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Behavioral Effects of Outdoor Learning on Primary Students

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in fulfillment of final requirements for the MAED degree

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BEHAVIORAL EFFECTS OF OUTDOOR LEARNING ON PRIMARY STUDENTS

Children have an innate sense of curiosity about nature. “When children come in contact with nature, they reveal their strength” (Montessori, 1967, pg. 69) and therefore outdoor education can be a useful learning tool for students. Whether being outdoors or bringing the nature-based activities inside, children have the opportunity to work with all of their senses. A growing number of schools around the United States have begun adding outdoor learning to their curriculum (Lieberman & Hoody, 1998) to bring positive outcome to students’ behavior. Outdoor learning provides another environment that children can thrive in and hopefully benefit from.

As many students struggle with learning confined to an indoor learning environment, like most classrooms, changing the environment offers students a uniquely rich context to frame student learning and provides them with movement, stimulation and grabs their attention so they can focus better (Bjorge, Hannah, Rekstad and Pauly, 2017). “If students are more focused, it is less likely for them to cause disruptive behaviors” (Bjorge, et. al, p. 4). This positive change in behavior is beneficial for everyone including students, teachers and parents.

By incorporating outdoor learning regularly in a classroom, children are given the freedom to move and explore on a sensorial level that may promote positive learning abilities. Using the outdoor environment as a classroom setting can have impact on children who are not successful in an indoor classroom setting. According to existing research, (Bjorge, et. al, 2017; James, J.K. and Williams, T., 2017; Lieberman & Hoody, 1998) student motivation and concentration behaviors as well as overall well-being can be greatly impacted and improved through outdoor learning opportunities.

Problem Statement

Learning outdoors can be beneficial to the children's wellbeing and their successes in the classroom. Teachers are looking to incorporate outdoor education not only outdoors but bringing the outdoors inside. Including outdoor education in primary (3-6 years of age) classrooms may positively affect the children's behavior in regard to motivation and concentration. Outdoor education refers to lessons that are given in the outside environment as well as using materials from nature as assets to teach the children. These tools benefit both children and teachers in fostering curiosity about nature, interest in the presentation of lessons, and independent engagement while learning. According to the research conducted by Bjorge, et. al (2017), "learning outdoors could have benefits not only to students, but also teachers" (p. 3).

Teachers everywhere, including us, notice students are struggling with motivation and concentration in the classroom. The Montessori environment for primary aged classrooms does not always facilitate outdoor education or incorporate nature-based materials. In our research we came across several studies incorporating outdoor education. There is substantially less data collected on the primary age group, which our research will focus on in an effort to fulfill this gap. Therefore, the purpose of this action research will explore how bringing outdoor education into the curriculum will impact behaviors, such as motivation and concentration, and the well-being of students in the primary classroom.

Literature Review

Outdoor education is a pedagogical approach that is being incorporated into classroom curriculum to improve mental and physical health and behavior. Many teachers are looking for ways to enhance their curriculum by bringing elements of nature into the classroom or by bringing students outside. We saw a need for further research around the implications of outdoor

education and how it can improve the health and behavior of students and their classroom.

Therefore, this action research study will explore whether Montessori primary students' behavior and health will improve by incorporating outdoor education into the curriculum.

Constructivist Approach Theory

This research focuses on the applicability of outdoor education and incorporating nature-based materials and its effect on learning. The theoretical framework for our research is the constructivist approach. According to Papert and Harel (1991), "Constructivism advocates student-centered, discovery learning where students use information they already know to acquire more knowledge" (p. 201). Constructivism implies student learning is based on time spent outdoors outside of school experiencing the natural environment and using materials that are made of natural products such as wood. Using the constructivist approach allows teachers to utilize students' existing experience of nature to further explore the environment and its resources.

According to Amineh and Asl (2015), "Constructivism describes the way that the students can make sense of the material and also how the materials can be taught effectively. With Constructivism as an educational theory in mind, the teachers should consider what students know and allow their students to put their knowledge in to practice" (p. 10). Keeping in mind that constructivist learning requires a constructivist approach to teaching as well, our independent variable consists of introducing new forms of outdoor education and nature-based materials. Our dependent variables are the responses or outcomes from student learning that may have caused or changed their behavior after lessons are given. This also includes new or newly adapted ideas created by new experiences learning outdoors and if they invent their own ideas rather than accumulating factual evidence.

Constructivism directly related to our research question around if outdoor learning can affect student's behavior when consistently provided by the teacher's and environment. Also, students construct mental models in order to understand the world around them. Their learning is supported by previous time spent outdoors outside of school. Students learn through participation in project-based learning where they make connections between different ideas and areas of knowledge facilitated by the teacher (Papert and Harel, 1991). We will work to answer the following question: How will outdoor learning affect students' behavior and wellbeing for learning in Montessori primary school environments? We are seeking ways to improve Montessori primary students' mental and physical health and behavior by incorporating outdoor education into their curriculum.

Outdoor Education

Outdoor education is defined as a method of experiential learning through all senses by exposure to the natural environment and provides students with opportunities to learn. According to Bishop (2013), "Nature need not design for children, nor engineer to create playscapes or boundaries; it has everything a child could possibly want, and it will inspire imagination" (p. 31). Outdoor education can be delivered by bringing natural elements into the classroom or by bringing students outdoors. This change to how their lessons are being given can directly affect their behavior and health (Bjorge, Hannah, Rekstad, and Pauly, 2017, p.28).

Montessori Philosophy

Maria Montessori's pedagogy focused on the combination of learning to connect to all living things and identifying one's place in the universe. Montessori (2005) theorized that "For the physical life it is necessary to have the child exposed to the vivifying forces of nature, it is also necessary for his physical life to place the soul of the child in contact with creation" (p.

145). Montessori's philosophy achieved success through the method's ability to teach compassion for and connection to all living things. According to Johnson (2013):

Maria Montessori included a variety of learning through the senses in her philosophy. 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 (p. 39).

Montessori teachers are not only focusing on what is available in the classroom but looking at alternative environments that could benefit students and improve their ability to learn.

Benefits of Outdoor Education

Maria Montessori's philosophy of using nature as a prepared environment has positive effects on children's learning, behavior, and health. While our research specifically collects data from Montessori classrooms the positive effects on students' behavior and mental health has been found successfully for children in general. According to the findings of Youngberg (2015), "Researchers illustrate that contact with nature can help ameliorate many of the psychological issues of at-risk youth from anxiety and depression to the lack of motivation and sensitivity for others and nature" (p. 14). Time spent in nature has shown to help concentration, brain performance, and mood in many people. According to Webb (2010), "the detachment of education from the physical world not only coincided with the dramatic rise in life-threatening obesity but also with a growing body of evidence that links physical exercise and experience in nature to mental acuity and concentration" (p. 99). Integrating experiential outdoor education into K-12 curricula results in better standardized test performance, reduced discipline and

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classroom management problems, and increased engagement in and motivation for learning (James, J.K. and Williams, T, 2017). There are overall benefits for all students by incorporating outdoor education into daily curriculum.

