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Teaching Outside To Engage Student Learning

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TEACHING OUTSIDE TO ENGAGE STUDENT LEARNING

by

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

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CHAPTER ONE

Introduction

I have been a teacher for many years, and I am always looking for ways to increase student learning. I know that not every student learns in the same way or in the same environment. This chapter will introduce my research question and information about why it is important to me. I will share stories of how I first became interested in learning outdoors and teaching in the outdoors.

With information about my experiences in the education structure I will explore some of the problems I have noticed with students in a special education setting. I will discuss some possible areas that are related to my research topic area. When complete I hope to answer the question: Does teaching academic subjects outdoors help Level IV special education students with increased attention, active engagement, and decreased negative behaviors?

My Outdoor Experience

I grew up going to daycare on a farm at an age that most children are put into preschools now. While on the farm each day, I had plenty of time for exploring and playing; there was also expectations to learn how to read and do math. Many days after lunch all of the kids would go outside to the barn with two books each. Often we would find a comfortable hay bale, the closer to the kittens the better, and look at or read books. In the summer the older kids would read out loud to the younger kids. We would also need to learn to count the eggs that were being collected or count how many bales of hay
were in the barn. Often the tasks we were given were not necessary for the farm but educational for us kids. When reaching first grade most of us were well ahead of others in the class because of what we learned outdoors on the farm.

The most meaningful experience I had learning outdoors came later when I was getting close to the end of my elementary years. Our fifth grade class took a trip to Long Lake Conservation Camp in Northern Minnesota. Our adventure consisted of four days and three nights at this camp. We did several activities outside that focused on standards that we needed to learn in fifth grade. I am not able to tell you what we were expected to learn on that trip, but I can tell you that I could not wait for each class. We also got to do fun things outdoors between learning sessions. My favorite memory is canoeing across the lake when we soon found ourselves too far to get back on time with my canoe partner not knowing how to steer the canoe. We worked together to figure out how to get back, which helped us both work on communication skills, reasoning, and a lot of patience. At least we got the most improved canoeing award.

In eighth grade I had another opportunity for a class that did part of our learning outdoors. We spent every day for 6 weeks observing trees and journaling. We learned to be observant, how to sketch our observation, and describe what we saw. The skill we learned outdoors easily transferred to our other academic subjects and made us better students.

**Educational Background**

I went to a public school that offered many opportunities to be outside. I believe that these experiences helped me overcome some of the things that were difficult for me in the regular learning environment. I was not the best student and found reading very
difficult. With the skills I developed I applied and was admitted to college. I attended St. Cloud State University where I got my undergraduate degree in special education. As part of my undergraduate program I did my student teaching in India. This very different educational experience gave me a new look on how not all education needs to be the same to be successful. It was in an all special education school where the focus was on academics with a balance of time outdoors. Students were given learning activities to do outside while at school and learning how to play a game of cricket was just as important as learning how to read and do math.

My first experience as a licensed special education teacher was in a school with many students who did not speak much English. The students I worked with both had special education needs as well as being English language learners. My most successful lessons in both reading and math were outside while being active. One activity that seemed to make a big difference in my students learning sight words was when we all put on hiking packs, safari hats, and brought hiking sticks and we went on a word hike. Once outside students had to hike around until they found a word, then we did direct instruction on that sight word and took it with us. Later in the week, when we assessed what words were learned that week, all students got the sight words from the hike correct while other words were less consistent.

My second teaching job was at an Elementary school that encouraged teachers to take students outside for lessons. They had a school naturalist that each class had time with once a week and a School Forest. This was the first time I was introduced to the concept of a “School Forest”. The program was well developed and I was able to take
my special education students out with the mainstream classes. My students felt included and were able to participate in academic lessons in the outdoors.

For the last nine years I have taught at a Level IV Special Education Setting, this means that the students are all identified as needing special education services their entire school day in a separate building away from mainstream students. I have worked with students both indoors and outdoors for teaching lessons. In the last four years I have developed an outdoor classroom, a school forest, protocol for taking students outside, and conducted many lessons in Language Arts, Math, Social Skills, and Science outdoors. To improve my ability to teach outdoors I have become a Master Naturalist and been trained to use Project Learning Tree, Project Wet, and Project Wild. I feel that teaching outdoors is helpful to all students including special education students.

**My Concerns**

While I have had great success teaching outdoors, there are still many students who do not receive this benefit. Many teachers are reluctant to take students outdoors because they feel that their behaviors are not controlled indoors in the classroom with four walls and it will be harder to keep them with the class outdoors. In the school I am at now we have a lot of students who leave the classroom for many different reasons and keeping them in the classroom is one of the biggest challenges. Some of these reasons might include: instruction being too difficult; environment concerns such as the smell, lighting, feeling crowded, and too hot or cold; not being able to sit still or needing to move around; having missed too much learning from attendance issues; or not being able to pay attention for long periods of time.
In a Level IV school, teachers do not use traditional teaching methods and have to find creative ways to meet the student’s educational and emotional needs. There are many academic and emotional issues for these students that inhibit their learning. Most of the students in this school have high behavior issues due to mental illness, Emotional Behavior Disorders (EBD), Specific Learning Disorders (SLD), Autism Spectrum Disorder (ASD), and Other Health Disabilities (OHD). Attendance is an issue for a high percentage of these students either because of truancy, treatment, hospital admittance, or incarceration. When students are in school, they often feel lost and do not understand the information being given to them, while they have also missed important prerequisite skills for a traditional scope and sequence of learning. Hands on, active learning helps keep them in class and engaged in their education when they are at school and teaching outside may be a better environment for them.

Capstone Topic

My research question: Does teaching academic subjects outdoors help Level IV special education students with increased attention, active engagement, and decreased negative behaviors? Research has shown that children spend a significantly less amount of time outside now than they did during the 19th century with many children spending less than 30 minutes a week. Studies have been conducted of outdoor education programs geared towards troubled youth indicating that time spent outside interacting with nature shows a therapeutic value especially those diagnosed with mental health problems (Triguero-Mas, et al, 2015; Bialeschki, 1981). Nature-based therapy has been a topic of increased interest that is being applied in some special education schools.
Andrea Taylor and Frances E. Kuo from the University of Illinois discovered that you children showed a significant reduction of Attention Deficit Disorder (ADD) symptoms when they were engaged with nature (Taylor & Kuo, 2009). There has also been a national effort to study environment-based education and some believe that teaching outdoors combined with other teaching strategies can increase student learning in social studies, science, language arts, and math while also enhancing problem-solving, critical thinking, and decision making (Eick, 2011).

There has also been a lot of development in using experiential learning with struggling or at risk youth. Meaningful outdoor experiences that are nature-based and experiential have increased students’ social and academic achievements (Peterson, 2011). Helping students to build positive self-esteem can help them be ready to learn and improve their mental health status.

I will be working with teachers in the level IV special education setting to teach a variety of academic topics outside to determine if it will increase the amount of time that students are with the class.

Summary

I have had many outdoor experiences that have taught me the importance of being outside. I hope that engaging other teachers and students to outdoor learning activities they will also feel that outdoor educational experiences is worth spending time doing. In chapter two I will focus on literature review in the area of outdoor teaching and learning. Chapter three will describe my research methods and how I will analyze the data collected. I will share my results in Chapter four including interpreting the results. The
final Chapter will reflect on the research and discuss topics that could be done related to the results that were gathered.
CHAPTER TWO

Literature Review

Does teaching academic subjects outdoors help Level IV special education students with increased attention, active engagement, and decreased negative behaviors?

In this chapter I will be focusing on five components; Traits of outdoor education, Effects of Nature/Natural systems on student learning, Nature-based Therapy, Experiential Learning, and Types of learning styles most common in Special Education.

Outdoor education is the main topic of this capstone question as it will involve taking students outdoors to teach science, language arts, math, social skills, and community involvement using an outdoor classroom, school forest, and field trips. It is also important to understand why it may be beneficial to take students out to a natural setting and how it will impact their learning, attention, physical well-being, mental health, and behaviors.

We will look at how nature-based therapy and experiential learning can and have been used in previous research. Then, since this research is taking place in a special education level IV setting, we will review some of the different learning styles and learning types in special education.

Traits of Outdoor Education

Outdoor education can be seen as either a topic in which natural sciences are taught or as a place where education is taught outdoors. In this section of the literature review, four different aspects of outdoor education will be addressed: Teaching the
Natural Sciences, Integrated education that includes Language Arts and Math, use of an Outdoor Classroom or School Forest, and the last, using Field Trips.

**Teaching science.** There are many different types of science that students are taught in school. The Next Generation Science Standards (NGSS) has identified the four domains of science as Physical Science, Life Science, Earth and Space Science, and Engineering (Next Generation Science Standards For States, by States, n.d.). While there are many standards within each of the four domains that cannot be taught outside, there are a vast majority of them that can.

Another term that has been used for outdoor education is the Natural Sciences; often this is referring to Environmental Education. The Environmental Protection Agency (EPA) stated the following definition:

Environmental education is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions. (2015)

Environmental Education cannot be taught in isolation and is in all four domains of the Next Generation Science Standards. It is also important for students to have direct experiences with what they are learning about, and there is no other subject that lends itself to being taught outside.

Duane Keown conducted a survey in 1984 of 1,702 secondary science teachers in the subjects of biology, earth science, and environmental science about their use of the outdoors in their teaching. The survey asked what areas of natural science were taught by these respondents and it included biology, earth science, environmental science, botany,
zoology, and geology. When asked how many of those teachers taught at least one lesson outside a year 85.5% responded that they did and 23% stated that they use the outdoors regularly. 69% of the outdoor science lessons took place on school grounds or within walking distance (Keown, 2015).

Olivia Griset, a high school teacher, was able to get the administration’s support to have a semester long field ecology course and to be able to take that class outdoors on a regular basis. Through three units her students used science inquiry and field investigation about natural systems. They learned how to collect data, communicate results, and notice differences. Students in her class also looked at how human behavior influences the environment, which allowed them to also identify environmental issues and trends. The fieldwork took the students out in the community, which requires support from both parents, staff, administration, and the community. Griset found that this type of class helped students of all abilities be engaged and learn, especially since 50% of their grade was based on the work they did outside (Griset 2010).

In an interview with Audri Smith (personal communication, 4/10/16), who took a similar class in High School, Minnesota Ecology and Field Biology, she stated that taking this class was the best class of the school year. Audri has both a learning disability as well as Attention Deficit Disorder. She struggled in most of her classes to get the work done and turned in. They would go outside one to two times a week to work on collecting data and do science activities outside. Audri still had homework expectations along with the regular education students, however she stated that the work could be done outside. This made it more of interest to her, so she didn’t have as many late assignments. The class covered birds and mammals in Minnesota, botany, forestry,
geology, and environmental issues. They were all topics that were important in the students’ lives and would give them a sense of understanding in their own environment (Smith, personal communication 4/10/16).

