation with the above-mentioned child brings to question: ‘How can we support all children in our Montessori Children’s House, regardless of their needs?’ Because of our small population, our school only qualifies for a speech therapist, so if children have other needs, the parents either have to sign off on the IEP or attend a different school. This concerns me as an educator who believes wholeheartedly that our role is to include everyone, especially in a public Montessori charter school where money isn’t a barrier for families.

I also ponder the question, ‘Is 40 children in one classroom ideal?’ I believe we might have had a different outcome in many areas with a smaller number of students, especially considering they were almost all new to Montessori.

This study has had a tremendous impact on my teaching. I feel that it gave me a purpose and a focus this school year and enhanced my personal Montessori philosophy in my interactions with the students, staff and parents. I believe I made a positive impact on everyone I worked with in terms of presenting the idea of connecting with nature as a birthright that we must honor and foster as educators and parents. “Wonder...leads to Curiosity...leads to Information...leads to Responsibility...leads to Action,” (Carson, 1998, p. 69).

Conclusion / Reflection

Given opportunities to discover nature, children not only experience the natural world to its fullest extent, they use those experiences to form important and lasting attitudes toward nature. Louv (2008) tells us that we can now assume that just as children need good nutrition

and adequate sleep, they may very well need contact with nature. “Healing the broken bond between our young and nature is in our self-interest...because our mental, physical and spiritual health depends upon it,” (p.3).

I think that providing hands-on nature experience is crucial during this time of childhood if we want children to develop naturalistic mindsets. A naturalistic mindset is having an active interest in and a strong desire to learn about nature and the natural world. This particularly applies to the scientific fields of botany (the study of plant life) and zoology (the study of animal life), (Louv, 2008).

I believe I effectively provided a variety of opportunities for the children in my class to develop an understanding, enthusiasm and appreciation for the outdoors and nature in general. I discovered how nature can easily be integrated into most of the content or curriculum areas: language, math, science, cultural, sensorial and practical life. By caring for living things, the children learned many facts about animal and plant characteristics. My hope is that in the longer term, the children will have a sense of responsibility and respect for all living things, and ultimately pass down their love of nature to their own children.

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Appendix A

Appleton Public Montessori
1545 East Broadway Avenue
Appleton, WI 54913

Dear Children's House Families,

As part of a continuous mission for best Montessori teaching practices, I will be doing an action research project in the classroom this year. This project will focus on integrating nature exploration throughout the Montessori primary curriculum. Your children will be involved as I observe their nature discoveries, inside and outside of the classroom. Based upon their interests and making connections with our Montessori botany and science materials, I will then plan for developmentally appropriate individual instructional needs. We will incorporate all areas of the Montessori curriculum, including math, language, art, sensorial, cultural, practical life and science. My objectives for your children are the following:

- 1) To enjoy outdoor activity throughout the seasons.
- 2) To investigate and experiment with a variety of natural resources.
- 3) To make discoveries using senses.
- 4) To use language to describe, explain, predict, ask questions and develop ideas.
- 5) To develop an appreciation of natural beauty and a sense of wonder.
- 6) To care for personal safety.
- 7) To care for the environment at APM and Plamann Park, and to create an awareness of wider issues.

I would appreciate having your permission to reproduce your children's work and to use photographs of the children working in my project. I will present these to other Montessori educators as well as use the photographs as a classroom record of the children's explorations. I will use a pseudonym to protect their privacy and photographs will not be identified by name. Please sign this form and return it to me as soon as possible.

If you have any questions or concerns, please feel free to call or e-mail me. (Phone 920-733-0836, or e-mail maureenharringtonrussell@gmail.com.)

Sincerely,

Maureen Russell
APM Children's House Guide

I grant permission for the use of the material as described above.

Parent name: (please print) _____

Parent signature: (please sign) _____ Date: _____