Positive Behavioral Effects

According to a recent study on the behavioral effects of outdoor education, behaviors can be triggered by the lack of academic interest, stimuli and, confidence. This can in turn affect their motivation to learn and stay on-task. Using the outdoor setting for different learning experiences can impact students who struggle in the classroom setting (Bjorge, et. al, 2017). It can increase student motivation to learn and build confidence, which in turn, can improve student behavior (Bjorge et al., 2017, p. 4-5).

Pearce (2015) concluded field trips and daytime school outings are the best ways to reach all children to let them gain a deeper understanding of an educational topic being discussed at the institutional level at that time (p. 3). Fox (1995) wrote: “Through research collected by observing young children’s cognitive development during outdoor play, it was indicated that children learn best in an environment which allows them to explore, discover, and play” (p. 2) and that “high participation was observed during most outdoor activities as students asked more questions and were more involved with looking for answers about the things we were discussing” (p. 45). These studies concluded there were different ways to approach outdoor education and each of them produced positive behavioral effects on their learning including motivation and concentration.

Motivation

According to Wirth and Rosenow, “Educators who understand and embrace this way of thinking will enthusiastically engage with children during investigations of the natural world.

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With a variety of activity areas encouraging boisterous full-body play as well as quieter, contemplative learning, all children can engage in intrinsically motivating experiences” (p. 45). When the kids see a connection between what they do in the classroom and what they might see out there in the real world, their motivation changes (Lieberman, 1998, p. 52). Alternatively, the feeling of failure could be associated with a negative perception of being inside of a school, which would be directly linked to the child’s motivation to learn(Bjorge, et. al, 2017).

Güdelhöfer (2016) concluded that “Outdoor Education can create strength-based activities and exercises where all children are included and participate on their individual levels” (p.44). Güdelhöfer’s study found that “learning outdoors [has] increased participation and learning motivation for all children in the class. Experiential learning particularly supported the children with special needs in their learning, as they created meanings more easily with practical and sensory experiences. Those concepts of learning to present meaningful potential on how to increase the inclusion of children with special needs” (p. 54). The link between children with special needs and the sensorial experience of learning outdoors is directly linked to Maria Montessori’s theory of Erdkinder and using nature as a prepared environment.

James and Williams (2017) focused on improving behavior in a classroom, their “Research supports that integrating experiential outdoor education into K-12 curricula results in better standardized test performance, reduced discipline and classroom management problems, and increased engagement in and motivation for learning” (2017, pg. 58). This study focused on the effects of outdoor education on motivation and its direct impact on children’s ability to concentrate. James said, “Many studies indicate that outdoor education programs hold high emotional engagement for students and, as a result, increase motivation for the learning taking place in this environment” (2017, p. 59).

Concentration

Concentration increases when children are motivated to learn outdoors. In turn, this helps support teachers' ability to teach to more focused and eager to learn children. According to Bjorge et al. (2017), "Many children struggle to sit still and/or listen while being in a confined area, such as in a classroom. By taking them outdoors, this offers students a uniquely rich context to frame their learning and provides them with movement, stimulation and grabs their attention so they can focus on their learning. If students are more focused, it is less likely for them to cause disruptive Behaviors" (p. 4). Results from case studies such as Yavuz (2016), Smith et al. (2011) and Güdelhöfer (2016) all reached conclusive evidence overall engagement, or concentration was affected positively by participating in outdoor activities, and educational environments were used enhance the overall learning experience. In all, when presented with an outdoor environment, it is said that children are motivated and concentrate better.

Moreover, Güdelhöfer (2016) also noted that while observing the children display a high level of concentration, they did not take advantage of the freedom they got while being outdoors (p. 40). In fact, according to Güdelhöfer, "the findings showed the positive influence of movement, as the children who commonly have problems with sitting still in the classroom showed increased participation and concentration in the outdoor lessons. This can be linked directly to an increased inclusion, as hyperactive children for instance are disturbing less outdoors than in a small classroom, which has positive benefits for all children of the class" (p. 53). The sensitive period for sensorial learning occurs during the primary age level and reflects in the Montessori pedagogy.

Health and Wellbeing

According to Louv (2009), “Too many school districts have contributed to a growing gap between nature and children. I call this nature-deficit disorder, which is not a medical diagnosis, but a description of the growing gap between human beings and nature, with implications for health and well-being” (p. 26). According to Güdelhöfer, (2016), “there are various benefits for health and well-being that we can find in nature, Outdoor Education can create the bridge to bring more children and youth outside into natural environments. Students not only increases their mental health and learning outcome, through better concentration or memorization but also increase their physical health and motor skills” (p. 25). Louv continues to argue that “schools can improve both health and learning by reintroducing students to the natural world” (p. 24). If we can include the natural world into our children’s curriculum, it would be curious to see how deep they can dive into it.

In New Zealand, “Kaitiakitanga (environmental guardianship) [thus] becomes a responsibility for everyone in early childhood care and education in Aotearoa, and these services are to initiate the learning of dispositions that will empower young children to care for the environment for the rest of their lives” (Alcock and Ritchie, p. 86). In another study about the social, psychological, and cultural benefits of experiences in the natural habitats and wilderness areas, Hine et al. (2009), discussed the emergent body of evidence that continues to demonstrate the health and well-being benefits experienced by individuals after spending time in the natural environment. Health benefits seen as a result of contact with nature include reduced stress levels, improved mood, enhanced psychological well-being, and improved attention and concentration (Hine et al. 2009).

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Natural places facilitate stress recovery, encourage exercise participation, stimulate development in children and provide opportunities for personal development and a sense of purpose in adults (Youngberg, p. 42). Using the outdoor environment for different learning experiences can impact greatly those students who struggle in the classroom setting. Changing the setting may increase student motivation to learn and build confidence and thus can improve student behavior.

According to Best, et al. (2017) and their case study on the Impact of Implementing Core Curriculum in an Outdoor Classroom on Primary-Aged Students' Academic Achievement, "Outdoor education can promote student achievement: academically, socially, emotionally, and physically. It also increases the likelihood of future success in life-skills and careers. Effectively implementing environmental education requires educators to connect curriculum to real-world situations, thus increasing student engagement" (p.15). As primary education's purpose is to prepare them for the future, outdoor education's impact is not only important for teaching lessons at that moment but the long-term effects of how they are delivered by teachers and received by children.

Bjorge et al. (2017) found "In a different study conducted by Palavan, Cicek, and Atabay, (2016), additional benefits for learning outdoors are cited. They write about how learning outdoors provides students with better self-confidence, concentration, knowledge retention, and comprehension as well as social, language, communicative, and physical skills (Palavan et al., 2016)" (p. 4). In conclusion, "Primary school children benefit from outdoor learning as it stimulates brain function and development" and should be incorporated into their curriculum and lesson delivery due to the positive behavioral effects made evident by several studies (Pearce, 2015, p. 2).