Just as Griset’s students and Smith’s personal experience implied, environmental education tends to be a subject that students in special education are able to do well in despite their disabilities. Many of the methods used to teach outdoors are hands on activities of making observations, collecting data, and learning how to interpret the environment around them. The typical skills that special education students struggle with are still part of the class, however the focus is on developing an understanding of the environment.

Outdoor experiences are also very engaging for students. Many students are motivated by being able to be outdoors and away from the traditional styles of learning; students are using math and language arts skills without realizing it. When they are observing, measuring, drawing, classifying, predicting, and inferring, it is all part of what they are doing outside—learning science through inquiry.

**Integrated academic subjects.** Outdoor education is not limited to science. You can meet standards in both math and language arts with activities outdoors (Eick, 2011). More importantly, you can also work on life skills that all students need such as social skills, independence, emotional regulation (Wilson, 1994), community involvement, and leadership (Mixon-Brookshire, 2012). Many teachers feel that they do not have enough time to take students outside because they have a large list of standards that they need to teach. The pressure from administration and parents to prepare students to do well on
standardized testing has many feeling overwhelmed. One creative way that some teachers have become addressed this challenge is to have an integrated program.

Integrated programs generally work to break down traditional boundaries between disciplines (Drake, 1998). An example of a program in British Columbia, Canada was discussed at great length in the article titled “The Development and Implementation of Outdoor-Based Secondary School Integrated Programs” (Comishin et al., 2004). This program focused on four or five subjects that are taught together, based on the teachers’ expertise and qualification. A class may focus on physical education, leadership, environmental science, geography, English, and cooperative education. The greatest emphasis would be on the outdoor experiential education, which are full days spent with one group of peers and one to two teachers for a full semester or school year. Several field trips would be involved as part of the semester.

A third grade teacher in Southeastern United States used the school’s outdoor classroom and nature study to connect her science and language arts curriculum (Eick, 2011). She had a goal to take her students outdoors as often as she could for activities such as studying the life cycle of butterflies and the life cycle of plants and how they depend on each other. Using the outdoor classroom on regular basis also gave real world connection to weather. Students could observe and record weather data, monitor phenological events such as monarch migration, and experience for themselves what the different types of weather were like and how to prepare for them.

Both of these schools felt that their outdoor activities were not separate or additional to their teaching but rather fundamentally linked to student Learning (Comishin et al., 2004; Eick, 2001) In the Elementary setting, there was a lot of support
from administrators and other teachers who then also took their students outside at times (Eick, 2001). Whereas, the secondary program found themselves regularly justifying the integrated program to colleagues and administrators (Comishin et al., 2004). There are other obstacles to an integrated program, such as funding constraints, time constraints, liability and risk management, proper certification, and inadequate skills. Many of the activities required additional trainings such as wilderness first aid, swimming, paddling, and CPR certifications (Comishin et al., 2004). There is a limited pool of qualified teachers for these programs due to the need for experiential pedagogy and outdoor skills.

The Integrated Program in Canada had a vision and a purpose and the four teachers shared a passion for developing the program. The significant challenges in program development are helping them turn it into a reality with a belief that their programs will have lasting impacts on their students (Comishin et al., 2004). Susan was already seeing the impact that the program in Canada was hoping for (Eick, 2011). The students were having inquiry-based experience in nature using their reading and math skills. The students met literacy goals because of the research process of reading, outdoor inquiry, and writing conducted by scientists and naturalists, which mirrored the skills they learned in language arts (Eick, 2011).

The integrated format that Susan used was outlined in an article titled *Outdoor Integration* written by Shawna Tatarchuk and Charles Eick. There were three examples of units that could be used including seeds, butterflies, and stream health. Students begin the science unit by reading a story or science article to engage them in the natural science topic. Students curiosity and interest in the topic motivated them to use language arts skills like finding main ideas, locating supporting details, inference, making predictions,
and drawing conclusions. You will notice that these are skills that are needed in science. Then students are taken outdoors on trails, woods, playground, gardens, or even just a grassy area to apply the concepts they learned about indoors. After they are finished with their outdoor inquiries, they return to process their learning through many different styles of writing. Tatarchuk and Eick believe that learning reading skills in the context of science and ecology will uniformly improve student reading (2011).

**Outdoor classroom/school forest.** The terms “outdoor classroom” and “school forest” seem to get used interchangeably. While there are many different possibilities of both, Minnesota has an official School Forest Program through the Minnesota Department of Natural Resources (DNR). They define a school forest as an outdoor classroom that allows students to learn a variety of subjects while addressing academic standards (DNR, 2016). Their program is a partnership with the schools, allowing Minnesota School Forests to have access to resources, training, and support available through the DNR. The Forest School approach in the United Kingdom offers children, young people, and adults regular opportunities to achieve and develop confidence and self-esteem through hands on learning experience in a woodland environment (O’Brien, 2009).

While there are great school forest programs in many states and countries, any outdoor space can be considered an outdoor classroom no matter what the size. Right now there is a trend to cut recess time in order to teach all the standards that will be on the high stakes tests. Teachers do not have time to directly teach everything they are expected to teach. One movement that doesn’t ignore standards and education, but rather weaves the standards with places and meanings, is teaching in an outdoor classroom.
(Weise 2012). Students need to be taught how to learn and how to question things around them. Being given facts and packaged information does not teach them how to learn. One of many benefits to using an outdoor classroom is students are learning how to question, investigate, read maps, use a compass, plan a route, choose a team, develop motor skills, increase social and cognitive development and many more benefits (Hemery, 2010; Malone & Tranter, 2003; Weise, 2012). One of the largest benefits of an outdoor classroom is that it can be explored by children outside school time and they will have access to real-life natural experience.

There are several factors that go into deciding where and when to have access to a school forest: time, money, space, training, administration support, transportation, and location. Many schools start with a small section and make it into a garden; others decide to develop a large structure to be used. There are also many places to find support. The Brandywine Valley Association developed the Watershed Learning Center to help teachers to learn how to access and teach outdoors at their school (Kenny, Militana, & Donohue, 2003). They helped develop outdoor, activity-based environmental lessons for teachers and students on site at their public school or within walking distance of their schools. The students enjoyed being outside, observing, and using their senses. Teachers were able to see different learning styles that students have and also see students use higher level thinking skills (Kenny, Militana, & Donohue, 2003)

While we want to develop a generation who will look at changing the damage previous generations have done to the planet, we first need to connect the students to the environment. Students need to have a sense of place and a reason to care about the environment. If we start telling them about oil spills, extinction, and global warming at
too early an age, we may have the opposite effect, and they may feel like there is no reason to care about the environment because they believe it will all end soon anyway (Weise, 2012). Once they are connected to a place, we can introduce them to small topics that they can make a difference on; instead of talking about saving the rainforest, a teacher can create a project to clean up a pond, field, woods, or river near the school that the students can be proud of and then can care about (Weise, 2012).

Once students see their outdoor classroom as a place of doing, thinking, feeling, and being, it will be natural for them to care about it. If you are able to design an area for your outdoor classroom, it could include natural landscapes, animals, ponds, places to sit, shade, and other natural things to play on; these all indicate a place for fun that students can enjoy. (Malone & Tanter, 2003). Student of all ages can help in conservation and restoration of wildlife habitat; a few ideas could include a butterfly garden, rock garden, bat boxes, nature trails, nesting boxes, or bird feeding stations (Haines 2006). Not all schools have an area that can be made into an outdoor classroom, so teachers can also consider an area within walking distance of their school.

Field trips. There are many aspects of outdoor education that you will not have access to at your school. Finding field trips in your area or doing a larger extended field trip may meet your students’ needs and ability. Many teachers find the task of taking a field trip daunting, and they may not know enough about the topic or the place they are taking the students to feel comfortable planning them (Fisher, 2008). Getting students out in the natural world and into the elements will make an impact on your students that cannot be reached in other ways. Through field trips you can increase student knowledge,
promote social skills and community involvement, encourage leadership, and address social and environmental goals (Morag, Tal, & Rotem-Keren, 2013).

A study that looked at the benefits of a long-term environmental education program done by Morag, Tal, and Rotem-Keren (2013), which took place mostly outdoors. They found that the importance of educational activities were secondary only to its nature conservation mission, the activities put little emphasis on educational objectives. This is similar to the single day field trips where teachers are invited to take part during activities to help facilitate student learning. Students often have no idea what to do in a natural setting and are timid when it comes to participating in these outdoor field trips (Lord, 2008). The benefits of field trips in nature have been perceived for centuries as positive, healthy, and educational. Used as a form of experiential learning, it has enabled students to engage with real natural or sociological phenomena in a context that students can find relevant, while it also allows the instructor to bridge student learning (Morag, Tal, & Rotem-Keren, 2013).

**Effects of Nature on Student Learning**

Often teachers have to advocate for why they should take students outside. There are many benefits to being out in nature. According to Kevin Coyle from the National Wildlife Federation, “Kids benefit enormously from just one hour of unstructured outdoor play each day. While expanding their minds and imagination, their stress levels fall and they become better able to focus on specific tasks” (Lord, 2008, p.90). When today’s parents were young, they spent a lot of time outside and being stuck inside was more like a punishment. Now many youth would rather spend time alone with their technology, playing computer games, texting, and emailing friends rather than going
outside with those friends (Lord, 2008). Students are afraid to encounter things in nature and handle them, while the less active more sedate lifestyle of our students increases their health risks as well as their mental abilities.

Attention and cognition. Studies have shown that the general population consistently reports a sense of rejuvenation after spending time in a wilderness setting or other related natural environments. Your direct attention can become fatigued and then be restored by spending time in a restorative environment. This is known as Attention Restoration Theory (ART). ART was originally developed by environmental psychology to help explain why the general population reported a sense of rejuvenation after spending time in the natural environments or wilderness settings (Taylor & Kuo, 2009). There is no evidence that both adults and children perform better systematically on tasks that measure attention after they have spent time in or viewing nature (Taylor, Kuo, & Sullivan, 2002; Tennessen, Cimprich 1995). Another theory, Stress Reduction Theory (SRT), states that viewing nature scenes either in person or pictures will activate our parasympathetic nervous system in order to reduce stress because of our innate connection to the natural world (Ulrich, 1981).