Barriers to Outdoor Education

Many teachers struggle to fit outdoor education in their daily schedule. Some find outdoor education does not outweigh results for achieving test scores. Teachers' reports showed that if they allow children to experience outdoors on a rainy day, they know that parents will react negatively to those experiences since they do not want to see their children's clothes wet and dirty (Yilmaz, 2016, p.427). Many schools are restricted to stick to the basics of writing, reading, and math (Louv, 2008). Outdoor Education strongly depends on teachers' motivations and beliefs, along with support from school authorities.

Many teachers think they need additional resources out of their budget or means to conduct an outdoor education program. Others think that weather and location can also negatively affect developing an outdoor education program. Exposing these kids to the outdoors and their surroundings are just the beginning of developing an outdoor education program and the first step is to simply start giving the same lessons normally given indoors taken outdoors. According to James and Williams, "Children are spending more time engaged in sedentary, often technology-related, indoor activities, and less time in the outdoors. This is partly because parents are more reluctant to let their children engage in unsupervised outdoor play for safety reasons" (p. 60). If the adults in the children's lives (parents and teachers alike) can agree to increase outdoor education exposure, they will be enhancing the positive behavioral effects in the classroom.

Methodology

The sample of this action research study consisted of 22 primary aged students between the ages of 3-6 years old (See Appendix E). Students chosen to participate in this study showed signs of difficulty with concentration and motivation in the classroom. There was a total of 11

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girls and 11 boys chosen for this study because of their lack of concentration and motivation in the classroom. Parent permission was obtained for the selected students to participate. Parents were also given a survey at the beginning of the first week of data collection and after the last week was completed. The surveys consisted of the same questions as the collective answers were used to compare any changes that may have happened outside of school in the duration of the study that may have affected the data collected in school.

In order to answer the research question, data was collected in multiple ways. Prior to starting the outdoor learning activities, all students' parents completed a Time Spent Outside of School Student Survey to provide background information on student interest in and time spent outdoors. In addition to the Survey, all students were given an Attitude Assessment before outdoor learning activities to determine attitudinal changes. Anecdotal Observations were used to write down any additional notes on behaviors each day for all lessons given. If there was unusual behavior, unforeseen changes in schedule or abnormal circumstances, they were documented here and described by the researcher. Finally, Tally Sheets were used to collect observational data to inform the researchers of levels of engagement and participation of students before, after and during the lessons.

This study used indoor and outdoor classroom observations using Tally Sheets (See Appendix A) along with pre- and post-Attitude Assessment Scales (See Appendix B) and Anecdotal Observations (See Appendix C) with commentary on each student's overall behavior. Parent Surveys (See Appendix D) were also used to learn about the students' time spent outdoors outside of school. This study was experimental utilizing outdoor education curriculum implemented in four different lessons. Some lessons were conducted outdoors if weather

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permitted and if the lesson was conducted indoors it included nature-based materials and topics.

Each lesson involved nature-based and hands on materials.

Observational behavioral data was collected before, during and after each lesson to evaluate to what degree students were exhibiting on or off task behaviors. We categorized each observational data point as follows:

1. Attentive to instruction/teacher (before).
2. Displayed on-task behaviors (during).
3. Participated in class discussion (after).

The way we measured the variability of observable behavior used words to describe concentration, attentiveness, on-task behaviors, and participation:

1. **A**=All of the time
2. **M**=Most of the time
3. **S**=Some of the time
4. **L** = Little of the time
5. **N**=None

Since one teacher instructs primary students ages 3-5 and another teacher instructs primary students ages 5-6, each lesson was targeted toward the overall primary age group inclusive of ages 3-6 with each objective remaining the same. Using the Behavioral Recording Sheet (See Appendix B) each lesson had its own separate data collected every day. Each sheet indicates what type of activity each lesson is: Small Group (less than 5 students), Large Group (5 or more students) or Alone (1 student). There was also a Comments section left blank at the end of each Sheet for any additional notes that the Researcher could include. This may have included disruptions to the lesson that were out of the teacher or environment's control such as an

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unplanned fire drill or a student getting sick and needing to be brought to the office and taken out of the lesson.

The first lesson focused on gardening activities: incorporating hands on materials to experience the lifecycle of how plants grow. For this lesson, we collected seeds, a pot, some soil, and a trowel. We would discuss the purpose of a seed and what the seed needed in order to make it grow (sunlight, water, fresh air). As a group (or together outside) the children would take turns scooping the dirt into the pot with a trowel. Next, other children would take some turns poking holes into the dirt with their finger to plant the seed. The seeds would now be planted into the holes of dirt and covered by the children. Finally, the children would take turns watering the plant. After this process, we discussed how often the plant would need watered and taken care of. Over the next week we would observe and see the process of the plant growing. Each new week we would plant something different, but still discuss the process of the life cycle of the plant.

The second lesson focused on observations of the weather and using observations to describe the weather on a graph. This lesson was conducted indoors as a group where the entire class sat in a circle. In Montessori terms, we refer to this group lesson period as “line time” where all of the students and the teacher sit at the edge of a circular shaped rug facing inwards. While line time is guided by the teacher, the students engage by asking questions after raising their hands to be called upon or sometimes participate collectively when prompted. For the weather observation lesson one student was chosen each time to look out the window and report back to the rest of the group. There were multiple jars on the windowsill. Each contained different substances that represented different types of weather including: sun, rain, snow and cloudy. The child who is selected to observe selects the jar that most closely represents what they

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observed and brings it back to the rug to share with the group. After a short conversation between the teacher and the student in question and answer form about why they chose this jar, the teacher opens the conversation to the group asking for others to comment on what they observe about the weather. Each day, a different child is selected to participate and thus every child in the class engages in this activity.

The third lesson was to collect natural items during a nature walk to create a story with sensorial engagement. For this lesson, the children and the guide were first prepared with attaching masking tape around their wrists to collect items for their story. The children and the guide would walk around outside and attach anything they could to their wrist surrounded by masking tape. After the walk was over, the children would come back together and receive a piece of construction paper and glue stick. The children would have the opportunity to create a story with their nature walk collections and present to their classmates.

A nature-based scavenger hunt was the final lesson. When we were outside the nature-based scavenger hunt included finding items outside that pertained to the natural world. When we were inside, the scavenger hunt looked a little different. We either had them find items based on the natural world, or we had a list of finding something: fuzzy, beautiful, smooth, round, rough, and different types of leaves. As a class, we would come back together and discuss the items that they found and why they chose to pick them or, or why they thought they were beautiful or fuzzy etc. After the lesson was completed, each student was invited to put their work in their personal cubby to bring home and share with their families.

Preliminary Report Findings

The purpose of this study was to attempt to use outdoor and nature-based education as a positive influence on students' behavior. The research design focused on changes in motivation and concentration measured by observing the students' behavior before, during and after lessons were given as well as their own evaluation of the experiences.

The subjects for this study were Primary aged students in Montessori classrooms that included both boys and girls. The two schools were located in Laramie, Wyoming and Denver, Colorado. A total of two classrooms were observed, evaluated and surveyed. A total of 22 students participated as well as their parents. Eleven students were male, and eleven students were female (See Table 1).

Data Analysis

Tally Sheets. The on-task behavioral observations were recorded as raw data on Tally Sheets (See Appendix A) for four different lessons. Observational data was collected before, during and after each lesson to evaluate to what degree students were exhibiting on or off task behaviors. The information observed and recorded was used to determine if the outdoor learning experience influenced a positive behavioral change for students. The raw data was quantitative in that we dictated the on-task behavior to be categorized as "all the time," "most of the time," "some of the time," "little of the time," and "none." The results were documented in the form of a spreadsheet with the culmination of all behavior throughout the entire study for each lesson.

Anecdotal Observations. The raw data collected was collected on Anecdotal Observations sheets (See Appendix B) with individual notes on each child. The observational

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data was collected before, during and after the outdoor or nature-based lessons were given to record any unusual behavior, unforeseen changes in schedule or abnormal circumstances. The data was recorded with commentary on each student's overall behavior throughout the day with multiple lessons. The raw data was qualitative by nature of the written descriptions.

Attitude Assessment. Evaluation of students' behavior followed the lessons in the form of pre and post Attitude Assessments (See Appendix C). The students were interviewed individually to determine whether their attitude toward learning changed in a positively and negatively, or in no way at all. The data collected in these assessments was qualitative and an indicator of the student's perception of their own behavior to compare with the researcher's perception of the student's behavior. This raw data was also qualitative by nature of transcribed conversations with each student with the exception of one question that warranted a "yes" or "no" answer.

Parent Surveys. Students chosen to participate in this study showed signs of difficulty with concentration and motivation in the classroom. There was a total of 11 girls and 11 boys chosen for this study because of their lack of concentration and motivation in the classroom. These students were chosen based on parental permission and willingness to participate. Each parent completed the same survey (See Appendix D) before and after the data collection period. The survey was designed to gauge student's time spent outdoors outside of school and in what capacity. Knowledge of which activities and level of interest in being outdoors was used to determine the possible effect of learning outdoors or interacting with nature-based materials. This data was analyzed by comparing the two sets of surveys to determine which answers changed and how so.

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This research study consisted of twenty elementary-aged students ranging in ages 3-6. A total of 11 boys and 11 girls were chosen to participate in this research based on parental permission and willingness to participate. See Table 1 for breakdown of student demographics per age.

Table 1
Student Demographics

<u>Age</u>	<u>Male</u>	<u>Female</u>
3	3	3
4	2	3
5	4	4
6	2	1

Effects on Motivation

The first research question addressed the extent to which motivation was affected by outdoor education activities being incorporated into the classroom curriculum. Anecdotal and behavioral observations were used to record changes in behavior by the researchers before, during and after each lesson.

Effects on Concentration

The second research question focused on the extent to which concentration was affected by outdoor education activities being incorporated into the classroom curriculum. Anecdotal and behavioral observations were used to record changes in behavior by the researchers before, during and after each lesson.

Effects on Health and Well Being

The third research question focused on the extent to which the children's wellbeing was affected by outdoor education activities being incorporated into the classroom curriculum. The

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students were interviewed at the end of each day to evaluate how they felt after experiencing lessons outdoors or with nature materials.

Table 2
Attitude Assessments

<u>Week</u>	<u>Yes</u>	<u>No</u>	<u>%</u>
1	20	2	90.9
4	22	0	100

Each student was individually interviewed at the end of the first and last weeks of data collection. They were asked, “*Does having the option to work outside make you want to work harder?*” (See Appendix C).

Based on the findings of this Attitude Assessment, the students unanimously agreed that having the option to work outside motivated them to work harder. The results gathered from week 1 and week 4 showed an increase from 90.9% to 100% (See Table 2). There were several other questions that evaluated how the students felt about their outdoor experiences, but we felt that this question most clearly defined an increase in motivation.

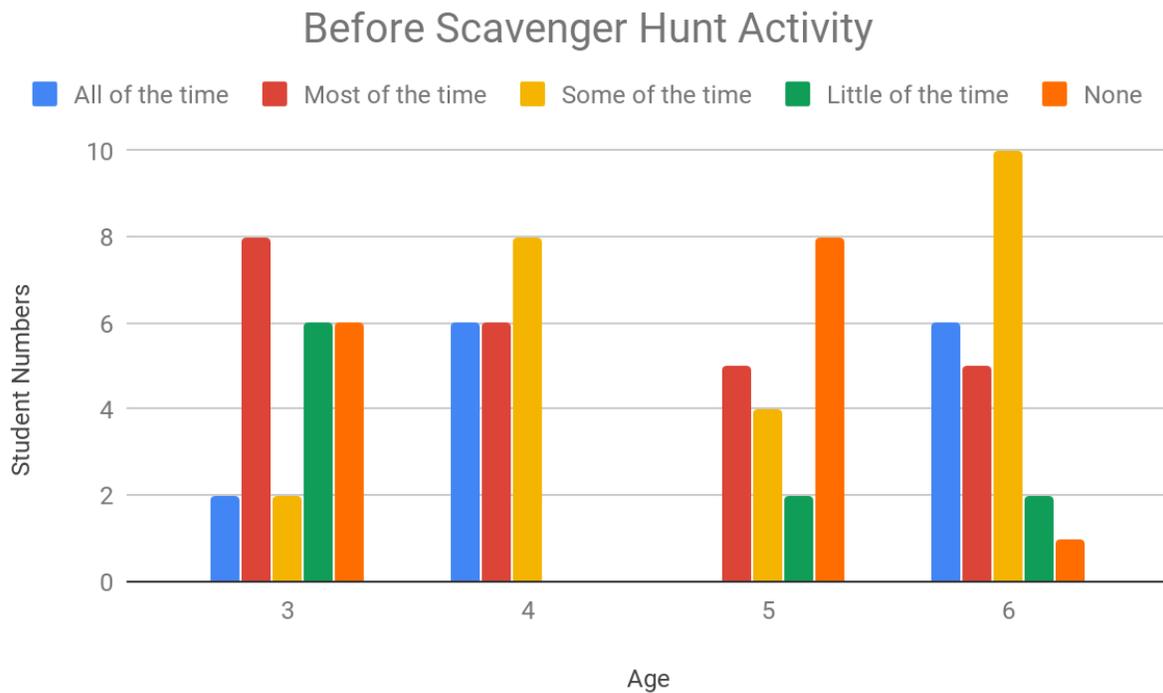


Figure 1A. Observations of on-task behaviors conducted before scavenger hunt lesson.