According to Bartman, Daily, Levy, and Gross (2015), a 50 minute walk in nature increased verbal working memory. Verbal working memory is reliable as a predictor of complex cognitive functions that include advanced reasoning, problem solving, and reading comprehension (Bartman et al., 2015). Low-income girls 7 to 12 years of age who had natural views outside their window performed better on tasks involving concentration, inhibitory control, and delay of gratification than those who did not have a natural view (Taylor, Kuo, & Sullivan, 2002). Schutte et al. (2015) hypothesized that
younger children ages 8 and younger would also benefit from walking in nature. They found that children did better on tasks of attentional control; they also found that boys and preschoolers did better on tasks to measure spatial working memory (Schutte, 2015). So far we have only looked at general population for studies and how it helps them. However consider a child that has a developmental disorder, one type of this would be Attention Deficit Hyperactivity Disorder (ADHD).

Many teachers struggle to maintain the attention of all their students. It is especially challenging to gain the attention of students with ADHD during their academic school day. According to Barkley (1995), children with attention deficits perform substantially lower on tasks involving attention than same-age peers; however, at times their attention is good and sometimes excellent, indicating that their attention actually fluctuates and is inconsistent.

One of the earlier studies from Taylor, Kuo, and Sullivan (2001) was on the effects of green play setting for children with ADHD. They found that children function better after spending time engaged in green play activities, as well as the greener the play area the more beneficial it was on children’s attention (Taylor, Kuo, & Sullivan, 2001). Increasing to a greener play area decreased the severity of the child’s attention deficit symptoms. Taylor, Kuo, and Sullivan (2001) not only found that there is a benefit of green play settings but also looked at six alternative explanations. The six alternatives that they researched include the following. First, increased attention was due to the study being conducted outdoors. Second, it was conducted in a particular social context. The third alternative explanation was because they are physically active during the study. Fourth, the activities for the study are qualitatively different from activities done in other
settings. Fifth, the activities are preferred activities. Lastly, the study period could have coincided with periods of time where medications benefits were effective. The analysis indicated that none of the alternative explanations could explain the nature-attention relationship discovered with green play settings (Taylor, Kue, & Sullivan, 2001).

A study by Taylor and Kuo (2009) examined the effects of exposure of different physical environments on children with ADHD. The results showed there was significantly better concentration after being exposed to a park with natural settings versus a more urban setting. It also showed that the effects of the walk in the park were equal to the effects of two typical ADHD medications at their peak benefit (Taylor & Kuo, 2009). This information can have positive implications for schools that can use nature as an important resource in learning. Attention and cognition are only two of the benefits of time in nature.

**Physical, mental, and social well-being.** There are many factors that go into the well-being of children. Being healthy is not just the absence of disease; health is a state of complete physical, mental, and social well-being (Chawla, 2015). This review shows, “Natural areas provided opportunities to engage in creative play alone and with friends, set self-paced challenges, find quiet retreats, learn about the environment from direct experience, and form emotional bounds with places and the natural world” (Chawla, 2015, p. 455).

Studies conducted with adults have been used to measure stress with biomarkers such as blood pressure and cortisol levels, as well as self-rating of health and well-being. Only recently have researchers started working with children and their biomarkers of health and well-being. Sonderstrom et al. (2013) found that the health of Swedish
preschoolers with nature play areas had longer sleep time at night and other higher health ratings by their parents as well as higher mid-morning cortisol levels due to increased physical activity. In Germany a study identified that 10-year-old children had lower blood pressure if they lived in a high greenness area (Markevych et al., 2014). At a middle school in Australia, schoolyard greening was added and researchers found that children at that school had significantly reduced blood pressure compared to two control school (Kelz, Evans, & Roderer, 2015).

A study done by Richardson (2014) looked at benefits of greenery on neonatal weight and survival. He could not find the cause of the beneficial effects of greenery but noted that green buffers are associated with less air pollution, greater physical activity levels outdoors, less noise pollution, more social contact, and lower temperatures. Low birth weight is a predictor of later health risks according to a study done by Dzhombov, Dimitrova, and Dimitrakova (2014). They found a positive association between residential greenness and birth weight and also suggested that the protective effects of nature begin at birth (Dzhombov, Dimitrova, & Dimitrakova, 2014).

Triguero-Mas et al. (2014) set out to evaluate the association between outdoor environments and general and mental health. They found that the higher amounts of greenness surrounding residential areas were associated with better health (Triguero-Mas et al., 2014). There was also a larger benefit of green exposure for women and those living in areas that are not densely populated (Triguero-Mas et al., 2014). In a time where many adults feel that the extensive use of technology is destroying family life and encouraging kids to be inside during free time (Lord, 2008), it is even more important for teachers to understand and educate on the benefits of nature. Psychologist Elizabeth
Nisbet points to the importance of green space to mitigate health hazards such as heart disease, low birth weight, respiratory illness, poor immune functioning, and higher mortality associated with urbanization. (Nisbet & Lem, 2015).

At times research is questioned on whether the claim can be explained by types of differences other than exposure to green spaces that was being tested. One of the studies mentioned above did a comprehensive job of looking at other variables and whether or not they made a difference.

Our study shows evidence that green spaces are associated with better self-perceived general and mental health across different degrees of urbanization, socioeconomic status, and genders, and that physical activity and social support were unlikely to be mediators as they did not show an association with green space indicators. (Triguero-Mas et al., 2014)

The research is being used to inform programs of the potential of nature as a resource (Nisbet & Lem, 2015). In the absence of physical, mental, and social well-being, where children are trying to combat stress, mental health disorders, mood and attention disorders, it has been found that connecting with nature can decrease the symptoms. Nature experiences decreased stress, depression, anxiety and rumination, lowered incidents of obesity, increased attention, physical activity, and academic performance (Bratman et al., 2015; Taylor & Kuo, 2009; Triguero-Mas et al., 2014). Children have the most to gain from spending time in nature every day because it will decrease the time they are engaged in screen time. This will help with their school performance, sleep, social skills, self-esteem, and cognitive function (Nisbet & Lem, 2015).
While the research on how dependent humans are on interactions with nature for physiological and well-being needs is ongoing, seven dimensions of holistic health and well-being have been identified (Maller et al., 2005). Those dimensions include biological and mental well-being, social well-being, economic well-being, environmental well-being, life satisfaction, spiritual or existential well-being, and other characteristics valued by humans. People with access to natural settings nearby have been found to have overall better health (Maller et al., 2005).

Even if people do not have direct access to a natural area, viewing nature through pictures of “just unspectacular scenes” has been shown to increase positive mood, sustaining attention, feeling relaxed, and decrease negative emotions like anxiety and anger (Maller et al., 2005, p. 48). Direct access to natural areas have even greater benefits than just viewing nature; just taking a walk in the park can relieve mental fatigue. These natural spaces are also an essential part of providing a setting to promote health through recreation and social connections, while being affordable and accessible to most people (Maller et al., 2005).

**Nature-Based Therapy**

There are several different techniques for helping a student who is having difficulty with physical, mental and social well-being. Often parents will take their child to the doctor because they are not sure what else to do. Modern medicine has its benefits and this review is not addressing the pros and cons of medications and other treatments. According to Nisbet (2015) there is research informing us in the development of therapeutic gardening, hospital gardens, animal-assisted therapy, schoolyard greening, and eco-therapy (Nisbet, 2015). The potential to meet mental health needs using nature
as a resource is just starting to be realized. I will talk about how wilderness, green space, and gardening can be used to help meet the physical, mental and social well-being needs of children.

**Social skills and behavior.** A study done by Roe and Aspinall (2011) looked at restoration and recovery of cognitive and emotional resources in young people. For this study they identified two groups of students, one group with good behaviors and one group with poor behaviors (Roe & Aspinall, 2011). They identified teenagers with (ADHD) who were “at risk” for exhibiting behaviors of being withdrawn or exclusionary. Some of this group were from a residential school with a few from mainstream schools. The group they identified as the good behavior group were all from a mainstream school.

They looked at previous research done by Taylor and Kuo (2009), which showed a walk in the park improved cognition in children with ADHD compared to an urban park. As well, their research on engaging in activities in natural open green space showed a big reduction in symptoms of Attention Deficit Hyperactivity Disorder. Other research showed that nature had an impact on children in their concentration, mood, self-discipline, and coping with stress (Roe & Aspinall, 2011). The goal was to show that, compared to the good behavior groups, the poor behavior groups would show a greater positive shift in mood and a reflection on life tasks after doing activities outdoors in a forest school. One limitation they felt they had in their research was that working with young people with behavioral problems was difficult for teaching staff and for developing the research. They stated that any research conducted using young people with mental health problems or behavioral difficulties are most likely to have a small number of participants. Roe and Aspinall (2011) concluded that nature and natural
settings can be helpful in managing difficult behaviors in young people. It can have a positive impact on mood and anger, which will then have a positive impact on health and well-being (Roe & Aspinall, 2011).

Students can also improve social skills by doing adventure activities outdoors that develop teamwork and conflict resolution as well as other social skills (Forgan & Jones, 2002). This experiential learning activity uses both outdoor education and group counseling techniques to develop an environment where students are willing to take risks, share, discuss, and problem solve together. Through this type of activity, students have been able to develop problem-solving skills, develop an improved change in attitude, and increased their positive self-concept. The skills they learned in these activities helped to decrease student misbehavior as well (Forgan & Jones, 2002).

Gardening. Gardening has been a necessity for survival in the past but is now seen as a leisure activity in the United States. It still has benefits that go beyond the product that grows. It can be a meaningful activity for a student that is struggling and becoming disengaged. Garden-based activities are being used in several countries for the purpose of meeting physical, mental and social well-being needs of young people.

A study in Queensland, Australia looked at how a garden-based program could help students who are “at risk”, including students with special needs, common family problems, or were just not engaged in their education (Ruiz-Gallardo, Verde, & Valdes, 2013). They conducted their research with middle class suburban area high school students with low academic success and a high number of disruptive behavior disorder episodes in class. Teachers would use garden-based learning as an instructional teaching tool to increase motivation, engagement, and improve student perception of school.
Their results were consistent other studies that used gardening programs. Students had improved social skills, re-engagement of the student in school, and reduced discipline problems (Ruiz-Gallardo, Verde, & Valdes, 2013).

Students were also able to see that something they started was successfully finished, they achieved goals, increased self-esteem, and were proud of their work (Ruiz-Gallardo, Verde, & Valdes, 2013). Being involved outdoors with elements of nature and living things goes beyond what they grew to improve the wellbeing of these students. The students showed an overall increase in academic success and a progressive reduction in disruptive episodes. The gardening they did was beneficial to the community, the students, and the teachers. Ruiz-Gallardo, Verde, and Valdes (2013) wanted to point out that this was not an experience that solved each student’s engagement in school. Overall the results were positive, but some students were still disruptive to classes, failed, or dropped out. They also noted that it is difficult to tell how much of it was from the garden-based activities and how much of it was simply from working outdoors. (Ruiz-Gallardo, Verde, & Valdes, 2013).