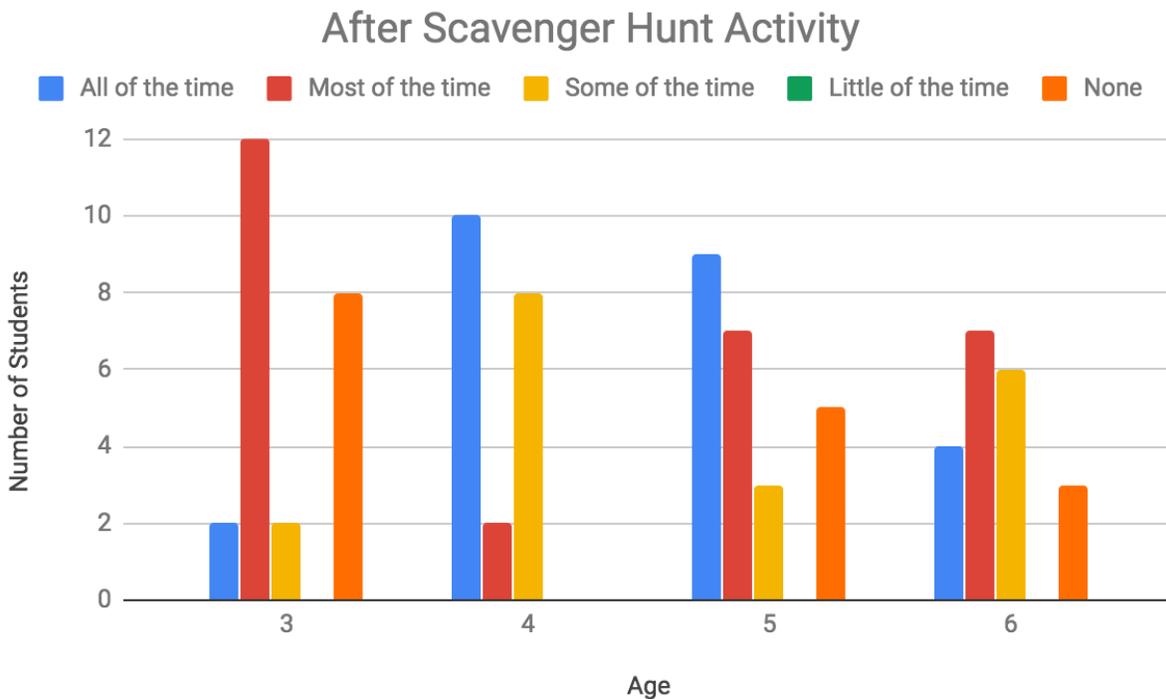


Figure 1B. Observations of on-task behaviors conducted after scavenger hunt lesson.

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Table 3

On-task behavior for All or Most of the Time for all Primary Students

Before	During	After
43.2%	71.6%	60.2%

Based on the findings for the on-task behaviors for Data Figures 1A, 1B, and Table 3, the results showed highest percentage during the lesson being given at 71.6%. The findings were based off of the Tally Sheets (See Appendix B) that coded the behavior. Figures 1A and 1B show that more on-task behaviors were displayed between the 3, 4 and 5-year-olds after the Scavenger Hunt lesson. There was a lesser amount of change for the 6-year-olds in behavior for before and after the activity. Table 3 depicts a 28.4% increase in behavior from before the lesson started as well as an 11.4% decrease after the activity.

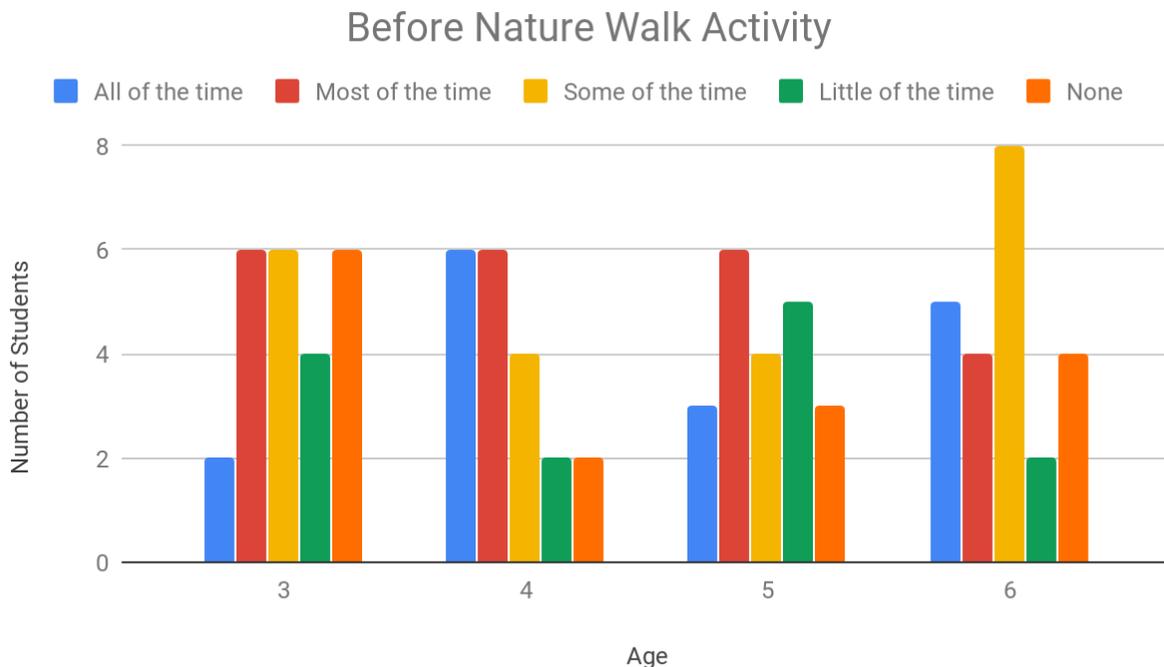


Figure 2A. Observations of on-task behaviors conducted before nature walk lesson.

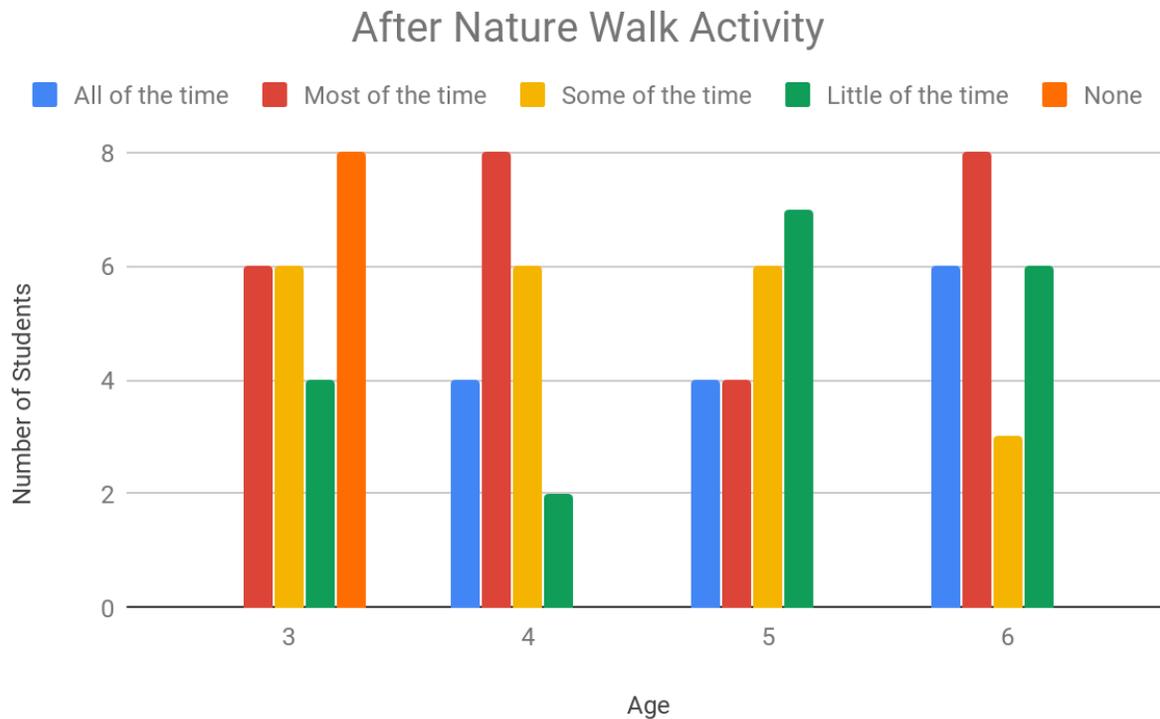


Figure 2B. Observations of on-task behaviors conducted after nature walk lesson.

Table 4

On-task behavior for All or Most of the Time for all Primary Students

Before	During	After
43.2%	55.6%	45.5%

Based on the findings for the on-task behaviors for Data Figures 2A, 2B, and Table 4, the results showed highest percentage during the lesson being given at 55.6%. The findings were also based off of the Tally Sheets that coded the behavior. Figures 2A and 2B show that more on-task behaviors were displayed between the 3, 4 and 5-year-olds after the Nature Walk lesson. There were more notable changes for the 6-year-olds in behavior before and after the activity. Table 4 shows a 12.4% increase in behavior from before the lesson started as well as an 10.1% decrease after the activity.