In Korea the results were similar in research involving students in grade one through three in a Horticultural Therapy Program (Bo-Young et al., 2012). Based on previous research done by Kang, they felt that horticultural activities improved attention and motivation, sociability and social relationships, self-concept, and the linguistic communication skills of people with mental disabilities and children with intellectual disabilities (Bo-Young et al., 2012). In this study, they did not find a significant difference in attention; however, the activities had the potential to improve attention. Children who participated in the horticulture therapy did show higher sociability, which
is consistent with previous research. The children were involved in tasks as a group and learned to follow rules while increasing social interactions, cooperation, self-control, assertion, and responsibility (Bo-Young et al., 2012).

**Experiential Learning.**

Experiential learning does not only occur in the classroom; it can occur anywhere. This method of teaching uses student experiences outside the traditional academic settings. Often this will take place in the community. In a college course, this might be labeled “field study” or an “internship” (Eyler, 2009). One way to think about it would be to say you are learning by doing. Project-based learning, team-building experiences, hands on learning, problem solving experiences, and service learning are all types of experiential learning.

Experiential education uses social skills, work ethic, and practical expertise to achieve goals that are essential to active citizenship (Eyler, 2009). It can have value far beyond the project they are working on, and students build academic skills, develop a deeper understanding of the subject matter, increase their critical thinking skills, and engage in lifelong learning that can be transferred to a future workplace. Students of all levels can contribute to project work through interactions and collaboration with their group; every member’s intelligence, strength, and desire to learn add to the experience (Griebling, Elgas, & Konerman, 2015).

The purpose of project-based learning is to address real-life problems and find solutions. While doing this, students feel empowered, confident, independent, and successful (Kincaid & Jackson, 2006). One class in Crawfordsville, Indiana used project-based learning to address a problem they encountered while taking an adaptive physical
education class for a walk in the community. They found that the sidewalks were not accessible to the students who used wheelchairs. This lead to a project where they investigated the question of how walkable their community was. Throughout the project, they saw increased attendance, positive attitudes, and academic benefits. Service learning can be a very powerful addition to any education program. Students combined their academic studies, problem solving, and values to engage in meaningful achievement (Eyler, 2009). It is also a way to transfer the skills learned into a capacity for lifelong learning (Eyler, 2009). It gives students a way to practice the skills and connections in the community. Students also learn to communicate, work in groups, and treat others with more care (Lieberman & Hoody, 1998).

Experience-based strategies are very effective for learning in natural environments. Education Queensland has embraced the philosophy of ‘real world’ environmental instruction through the state (Ballantyne & Packer, 2009). They established 25 Outdoor and Environmental Education Centres (O&EEC’s) for providing nature-based experiential learning to complement school programs and give students the opportunity to study certain aspects of sustainability of the environment. O&EEC’s identified nature-based experiences as critical to the formation of pro-environmental attitudes. Students developed positive productive relations through these centers with both the natural environment and the local community. The teachers noticed that students were encouraged to ask questions, compare different perspectives, draw conclusions, create meaning, and develop values and opinions. Students identified the field investigations as highly engaging (Ballantyne & Packer, 2009). The findings of this
study concluded that experience-based learning strategies had the greatest effect in student learning for sustainability in natural environments (Ballantyne & Packer, 2009).

**Unique Learning Needs in Special Education**

One of the first things that you will discover when working in the special education field is that there are many different ways to learn. Often you will find that many of the teaching strategies encountered in Environmental Education are the exact same strategies that work best for special education students. Students learn using various learning styles, including auditory, visual, tactual/kinesthetic, and visual/tactual, or combinations of the four (Holland, 2001). A hands-on, direct approach is one way to teach, which is often how students with special needs learn best. The terms “Nature Smart” (Louv, 2016) or “naturalist intelligence” (Gardner, 2000) are often used to describe students who excel with nature-based instruction. In this section, I will talk about different learning styles and multiple intelligences, as well as how environmental education is presented in special education.

**Learning styles.** A learning style is, very simply put, a way that a person prefers to learn. Research on learning styles started by Dune, Dune, and Price in 1977 stated how a student learns is the most important factor in their academic achievement (Holland, 2001). Holland put 24 areas of learning styles into four basic groups: environmental factors, emotional factors, sociological needs, and physical needs.

Environmental factors include sound, light, temperature, and design. This is one factor special education classes pay close attention to because it is the simplest to change for the success of the student. Sound can affect a person in different ways and affect their ability to focus. One student may need to have background noise, music playing, or
conversations going on around them, while another student may need an area that is quiet with distractions blocked out in order to learn or concentrate (Holland, 2001).

Temperature and light have similar contrasting factors. Some people like to be warm in order to focus, and some people get sleepy when it is too warm. When it is cold, they may either concentrate or be tense and jittery. The level of light is a personal preference as well and often needs to be consistent for some learners, while other learners like to have normal variations of lighting (Holland, 2001).

The design of the area in which students learn can be defined as formal or informal physical design. With informal physical design, learners do better laying on the floor, sitting in a bean bag chair, possibly outside under a tree, or any other place they feel more comfortable. Formal physical design is more like a traditional school setting with desks and chairs, sitting at a kitchen table, or in a study carrel at the library (Holland, 2001).

Many teachers will accommodate different learning styles, especially with light, sound, and design. A classroom could have an area with a formal atmosphere with desks and chairs, while another area is carpeted with extra pillows for students to use while working (Bruner & Majewski, 1990).

The emotional factors involved with learning styles include motivation, persistence, responsibility, and structure. When a learner is motivated, persistent, and responsible, often they only require an explanation of their learning task, resources, and what to do if they need help (Holland, 2001). When a learner is unmotivated, they often lack persistence and responsibility, which requires them to have more structure. Structure can be in the form of shorter assignments, teacher supervision, and frequent
feedback and praise. Structure can be a critical element for an unmotivated student in their learning process, although often unwelcomed when imposed by the teacher or assistant (Holland, 2001). An example of structure is giving a student who needs it a detailed schedule with checkpoints for a project. This would include smaller segments that need to be completed before they go onto the next segment, which will limit the instructions to only the segment they are working on (Brunner & Majewski, 1990).

There are a variety of sociological patterns for learning, including working alone, with one or two friends, with an adult, in a small group or team, or a combination of any of those patterns. Some prefer to learn from the teacher who they feel has wisdom and authority. However, some students resent authority and will choose to work alone or with a friend (Holland, 2001). Brunner and Majewski (1990) found that their students did not do well working alone even when the option was available to them. They used cooperative groups with teachers instructing them how to use techniques that benefit small groups (Brunner & Majewski, 1990).

The last group of learning styles is physical needs, which are identified as auditory, visual, tactual/kinesthetic, visual/tactual, or a combination of any of these (Holland, 2001). Auditory learners do best by listening to lectures or with lecture and discussion. They make up only about 20% – 30% of young learners. 90% of instruction is conducted through lecture or discussion, so this can create a disadvantage for 70% - 80% of students (Holland, 2001). Unit plans and lesson designs need to incorporate all the perceptual elements. Teachers should plan hands-on activities when difficult or new information is presented to help tactual/kinesthetic and visual/tactual learners (Brunner &
Majewski, 1990). Visual learners will benefit from seeing pictures or graphs about the subject matter (Sze, 2009).

Most adolescents that are considered “At-Risk” do not learn well with auditory or visual learning styles alone. They are often nontraditional learners and do not do well on standardized tests when taught with these methods (Honigsfeld & Dunn, 2009). Many of these same students are highly tactual learners and need hands-on learning, experiences, and manipulatives, while also needing frequent movement (Honigsfeld & Dunn, 2009). Some individuals need to be moving or doing; these students will fidget, not be able to sit still, or need to eat, chew, or drink something in order to be learning (Holland, 2001). Tactual and kinesthetic learners are more likely to internalize the information they are learning while using small or large motor movement. In order to engage their minds, they need to engage their hands and feet with movement and manipulative instructional resources (Honigsfeld & Dunn, 2009).

Learning styles are very important for special education teachers to understand about their students. Often students with autism thrive in an environment that provides structure (Sze, 2009). Helping the student discover their learning style will help them realize the way they learn best. When students know how to change things to meet their ways of learning, they will be able to take charge of their educations (Sze, 2009). Students are often identified as having a disability because they do not learn in the same way as other students in their classes. It is important that teachers help students understand that multiple ways of getting information will help them learn. Once they identify their learning styles, they should still use other learning styles to reinforce their learning (Sze, 2009).
If teachers can successfully use the framework of learning styles to support students, they will be able to create safe environments that promote active learning and provide healthy social relationships along with academic skills (Marshall, 2002). “If students can’t learn the way we teach, then we need to teach the way that they can learn” (Marshall, 2002, p. 62). Learning styles are about the way a person approaches everything they learn (Checkley, 2009).

**Multiple Intelligence.** Albert Einstein once said, “Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid.” Before a teacher can develop units and lesson plans, it is important to understand the students they will be teaching. One way to learn more about the students is to find out their interests. Having students take an interest inventory can help a teacher connect to their interests. One such inventory can also lead to students better understanding themselves (Beam, 2009). Howard Gardner developed the theory of multiple intelligence in 1985, which engaged conversations about seven Multiple Intelligences (MI): linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, intra-personal, and interpersonal (Beam, 2009). This helped people realize that we could teach in different ways, and that led to differentiated instruction, which is key in special education today. MI addresses not only how various students think, but also what they enjoy, what they need to be successful, and how they prefer to receive instruction (Beam, 2009).

Linguistic students think in words and enjoy reading and writing. Logical-mathematical students use reasoning and enjoy experimenting, questioning, calculating, and figuring out puzzles. The third type, musical students, learn best through songs,
chants, rap, or rhythms and they do very well with background music while they work. Spatial intelligence students will often think in images and pictures and do well with designing, visualizing, and drawing. Information is best presented to them with graphs, charts, movies, and videos. Bodily-kinesthetic intelligence is similar to the kinesthetic learning style as students are “hands on” and may enjoy building things, running, cooking, gardening, or working on small machines and cars. Intra-personal intelligence students are often quiet and prefer independent work that has self-paced instruction, journal keeping, or multiple options to show understanding with their homework. The last of the original seven MI is interpersonal, and they tend to be the leaders in a group. They like to bounce idea off of others and enjoy cooperative learning (Beam, 2009).

About a decade later, Howard Gardner added an eighth intelligence known as the naturalist intelligence. A person with naturalist intelligence is able to discriminate among living things like plants and animals, as well as non-living things like rock configuration and clouds. They value our past as hunters, gatherers, and farmers (Checkley, 1997). Beyond just identifying they can also classify plants, minerals, animals, rocks, grass, and all variety of flora and fauna into groups based on characteristics. Darwin is the most famous example of naturalist intelligence (Checkley, 1997).

Understanding Multiple Intelligence (MI) will help teachers prepare activities that are differentiated for the student’s needs. Some things that a special education teacher can do is allow a student the choice of what form their homework will be turned in (song, poem, model, drawing, developing an activity, or other forms they choose). It can also be helpful to allow students to be mobile during learning time, allow open-ended activities, or vary supplemental materials (Beam, 2009). Looking at the eighth intelligence,
Naturalist, this is the type of student that is comfortable in an outdoor classroom. They can make connections in the outdoors that they cannot make inside a traditional classroom (Meyer, 1997).

There have been many different curriculums developed to use outdoors with students. The Project Wet curriculum and activity guide is full of learning games, simulations, guided imagery, and other MI strategies. Using resources such as Project Wet can enhance the learning for students with Naturalist Intelligence by helping them understand and learn, while staying engaged in their learning. In the last few years, we have heard the saying “Nature Deficit Disorder” in relation to a book released in 2005 by Richard Louv titled “Last Child in the Woods: Saving Our Children from Nature Deficit Disorder” (Louv, 2005). The release of this book started a grassroots effort to reconnect children with nature. Students who have the Naturalist intelligence are not able access outdoor education programs to the extent needed. Outdoor education seems to help nearly every kind of student do better in school, it can also help reduce bullying, obesity, and depression (Louv, 2016). There is a need for teachers that are comfortable teaching outdoors, which is one of the toughest challenges of meeting these students’ needs (Louv, 2016).

**Environmental education for special needs.** There are many students with special needs who do not have the same access to environmental education due to lack of information, experiential programs for all ages, physical accessibility, inadequate transportation, staff awareness towards special populations, as well as attitudinal barriers such as discrimination (Bialeschki, 1981). It is important that we make outdoor areas accessible for students with special needs, so that they can participate in activities with
nondisabled peers at nature centers and interpretive trails (Bialeschki, 1981). People with disabilities, who are capable of independent or semi-independent living, need to understand how their daily actions will impact the natural environment (Domingues & Schilling, 2001). They found that hands-on exploration activities in the outdoors meet the unique learning needs of students with disabilities in environmental education (Domingues & Schilling, 2001).

Teachers should encourage students with special needs to be actively involved in environmental and outdoor education programs. Domingues and Schilling (2001) suggested some tips on how to help these students be successful:

- Develop a buddy system;
- Focus on the process of being outdoors rather than the outcomes of the activity;
- Review more often than you would with regular education students, repeat important information;
- All students in the class should be encouraged to participate;
- Encourage students to touch, smell, and listen so that you can use field trips as sensory learning experiences that help students be more aware of the environment;
- Consider both the mental age and the chronological age when selecting activities;
- Provide a learning environment as close to the most logical location as possible;
● Individual adaptations will be needed for activities for the physically impaired;
● Use step by step instruction;
● Teach new concepts when students are most alert which is usually at the beginning of the session;
● Remember that fun and success are the basic ingredients for any recreation or environmental education activity;

Children with all abilities are losing touch with the environment (von Benzon, 2011). School-aged children’s access to the natural environment is limited more than previous generations. There is a perception that if this continues, the access will only decrease as today’s children turn into young adults. Not having fond memories of being in nature as a child makes them less likely to provide experiences in the natural environment to their children (von Benzon, 2001). Some adults are unwilling to allow their children to play independently outside, which limits children's ability to play outside, and parents do not feel it is safe for their children. With society suggesting that there is extreme risk for children playing outside, it is unlikely that children with disabilities will be allowed to have time outside for independent play either (von Benzon, 2001). Children with learning disabilities are often considered to be missing necessary skills for negotiating environments safely. Interest in making natural environments accessible in the UK has only been to meet obligations of the Disability Discrimination Act of 2005 (von Benzon, 2001). Arguably it has been found that proximity to nature increases children’s ability to deal with stress and improve behavior (Taylor, Kue, &
Sullivan, 2002). Increasing children’s physical activity by spending time outdoors has many benefits, including increased concentration, physical development, and social skills development (Forgan & Jones, 2002; Taylor, Kue, & Sullivan, 2002; von Benzon, 2001). Out-of-class opportunities for students with disabilities have positively contributed to student outcomes in interpersonal and intrapersonal skills (Johnson, 2000). Research has shown that there are more benefits than risks for children when spending time in nature.

Special education teachers are often making accommodations for students to be able to fully participate in activities with nondisabled peers. Yet, environmental education continues to be a luxury that is not accessible to all students (Bialeschki, 2016). Environmental education curriculum also serves as a strategy for presenting learning readiness skills and for learning how to interact with nondisabled peers (Bialeschki, 2016). Increasing access to natural environments can also meet the needs of different learning styles and different types of Multiple Intelligence that special education students have.

**Summary**

In this chapter we looked at five components: traits of outdoor education, effects of nature/natural systems on student learning, nature-based therapy, experiential learning, and unique needs in special education. Many of these topics are dependent on one another as well as complementing each other. Outdoor education helps students of all kinds do better in school and later in life, and it can reduce mental health needs, physical health needs, and decrease negative behaviors (Chawla, 2015; Louv, 2006; Triguero-Mas et al., 2014).
Outdoor education can occur in many places and using many different methods. The main components of outdoor education are environmental education and being in the natural environments, which can be used individually and jointly. Integrating the environment into learning can increase student’s science, language arts, math, and social skills (Lieberman & Hoody, 1998). Students can increases their community involvement using an outdoor classroom, school forest, experiential learning, or field trips. It is beneficial to take special education students out to a natural setting for a positive impact on their learning, attention, physical well-being, mental health, and behaviors.

Looking at how nature-based therapy and experiential learning can be and have been used in previous research help to understand the goals of this capstone. Students that will be involved in this research are part of a special education school, and it is important to understand limitations society and parents put on them. It is part of the goal of this capstone to involve students in outdoor education to improve their learning and engagement, which will also reflect on improved behaviors. Teachers need to understand the learning styles of the student involved, as well as be aware of different possibilities of Multiple Intelligence.

In the next chapter, I will describe the type of action research I will be conducting. You will learn about the school and the students who attend, a general idea of the type of disabilities students have, and the outdoor environment that we will be using. I will discuss the methods by which I will be collecting data and why I chose those methods. I hope to give enough information so that you will have a clear picture on what and how I will collect information to answer my question: Does teaching academic
subjects outdoors help Level IV special education students with increased attention, active engagement, and decreased negative behaviors?
CHAPTER THREE

Methods

I conducted research to find out, “Does teaching academic subjects outdoors help Level IV special education students with increased attention, active engagement, and decreased negative behaviors?” I will talk about action research and why I chose this type of research. I will share information about the participants and the setting in which this research took place.

I will talk about why I used mixed methods (both quantitative and qualitative data) for gathering information. I will explain which considerations I took into account for using humans in research and how I prepared for the human subject research process. Finally I will describe the methods and tools I used for collecting the data and how I interpreted the data.

Action Research

I chose to conduct action research as a way to focus on how teaching outdoors benefits students in special education. I have had experiences with taking students outside and feel as though I had less behavior and more engagement when taking students outside. There has been research about the benefits of nature. I wanted to find if those benefits could be observed with our small school with “high behavior”, or inappropriate behaviors that regularly interfere with their learning, and high mental health needs.
Once my data was collected I was able to interpret the data and make a plan for how I can help students benefit from what we learned. My recommendations related to the research results will be in chapter 5.

Teachers within the school will receive training on how to teach outside at the beginning of the school year. Follow up trainings will occur a few times a year to find out what additional support teachers need.

**Mixed Methods**

I used both qualitative and quantitative data. I used a teacher focus group similar to a professional learning community, teacher surveys for each outdoor lesson (Teachers survey is in Appendix C), student self-rating scales each day for the data collection dates (Teachers survey is in Appendix A), followed by staff interviews (Appendix D) and student interviews (Appendix B) with participants that have turned in permission forms, and student engagement data.

**Setting**

This study took place in a level IV setting school, in a suburb of a large metro area. A level IV setting enrolls students’ in a separate special education school where they receive special education services all day and do not attend any activities with mainstream students. This school consists of middle and high school students who have Autism Spectrum Disorders (ASD), Emotional/Behavioral Disorders (EBD), Specific Learning Disorders (SLD), and other neurobiological disorders. The school’s goal is to provide each student with the necessary coping and self-management skills appropriate across life settings. A combination of academic and social-emotional skills are often both addressed in direct instruction. Classroom design is based upon the individual needs of
each student. The school provides experiential learning opportunities for students off campus, such as work sites, community involvement, community college courses, special projects, School Forest program, and other outdoor learning experiences.

Figure 2.1 School Forest Map

![Figure 2.1 School Forest Map]

*Figure 2.1. Map identifying locations within the school forest.*

The school has two quality outdoor resources: the school garden and the school forest. Both of these resources have been used by a few teachers to integrate into the school curriculum as outdoor learning.

The school forest is adjacent to the school with approximately nine acres of Township land, which is a Department of Natural Resources (DNR) designated School Forest and consists of:

- Trails;
- Small pond;
- A shaded seating area overlooking the ponds with six benches;
- A mowed grass area with one picnic table;
- Outdoor Learning Classroom which currently includes a labyrinth and four picnic tables and an outdoor lab with magnetic white board;
- There are a variety of outdoor supplies available to the teachers including: Gardening tools, 5 GPS units, 11 pair of binoculars, a classroom set of magnifying glasses, measuring tools, outdoor desks, and some identification books.

Figure 2.2 School Forest

*Figure 2.2. Picture of the pond in the school forest.*

School Forest

Students have participated in developing many features of their School Forest. They constructed the seating area benches, assisted with the trail signs, designed and created the labyrinth, assembled the picnic table kits, and built the outdoor classroom whiteboard.
Teachers and staff have used the School Forest for recreational, educational, and therapeutic purposes. Classroom teachers, the art teacher, and the mental health team have used the space for some of the activities below:

- **Educational science lessons**: geocaching, scientific observation skills, release site for dragonflies and damselflies, wildlife viewing, lessons on cardinal directions and navigation, identification of trees by bark, snow melt prediction, environmental awareness through trash clean-up.