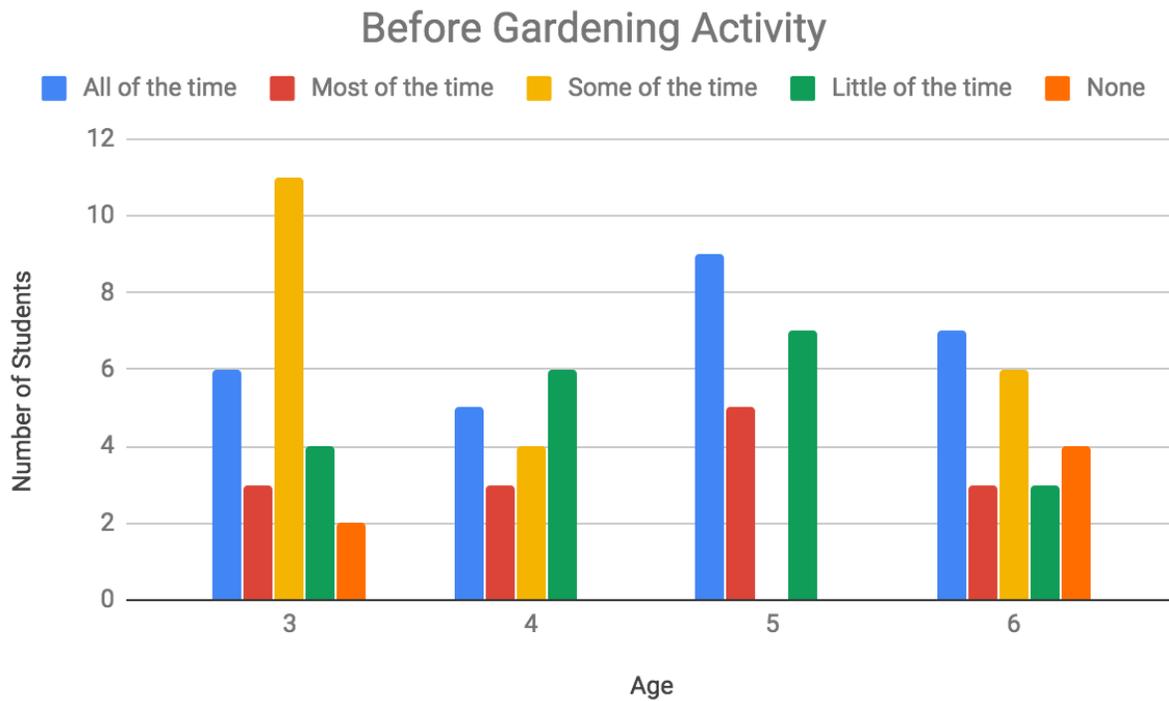


Figure 3A. Observations of on-task behaviors conducted before gardening lesson

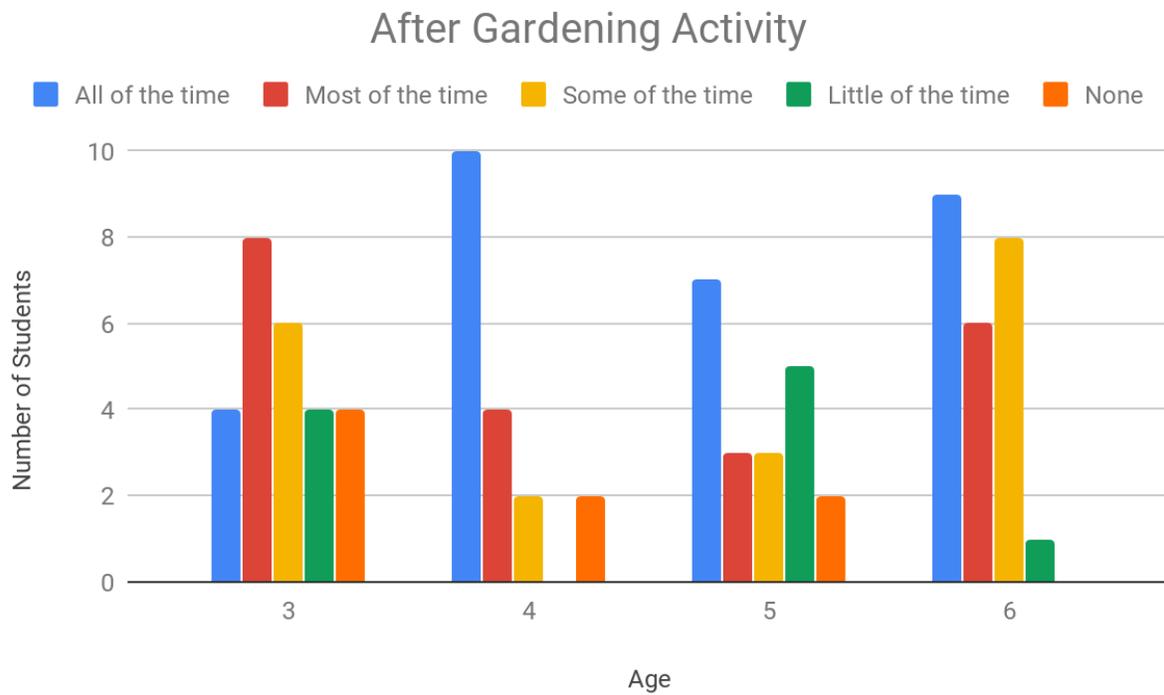


Figure 3B. Observations of on-task behaviors conducted after gardening lesson

Table 5
On-task behavior for All or Most of the Time for all Primary Students

Before	During	After
46.6%	65.9%	57.9%

Based on the findings for the on-task behaviors for Data Figures 3A, 3B, and Table 5, the results showed highest percentage during the lesson being given at 65.9%. The findings were again based off of the Tally Sheets that coded the behavior. Figures 3A and 3B show that more on-task behaviors were displayed between the 4, 5 and 6-year-olds after the Gardening activity. There were increases with the behavior from all or most of the time with the 4, 5 and 6-year-olds as well. The 3-year-olds behavior changed significantly from before to after the activity with a 11.3% increase. Table 5 shows a 19.3% increase in behavior from before the lesson started as well as an 8.0% decrease after the activity.

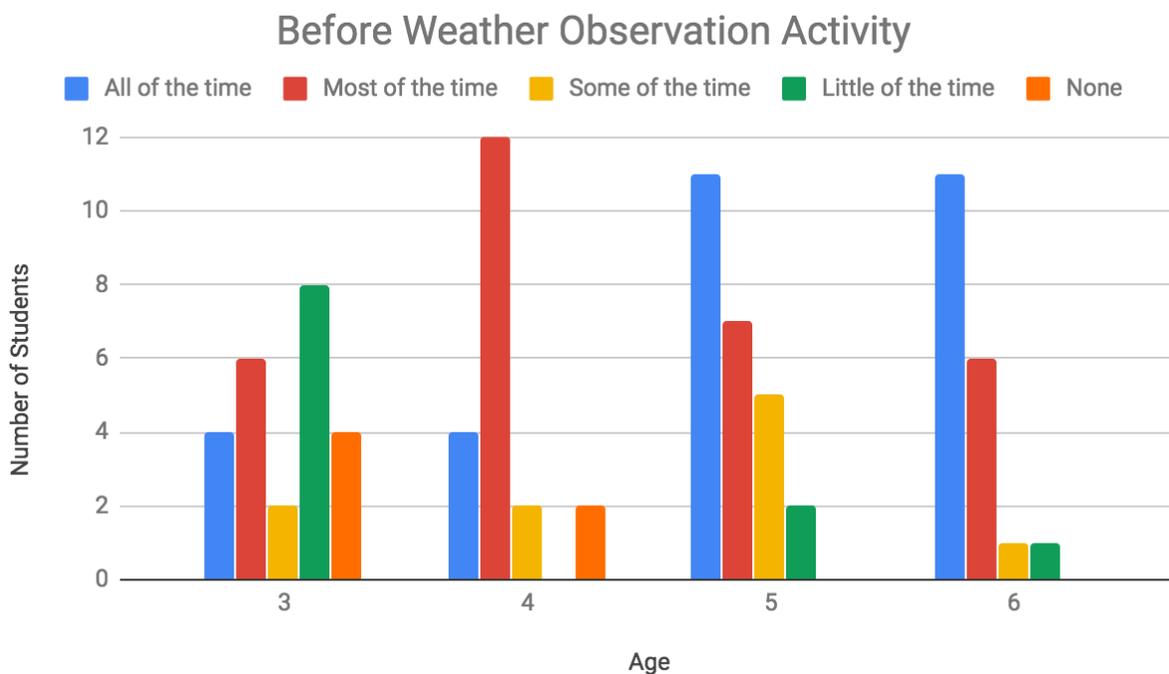


Figure 4A. Observations of on-task behaviors conducted before weather observation activity.

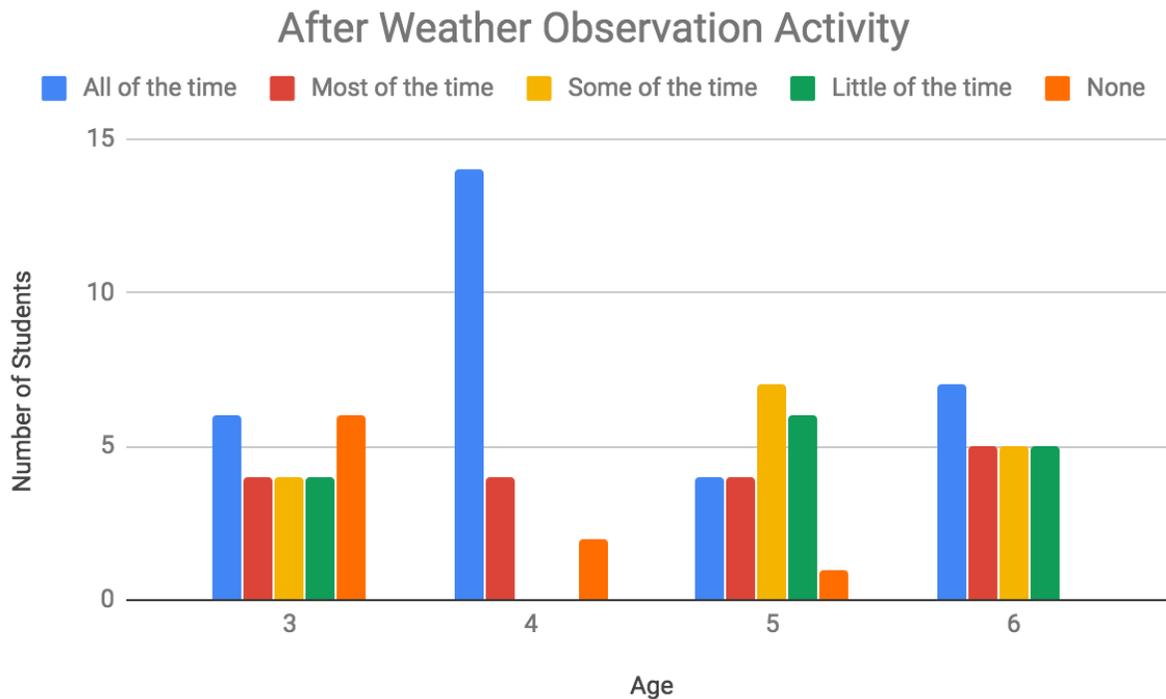


Figure 4B. Observations of on-task behaviors conducted after weather observation activity.

Table 6

On-task behavior for All or Most of the Time for all Primary Students

Before	During	After
69.3%	65.9%	54.5%

Based on the findings for the on-task behaviors for Data Figures 4A, 4B, and Table 6 the results showed highest percentage before the lesson was given at 69.3%. The Weather Observation lesson was the only activity that yielded these results as the other three lessons showed the highest percentage of on-task behavior during the lesson. This lesson was the least participatory as only one student would be chosen at a time to respond to questions about the weather, whereas the other three lessons involved equal involvement of all students in a group lesson setting.

Table 7
Parent Assessments

<u>Week</u>	<u>30 min or less</u>	<u>30-60 min</u>	<u>60+ min</u>
1	3	3	16
4	0	10	12

Each student’s parents were surveyed at the end of the first and last weeks of data collection.

They were asked, “*About how much time does your child spend outside during the week (not counting school time)?*” and given the option to select from answers: “*30 min or less,*” “*30-60 min*” or “*60+ min*” (See Appendix D). There was an increase of time spent outside overall for all of the students. The selection of “*30-60 min*” increased from 3 to 10 students and while the selection of “*60+ min*” changed from 16 to 12 students, the selection of “*30 min or less*” decreased from 3 to 0 students.

Findings Based on Existing Research

Montessori Teacher Kelly Johnson discussed the importance of disconnection realization as an educator stating that “one of the most important roles of a Montessori teacher (and, coincidentally, of a gardener) is that of observer” (Johnson, 2013, p. 38). Motivation can be an important factor for academic success and some studies in outdoor education settings have already analyzed motivational aspects of short-term interventions (Becker, et al., p.15). Johnson (2013) recalls that “through experience, I discovered the added bonus that nature drawing focused the students’ attention, increased observation, and contributed to relaxation in our garden and on nature outings. And this peace seemed to accompany us back indoors” (p. 39). As Montessori educators, we are encouraged to follow the child and learn how to help them help themselves through observing their behavior.

Johnson (2013) describes her experience stating that “Gardening and other outdoor

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learning activities have engendered great camaraderie and enthusiasm among my students, while also kindling a connection to the wild world of nature, right outside our classroom door” (p. 39). Johnson goes on to expand on relationships of her students with each other and her relationship as a teacher with her students enhancing through outdoor education experiences. She says, “Exploring the natural world with children, even in more controlled natural areas such as gardens and school yards, equalizes the established roles of teacher and learner. We all become learners in the garden. No matter how controlled an environment is, the wilds of nature abound” (Johnson, 2013, p. 39). Lastly, Johnson states her support for a school garden as it “offers opportunities for the absorption of these ideas easily and experientially” (p. 40).

According to Gilder, “nature retunes the body and mind for greater learning and curiosity” (p. 35). “In the same manner, White and Stoecklin (1998) described the ideal outdoor environment by emphasizing the importance of unstructured experiences with the elements of the nature rather than structured experiences. Then, many other researchers also gave high priority to natural elements in outdoors for young children” (Yilmaz, p. 427). Our interest in using a lesson on gardening is to incorporate the sensorial hands-on learning for the children to experience. In a study by Webb, “gardening lessons were designed to give students the opportunity to use the purposeful movement of preparing and planting a garden to see if this experience would foster more focus and concentration in the classroom” (p.4). Webb also mentioned from their study that, “in gardening, you are creating a final “product” (growing plants), not just observing nature” (p. 26). Students who struggle to learn indoor classroom settings can gain the most through outdoor learning experiences. We achieved similar or supporting results in conclusion to our studies with a focus on primary aged Montessori students and their outdoor education.

Conclusion

Based on the findings of this study, there are positive effects after students are introduced

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to nature-based materials and learning in an outdoor setting. On average, there was a 14.2% increase comparing on-task behavior during an outdoor lesson to before the lesson. This same average, 10.2%, holds true when comparing on-task behavior during an outdoor lesson to after the lesson. Students are more likely to exhibit on-task behaviors during outdoor lessons than before or after, with the exception of the Weather Observation lesson. In this particular case, the lesson yielded higher percentages of on-task behaviors before the lesson was given at 69.3% compared to a 65.9% during and a 55.4% after the lesson. For this lesson one student responded to questions about the weather, whereas the other three lessons involved equal involvement of all students in a group lesson setting.

In conclusion, students were more engaged and less likely to display off-task behaviors during lessons occurring outdoors. Research by Bjorge, et. al (2017) concurs with our findings in that outdoor learning can increase student motivation to learn and build confidence, which in turn, can improve student's on-task behavior. Through the Attitude Assessment, we discovered students were more apt to have an overall better attitude after being exposed to the outdoors. The students unanimously agreed that having the option to work outside motivated them to work harder. The results gathered from week 1 and week 4 showed a 9.1% increase in an interest and motivation to work outside. Our Literature Review supports our findings as according to Lieberman and Hoody's (1998) study, benefits of learning outdoors include academic achievement, reduced classroom management problems, and more importantly, increased enthusiasm for learning.

Recommendations

This research was conducted during the colder winter months in climates that challenged the ability to give lessons outdoors. While we were able to adjust to the conditions in our

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classrooms, further research conducted during warmer seasons would help to evaluate more time spent outdoors throughout the day. It would be insightful to expand on the research outside of the school day, particularly what outdoor activities students are participating in outdoors outside of school. Additionally, research could be conducted in different regions, states or even countries to seek whether geographical location also has a positive impact associated with outdoor learning. We agree with Bjorge, et. al (2017) that collaboration on past and new ideas for future outdoor learning activities is beneficial to continue across all grades. Cross collaboration between different age groups involving outdoor education lessons could expand the research of existing studies.

In our study, we came across certain uncontrollable and unforeseeable obstacles that we would take into consideration with future research. For example, we had several absences of students ranging from missing just one lesson, one day or multiple days of school. There were also interruptions to lessons that were not planned (i.e. a fire drill) that may have altered the concentration and motivational behavior of our students. For additional supporting data to our research we would recommend conducting a similar study during warmer seasons such as Fall or Spring.

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Appendix A

Anecdotal Observation (2 minutes each child):

Date: _____

Lessons: _____

<i>Look, Listen, and Note</i>	<i>Look, Listen, and Note</i>
Name:	Name:
Observed:	Observed:

Appendix B

Behavioral Recording Sheet:

Date: _____ Lesson: _____ Time: _____

Type of Activity (circle one): Small Group (<5) Large Group (5+) Alone (1)

Student Name	Attentive to instruction/teacher (before)	Displayed on-task behaviors (during)	Participated in class discussion (after)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

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- 41-50 years old
- 51-60+ years old

Child's age

- 3 years old
- 4 years old
- 5 years old
- 6 years old

About how much time does your child spend outside during the week? (not counting school time)

- 30 minutes or less
- 30-60 minutes
- more than one hour

Where does your child prefer to spend their free time?

- indoors outdoors

When indoors, what does your child prefer to do? (check all that apply)

- read
- watch tv
- play computer or video games
- play board or card games
- play with toys

When outdoors, what does your child like to do? (check all that apply)

- running
- biking
- play yard games

- playing sports games
- gardening/yard work
- playground
- just playing

Do you belong to any community groups? (check all that apply)

- community center
- 4H
- after school educational programs
- Boys & Girls Club
- Youth Groups (i.e. church)
- sport or team activities
- other

In the last year, have you visited... (check all that apply)

- local zoo
- local park(s)
- museum(s)
- library