- **Recreational and therapeutic activities**: “Predator-Prey” (Project WILD) games, iPad photo scavenger hunts, practicing skills for camping trips, painting, sketching, journaling, collection of natural material for art projects, calming nature walks, yoga, team-building exercises, conversation and therapeutic interactions.

Figure 2.3 School Garden

*Figure 2.3 School Garden located between the school and the playground*
The second site is the school garden. Located close to the building, it is comprised of twelve raised beds with vegetables, annuals, and perennials, an arbor at the south end, and a seating bench.

The school has a nature-based program specialist come to the school, she is able to help coordinate work projects in the garden and conduct nature-based activities throughout the year, including starting the garden indoors in the winter. Students helped with a wide variety of tasks, such as: bed construction, weeding, planting seeds and seedlings, transplanting, digging, carrying soil, spreading mulch, harvesting, eating, and cooking. Many of the students contribute to the School Garden projects in the fall and the spring. Classroom teachers and the mental health team have used the gardens and its materials for science projects, scavenger hunts, art projects, cooking lessons, therapy groups, and for relaxation and recreation.

Participants

Participants were chosen from students who attend this school for the observation period, the third trimester. With a high turnover rate of students, all students who had their parents’ consent to participate were included in the interviews. This made up 10% of the students in the school. All students in class received the lessons outdoors and filled out the survey as part of their class assignment. The school consists of middle and high school students who have Autism Spectrum Disorders (ASD), Emotional/Behavioral Disorders (EBD), Specific Learning disorders (SLD), and other neurobiological disorders. Only the students who were enrolled in this school for an entire trimester had their data included for analysis. This gave a smaller sample size but with more accurate data.
All teachers were asked to participate in two lessons outdoors during the trimester. Trainings and curriculum guidance was given by the MN School Forest Program, district instructional coach, and two staff from the school.

**Human Subject Research**

I sent out letters at the beginning of the trimester to obtain consent for participants in the research. All students enrolled in the school had access to and benefit from the activities planned, regardless of returned consent forms.

The choice of observation time was arranged so that students will not be deprived of going outdoors in order to participate in the study. There was no control group; rather, baseline data was collected in two separate procedures. Self-contained rooms collected baseline data on days they did not teach outside. The high school students that rotate throughout their school day had their baseline data collected from the school’s behavior tracking and student engagement data.

Student information is kept confidential with limiting individual factors for students. Pseudonyms are used when referring to student and staff interviews. The location information and school demographics are kept general.

**Methods**

The school has nature-based recreation and learning programs that help students interact with nature to improve and promote the students’ health and wellbeing. It was designed to include guided interactions with plants, animals, and natural landscapes to bring about measurable outcomes. The students are exposed to nature-based recreation and learning programs to encourage personal growth through direct connections with nature. We used curriculum that offers students hands-on experiential learning
opportunities in their school’s outdoor natural environments in reading, math, and science.

Students were assessed during the third trimester which started mid-March and ended the first week of June. Teachers were asked to take the students out for two academic lessons during the trimester. Science classes were not included in this study as they have gone outside once a week if the weather is above 20 degrees Fahrenheit. This reduced the possibilities that the data being collected being higher due to the content taught being directly related to the environment.

**Data Analysis Methods**

Once qualitative data was collected, it was analyzed for common themes. I found commonalities in the answers to key questions. Student and staff surveys were compiled into data and graphed to show changes between the two types of observation periods.

**Summary**

The action research chosen to answer the question, “Does teaching academic subjects outdoors help Level IV special education students with increased attention, active engagement, and decreased negative behaviors?”, used hands on learning in the outdoor environment to measure students engagement in their own learning. Students did activities in several instructional areas including science, math, reading, and social skills.

In the next chapter, I will discuss the results of the student and staff surveys as well as the student and staff interviews. You will learn about the students’ engagement and how it did or did not change with being taught lessons outdoors. I will connect previous research to the results from this research. I hope to give enough information so that you will have a clear results that answer the question: Does teaching academic
subjects outdoors help Level IV special education students with increased attention, active engagement, and decreased negative behaviors?
CHAPTER FOUR

Results and Discussion

This chapter will look at the results to the question, “Does teaching academic subjects outdoors help Level IV special education students with increased attention, active engagement, and decreased negative behaviors?” Students participated in lessons outdoors in academic subjects including math, reading, digital citizenship, current events, writing, and social skills. The school consists of ten classrooms, and five classroom teachers participated in collecting data for this research. Interviews were conducted with 10 students which is 12% of the students that attended for the third trimester and 15% of the students that were taught lessons outside.

This chapter will include discussion on survey results related to attention, active engagement, and behaviors from both students and staff. There were 80 students that attended the school for the entire third trimester and 64 participated in classes taught outside. What does the engagement data show and does it match what is seen in the survey results? It will also have results from interviews both students and staff and how the results related to the research question. Discussion is also had on whether there is a common outcome when comparing students and staffs information. Finally, what comparisons can be made with the information from previous research in related topics?
**Student Survey**

Students were given a survey before and after they were taught a lesson outside. The survey asked them to rate each question 1 to 5 with 5 being the highest. Students were asked to answer three questions before they went out and four questions when they returned. Most students talk about how much they do not want to be at school on a daily basis. However, as a class, on days they were going outside they were looking forward to class and ready to pay attention with most of the students rating the questions as a 5.

![Student Survey](image)

*Figure 4.1 Student Survey*

After the class was done and they filled out the second half of their survey, most students also rated a 5 for enjoying class and paying attention. It was interesting that more students felt that they didn’t learn anything new. It could be that they were unaware of what they were actually working on or that they were applying skills they had previously learned.
Student Interviews

Students were interviewed the last week of school allowing them to take part in as many outdoor lessons as possible before being interviewed. The students that were interviewed ranged from 6th grade to 12th grade. Four of the students were in middle school and six of the students were in high school, which is also a good ratio for representing the school because there are 6 high school rooms and 4 middle school rooms.

Students were asked if they were taught outside and what classes. Nine out of the ten students recalled lessons they were taught outside in the subjects of Social Skills, Reading, digital citizenship, current events, history, citizen science, science, and Life Skills. The tenth student said he didn’t remember any lessons being taught outside but that his class did get to go outside sometimes. There were additional comments from more than half of the students about going outside with their mental health groups or for gardening with their homeroom class.

Students were asked to share some of the things they learned while they were outside. They learned about different types of trees, animals, and habitats. One of the youngest students interviewed said, “We learned that nature is real.” Several students talked about how they also learned about gardening. While learning to prepare a garden, they learned about invasive species and why they put wood chips around the garden beds. They recalled planting peppers, flowers, cabbage, and tomatoes. One student said he didn’t learn anything because he knows all about the woods and would spend all day outside if he could.
I asked the student what they did for academics outside and she stated, “We did reading outside for language arts, and our current events sheet, then chill time. We could do our work while we sat on the swings.” Another student recalled a history lesson during their space race unit, “We learned how to shoot rockets the right way”. One of the high school students stated that they learned how to build benches, which had a lot of measuring. Many students talked about service learning as part of what they do outside at school. I asked for some examples, and they said putting wood chips down in the garden, raking at a house next to the school for an elderly man, building benches, and reporting on trees and dragonflies that they see in the school forest on a website.

Students were also sharing information about calming strategies that they used outdoors. They could take a nature walk, walk the labyrinth, do sidewalk art, or play games with other classmates. Many of the mental health skills groups access the outdoors.

In response to how they felt about school when they were outside, seven out of the ten students listed a positive response. They expressed that it was better when they were outside because they were calm, relaxed, and felt free outside. One response said a lot about how most students see schools now she replied, “Happy, because at most schools you don’t get the opportunity to be outside.” All the students in this study struggled in a regular school setting and were sent to this level IV setting school in hopes that they could be more successful in a smaller environment, where teachers are allowed to make adaptations to their day and how students are taught. The remaining three were neutral on how they felt about school when they were outside; stating that they don’t look differently at school or it’s the same.
On average the students in this program often have high behaviors and struggle with staying in class. However the behaviors they reported to me while learning outside were all minor and allowed them to stay with the class. The behaviors they reported included getting frustrated with classmates who don’t listen, zoning out a few times, and at times just sitting out of the activity. None of the students were sent back into the school for their behaviors. Often students will be sent out of the classroom to the crisis area two to ten times a day. One student stated that he would have behaviors when it was time to go back inside, “When it was time to come in I was running around because I wanted to stay in the woods.”

The students talked the most when asked what they like and dislike about learning outside. The things they disliked included; when it was hot, there were mosquitoes and more distractions, it was too short of a time, people were complaining, and the sun was in their eyes. Most agreed that the teachers did not really make them go out if it was too hot. Students would want to have bug spray; however, school policy states they have to bring their own and most parents do not follow through with this. They liked a lot of different things about being outside. Students enjoy being outside, they do not get to be outside much on their own and no one is encouraging them to do so outside of school. One of the things they like best is that it is not inside. They state they felt calmer and like to learn outside better. Some of the responses were:

A. “I like learning outside because it’s more relaxing”

B. “I like that we actually found living creatures, frogs, tadpoles, fox den, termite den.”

C. “Learning about the trees, birds, and any sort of animals.”
D. “I like the smells it is usually better out there, I like the breeze.”

E. “I like learning outside because it gives me more time to think.”

There are also things that they would like to add to their outdoor activities. Both learning and just enjoying being outside. Some active things they would like to do include bike rides on the trails, add a tire swing on one of the trees in the forest, more time to just play outside, a school carnival, and group games like capture the flag and kickball. Some things they would like to learn about include: building shelters tying knots, building a fire, how to spend all day outside, and more about nature. One girl would like to be able to do more painting outside, and I asked her what type of painting. She said she wanted to paint more pictures like she did of a school’s favorite sugar maple tree in the front of the school. The students started monitoring this specific tree for phenology two years ago.

**Engagement Data**

Classroom engagement data was collected by each teacher when a lesson was taught outside for that class period. Baseline data was collected in two separate ways. The self-contained classrooms took their baseline data during the same week on the days that they were taught the lesson inside the school classroom. High School baselines were taken from the behavior tracking forms that the school uses for each student.

Figures 4.2 through 4.4 show student engagement for the different type of classrooms, which includes High school self-contained, Middle school self-contained, and High school classes that students rotate between teachers. Heidi’s High School self-contained room did two weeks’ worth of lessons and are listed with results from each week. In this classroom engagement increased with each lesson taught outside.
Figure 4.2. Student engagement indoor baseline and outdoor percentages for the self-contained high school classroom. More students were engaged outdoors than indoors.

The self-contained middle school room did several lessons outside and twice each week. Eli tracked two of the weeks that he taught the classroom outside. The first week he had all students fully engaged and he felt that all the lessons went very well. The second week he still had all students engaged at least partially; however, a few students were off task for part of the lesson, but all students did complete the lesson.
Figure 4.3 Student Engagement, Self-contained Middle School

![Student Engagement Chart](image)

**Figure 4.3.** Student engagement indoor baseline and outdoor percentages for the self-contained middle school classroom. More students were engaged outdoors than indoors.

The students that are part of the high school rotation have a six-period schedule. Not all students have the same schedule and therefore have different students with them in each class. Figure 4.4 shows that group 1 and 4 had a higher percentage of students who were not on task. From the information from the teachers, group 1 was a small class of 4 students, and right before class two of the students were in “crisis”, where mental health issues prevented them from being a part of the classroom or leading to high behaviors. Students after a crisis take a long time to be ready to participate in lessons but the school's goal is to have them back in class as soon as possible. It is important to know that within a Level IV setting this can impact a class or school day. Group 4 was also a small class and with just one person not engaged it raised the percentage of students not engaged to 33%. The largest class size in the high school during observation...
period was 9 students, and it is not uncommon for attendance to be an issue for students in this school as well.

**Figure 4.4 Student Engagement, High School Rotation**

![Student Engagement Graph](image)

*Figure 4.4. Student engagement indoor baseline and outdoor percentages for the high school classes that have a rotation schedule. Three out of five groups, students were more engaged outdoors. Baseline was taken from all high school students (40)*

Six of the nine results show increased engagement when lessons are taught outside. All of the self-contained classrooms had an increase in engagement to the point where all students were either partially or fully engaged. The complete engagement data also demonstrates that all of their outdoor lessons increased the fully engaged students above the baselines. The high school classes that rotate had the most inconsistent results; however, the students that were fully engaged still increased overall above the baseline.

The overall baseline for the school on fully engaged students increased 33%, which came directly from the students that were partially engaged. The students not engaged stayed the same in the overall baseline. The number of students not engaged was
greatly affected by the small classes that had students in crisis right before class or high absenteeism. This is a common occurrence in a Level IV setting school with a student population like ours, this can happen at any time during the school day.

Figure 4.5 Student Engagement

![Student Engagement Chart]

*Figure 4.5. The overall student engagement with indoor baseline and outdoor percentages for all classes. More students were engaged outdoors than indoors.*

Students’ participation minutes for the trimester, which includes all classes, was 47%, which means that students were engaged in their school day 47% of their day, including students who were fully engaged and partially engaged. The outdoor lessons show a 33% increase in engagement.

The school district also collected engagement data for the previous school year and reported that 76% of the school is engaged. This does not differentiate between fully and partially engaged; therefore, if we assume a similar ratio, there would be 25% fully engaged and 51% partially engaged in the 2015-2016 school year and 24% not engaged.
This study shows there is a 51% increase in students who are fully engaged and a 14% decrease in the students that are not engaged when comparing the results of teaching outdoors to the district engagement information.

Additional baseline information from school records to take into consideration are the students Out of Place minutes, which is when students are not only not engaged but are refusing to stay in their assigned classroom. The Out of Place minutes averaged 72 minutes per day for this trimester, which is 20% of the school day. With students out of place 20% of the day, the expectation would be that students would also be out of place 20% during any given class, which would be up to 10 minutes per class. The baseline indicates that during the outdoor classes it is expected that there would be 13 students to be out of place or the equivalent of 650 minutes for all participants. Only 1.5% of the students that participated in the outdoor instruction were Out of Place, which is the equivalent to 50 minutes out of all participants.

**Staff Survey**

Staff members were given a survey before and after they taught a lesson outside. The survey asked them to rate each question 1 to 5 with 5 being the highest. They were asked to answer three questions before they went out and four questions when they returned. Staff felt confident about teaching outside and were looking forward to class. They all felt that their lessons were designed to meet the standards they are working on. The confidence of teaching outside averaged 93% for those who participated. There were 3 teachers in the school that chose not to participate in the survey with their class. When asked what prevented them from participating they felt that it was time and being comfortable teaching outside. Some of the teachers that did participate stated this was
the first time they taught a class outside. They gained confidence as they taught outside more.

Figure 4.6 Staff Survey: Self-reflection

![Staff Survey: Self-reflection](image)

Figure 4.6. Graph reflecting mean, median, and mode for staff survey

After the class was done, staff filled out the second half of their survey. One question addressed how they felt the lesson taught met the standard that they were trying to teach. Reflecting after teaching a lesson is part of the teaching process and teachers often use formative assessments for this information. Although specific data was not collected on how indoor lessons met the standard being taught, it is common that not all lessons go as designed and may not meet the objective. The mean, median, and mode on this survey show a positive correlation that the outdoor lessons met the standards. Taking a lesson into a new environment and still meeting the standard in each academic subject was important, one thing that makes some teachers reluctant to teach outside is that they
have to meet all the standards of their subject and they think it will take time away from meeting the teaching expectations.

**Figure 4.7 Staff Survey: Student-observations**

![Graph reflecting mean, median, and mode from staff survey of what they observed from students during their outdoor lesson.](image)

*Figure 4.7. Graph reflecting mean, median, and mode from staff survey of what they observed from students during their outdoor lesson.*

The remaining questions related to how the students did during the outdoor lesson. Most staff felt that student engagement, positive behaviors, and paying attention were rated around a 4 on the 1 – 5 scale. Negative behaviors often interfere with student learning, both their own behavior and that of their classmates. Teachers observed students having positive behaviors which then also increased student engagement and attention. All teachers said that they felt that teaching outdoors was a positive experience for both them and the students.
Staff Interviews

Teachers were given training that included a tour of the school forest, how to access tools and school forest items, and how to plan lessons that meet their standards to be used outdoors. Teachers were asked to teach two lessons outdoors during the third trimester. At the end of the school year, five teachers were interviewed: three high school teachers and two middle school teachers. This was an even representation of the school as there are six high school classes and four middle school classes.

The teachers that were interviewed taught 5th through 12th grade. Two self-contained middle school classes consisting of 5th – 8th grade, one self-contained high school class with 9th – 12th, and two high school classes that are part of the high school rotations. The subjects they taught outdoors included Language Arts, Math, Reading, Writing, Digital Citizenship, Current Events, Social Skills, and other electives. All students in their classes are special education students with an IEP for a Level IV setting. Two of the teachers taught two lessons outdoors in the semester, two teachers taught three lessons outdoors, and the last teacher taught 10 – 15 formal lessons outdoors but took his class out 2 to 3 times a week including informal lesson time.

There was a wide range of comfort levels for teaching outside and how they prepared for their outdoor lessons varied based on both experience and comfort level. The first teacher I interviewed self-identified as being uncomfortable teaching outside and that it was a stretch for her. Shelly taught her Language Arts lessons outdoors. She prepared her students and herself for teaching outdoors by setting clear expectations for the students, mentally preparing herself, and giving the students a few days’ notice before going outside. She had a backup plan for students that refused to go outside,
students would stay inside with staff and do a similar assignment in the classroom. The first day no one refused to go outside, and she felt that the lesson went very well. The second time there was a student with high behaviors in crisis before class, and it continued into class, and they never got a chance to join the class outside. She did not have any problem behaviors with the students that joined her outside. Shelly felt that her students paid attention except for one student who played on the bridge for a while but then came and did their work, so it was not a refusal, and they did complete their assignment.

Shelly liked being outdoors with her classroom. Both days she taught outside there were not a lot of bugs or bees, and it was nice to be in the sunshine. She felt it was good for students to incorporate some movement as well. Advice she would give to other teachers would be to make sure to go over expectations a few days before and the day they go out. Have clear expectations of what will happen if they are just messing around and if they have to be sent back inside. I would also suggest bug spray.

Heidi has the self-contained high school classroom, most staff in the school would consider her class the most difficult to engage in lessons and with the highest behaviors. As she prepared her reading lesson, she took what she was going to do inside, collected her materials and made sure she was organized. Heidi also had a backup plan of having a staff member go inside with students if needed for behaviors or refusals. When I asked her if she had any student behaviors outside she stated, I had a couple of students that were disengaged before we even went out and they had trouble getting started but once they saw other students doing their work and
getting rewarded they engaged in the lesson. I did not have to send anyone inside.

Heidi liked teaching outside in the fresh air, and sunshine made her feel more comfortable. She did not like having to haul all of the teaching materials out with her, and the first time they went out they did not realize the picnic tables were wet, so they had to get towels and dry them because some of the kids would not sit down. She would advise that you be very organized when you go outside, bring what you need, have a good plan when students want to spread out. If you don’t have extra staff, it would be good to find one because students like the space, and they like to spread out to do their work, and it is harder to give help when needed if you don’t have another staff with you.

Eli was very excited to be a part of this study because he feels that students often do better when they can move around and be outside. He not only taught the requested two lessons outside but taught ten to fifteen formal lessons. He also made sure that his students, which are 5th through 8th grade, got outside two to three times a week. To prepare for class, Eli has a satchel full of dry erase boards and a whistle for signaling students. Students learned a communication system with the whistle in their science class, and it was taught to all the teachers. He also made sure he had the assignments, clipboards, back up assignments, and communication radio. Eli said, “I would literally pack everything including materials like compasses and things.” He planned his lessons around a concept that all the students were struggling with, like fractions or estimation.

Eli’s backup plan was simple: it wasn’t an option to refuse. “Some would try to refuse and the plan was you can’t, you need to at least step out and see it.” They would have make up work for what they missed and his true backup plan was same assignment
inside. Students would struggle inside and find it easier to go out with the class next time. “How do you estimate the size of a tree if you aren’t at that tree and using the ruler?” Eli explained.

Eli liked everything about teaching outside. If kids were off task, they would wander for a bit, but they wouldn’t be physically aggressive. If they did wander, they may be off task, but they would still be able to explore and learn. The first few times they tended to be distracted while they were outside, then they would follow even if they were off task. Being outside was satisfying a need that could not be met inside; it was also a lot easier to remind them to be on task. The social element of being off task was taken away outside and they did not need as much redirection. If the work didn’t get done, they would make it up later. They were calmer outside even when they were off task. Eli did admit one thing he didn’t like about being outside, the dry erase boards would get cold in the winter and harder to wipe off.

As mentioned above, Eli’s class had some off-task behavior while outside. When asked about other behaviors he said at times they were distracted, wandering around and out of place but nothing that required a behavior incident form (school behavior reporting form). Eli did feel that students were paying attention outside stating, “Participation was actually higher, you may get drift off and lose attention quicker but they would be able to come back, since most of the lesson was meant to be done outdoors they’d get back to task.” His biggest struggle with his students was finding a concept that was not too difficult for all students as they all have gaps in their learning.

Eli has a lot of suggestions on how to help teachers that are not comfortable teaching outdoors. “I think if you are uncomfortable doing it yourself you need to honor
that right away. Then you are going to scoop in those kids that are uncomfortable to go
out there.” He also had some training ideas that included how to find teachable moments
in the woods, learn more about the area you are taking them outside. Experiential
learning as part of workshop week, have staff take an overnight trip to an environmental
center, this will help with students as we look at taking them as well. Eli felt that it was
important to teach our students outside because most of them will work in jobs that
require most of their day outside.

Kyle is on the same team as Eli and works with the 6th through 8th graders. He
took students outside for three reading lessons. He made sure he had the student
materials, journals, and writing utensils as they went outside. While all of his students
went outside each time, he also had a backup plan of them doing the same work inside
the classroom. Kyle liked that taking the students outside taught them that learning does
not just happen in the classroom. He feels that it is important for them to know learning
can happen anywhere and that what you learn is transferable to other areas such as
outdoor spaces.

Students were always in eyesight when outdoors with the biggest problem not
being with the group. Students were still engaged off to the side of the group lesson and
they did their work more independently. There was never a reason to send any student
into the school for disruption and he never needed to end a class early. The students paid
attention for the most part and there was a lot of positive learning.

When I asked Kyle if he had any suggestions for teachers that are thinking about
teaching outside, he said, “Take a risk. We have expectations when we are outside and
expectations for learning. It is just connecting those dots and making sure students know their expectations outside are the same as in the classroom.”

The last teacher I interviewed was Andy, a first year teacher that taught high school current events and digital citizenship. When he taught lessons outside he wasn’t teaching anything different just changing the location of the discussion he was having with students. Getting ready to teach outside was not any different for him, he would take the articles or readings outside with the students and find an outdoor space that was shaded. I asked Andy about his backup plan and he replied;

Actually, they did all go outside and, I had more success out there in term of getting the kids involved. In fact towards the end of the year they were saying ‘why don’t we go outside as much as we use to? I think they actually did better out there than in the classroom, honestly. We would have an assistant out there so the plan, (if there was a behavior issue), would be you go inside and you are expected to do the same thing.

Andy wishes he would have used the outdoor area more, he attributes his limited use to the fact that he felt like he was playing catch up all year trying to learn everything as a new teacher. He liked being out there and wished he would have had more time each occasion they went outside. He also felt that the length of the class periods limits what you were able to do outdoors because it adds time to your class to get out there and back. Behaviors he encountered outdoors were swearing and not being on task. He did not have to send anyone inside. Andy said, “I didn’t have a ton of that to be honest with you, it was more the fear of that I guess.” His students that normally participated did the same outdoors, he was surprised that the kids who don’t participate inside the school,
participated more outside with some of the minor behaviors he would see inside. He appreciated that they were more engaged.

As a first year teacher, Andy got involved in the school forest committee and sees benefits of using the forest and teaching outdoors. He also had some ideas to increase the use of the school forest including,

A. Plan that it is something we are doing and work our lessons around teaching outdoors.

B. Make it an expectation for teachers to actually get out there and track the use of the forest.

C. In the high school meeting we say what we are all doing an outdoor lesson this week and share some ideas how we can help each other.

D. Have a place for resources to teach out in the forest. It would be nice to have a file cabinet you open it up and find out which kind of lesson you want to teach weather it’s current events or actually learning about the environment and be able to pull it out and it’s right there for me.

**Connecting Previous Research**

Previous research talked about the traits of outdoor education. Bringing students outdoors to be taught has accomplished some of these traits; integrated instruction and use of an Outdoor Classroom or school forest. Students were exposed to an integrated instruction that met standards in math and language with activities outdoors (Eick, 2011). A variety of different lessons were taught that had students working on life skills, social skills, emotional regulation, community involvement, leadership, and independence (Mixon-Brookshire, 2012; Wilson, 1994). As Andy had said at times he was not teaching
about nature, the forest, or outdoors, rather he was taking what he was teaching to an outdoor setting. Many of the students in this school helped create the outdoor classroom and have done projects within the school forest which may have increased their engagement as they had a sense of place. As one student said she liked going outside “because at most schools you don’t get the opportunity to be outside.”

As the teachers were given training to teach outdoors at this school, they were told about how one 20 minute walk has the same effects as two doses of ADHD medication (Taylor & Kuo, 2009). A lot of the students in this school have medications for various reasons, they also often miss doses of medication for various reasons. One staff said that it is good to know this information. If a student has missed their medication for any reason staff can try to make adjustments to their day so that they can spend outside as an additional strategy to help prepare them for learning.

Taylor, Kue, and Sullivan, (2001), indicated that increasing a greener play area decreased the severity of the child’s attention deficit symptoms. Knowing that nature-attention relationship occurred with green play settings for students with ADHD it was important to see if this nature-attention relationship occurred with structured learning time in a green space. Both the student survey and the teacher survey show that students were able to sustain attention during the outdoor lesson. This did not totally remove the issues students had with attention, as stated in the staff interviews, both Andy and Kyle said that students would at times be off task and not paying attention. However, it did greatly decrease the inattentiveness of students and increased their engagement and attention.
Students in this school have a high occurrence of mental health disorders, mood disorders, and attention disorders. They are often in a constant state of stress. Bratman et al., (2015); Taylor and Kuo, (2009); and Triguero-Mas et al., (2014) found that nature experiences decreased stress, depression, anxiety and rumination, while increasing attention, physical activity, and academic performance. Student interviews support that teaching outdoors has had a similar outcome. Several students reported feeling calmer, happier, relaxed, and free. The fact that there were less negative behaviors during the outdoor lesson also supports that students were less stressed during this time.

Students also shared information about activities they did with their mental health skills group, or during their individual times with the school social workers. The interview questions were not related to these activities; however, students brought them up. Students have learned calming strategies they can use on their own outdoors, in any location, and participated in therapeutic gardening and other activities through their social skills groups and classes. Another activity that students brought up was service learning projects. Forgan and Jones (2002), showed that students improve social skills by doing activities in the outdoors that develop teamwork and conflict resolution.

There are definitely unique learning needs in special education with students that are not engaged in their own education. Students at this school were similar to students in the study in Queensland, Australia that included students who are “at risk”, including students with special needs, common family problems, or were just not engaged in their education (Ruiz-Gallardo, Verde, & Valdes, 2013). Teachers at this school were able to accommodate different learning styles, allowing for movement, space, and a different location to meet students’ needs. Eli, Heidi, and Kyle stated that students had different
needs met in the outdoors and that allowing student the space needed to be off task in an acceptable way was helpful to get them re-engaged more quickly.

Conclusion

The results for teaching academic subjects to students in a special education Level IV setting are very positive. Did the data show the three things we were monitoring; increased attention, active engagement, and decreased negative behaviors? The results show that teaching in the outdoors has had a significant impact in all three areas.

The staff and student survey both show that student attention was rated high during the outdoor lessons. While there is no survey to compare to days where students are learning inside, the results of the survey are strongly positive. The mode for student attention on the student survey was a 5 and on the staff survey was a 4 both of these are considered high. Students were looking forward to class on days they were going outdoors and felt that they were ready to pay attention.

The staff survey partly addressed how they felt about teaching outside. This does not directly answer any areas of the question but is a very important part of the study. Staff received training and support to help reach the students. If a staff member is not prepared or is unsure of his/her own lesson there will be a direct effect on the students’ outcomes. Staff are very experienced with adjusting their lessons to meet the needs of all the students and the many different learning styles. Yet even with the skill and expertise of the staff there was still some hesitance to take students outside.

The level of Student Engagement indicated the most positive results. Starting with the baselines of student participation minutes for the high school students at 47% for all high school classes there was a 33% increase in engagement during outdoor lessons.
The district engagement data which included all schools in the school district shows there is a 51% increase in students who are fully engaged, and a 14% decrease in the students that are not engaged when teaching outdoors. Student’s Out of Place minutes decreased from an average of 20% of their school day to 1.5% during the outdoor classes. The staff survey also indicated that students were engaged in the class with a 4 on a 1 – 5 rating scale.

A decreased in student behaviors were evident in both the staff survey and the staff interviews. Teaching a class outside is not without behaviors that interfere with learning, expecting those results in a special education Level IV setting would be unrealistic. The fact that the behaviors that did occur were minor and only interfered with the student learning of the person with the behaviors. During all of the lessons taught outside students were able to stay with the class and no one was asked to go to an alternate instruction area which, in this case, would have been the indoor classroom. There were also no behaviors that lead to writing up the school’s behavior incident form. Only one student removed themselves from the learning environment by refusing to go outside. Students were also able to identify minor behaviors that they had outside and these behaviors were primarily being distracted or off-task. All students and staff reported that eventually all assignments were completed either at the time of the lesson or shortly after, with the exception of one student.

In the next chapter I will discuss some things that needed to change in the study before data collection started. I will also talk about different areas of research which can be expanded on in the future, based on these results. I will also address some of the
limitations that made it difficult to get more baseline data for student attention and student behavior.
CHAPTER FIVE

Conclusion

In this chapter I will reflect on what I learned about my question, “Does teaching academic subjects outdoors help Level IV special education students with increased attention, active engagement, and decreased negative behaviors?” I will discuss the research and what changed in the study from the original design. I’ll address some of the limitations that made it difficult to get more baseline data for student attention and student behavior. I will also talk about implications of research and make recommendations for further study. Finally, I will review how the results can be applied to special education and teaching outdoors.

Research Design

The nature of this school made it difficult to design the research to meet the question without making several changes. When I first started designing the methods I was unsure of what I would be teaching and how it would affect the research. This made the process of getting approval to start the research difficult as I was not able to tell the human subject committee what my part would be in the research. After all permission was received to start, the methods needed to change based on time.

Originally I was going have students assessed during four separate months. Two of the months were when students went outside often for learning (more than 8 times). The other two months were when students only go outside once a week if the weather is above 20 degrees Fahrenheit for science class. Each semester had an observation period in each type of month so that the schedule was consistent for student. This reduced the
possibilities that the data was due to a different schedule or class changes. Since permission to start the research was not approved until late September, I was no longer able to give the teachers enough time to collect data in the warmer month of the fall.

With this change, I would not be able to collect data in the first semester. At that point I felt that I would still be able to get reliable information with one observation period. Additionally, we would have less variable of students who were just getting use to their new school and teachers. This new timeline would still offere good baseline data and accurate results. At the end of October the school changed from semesters to trimesters, with the second trimester beginning in December and third trimester starting middle of March.

With the new time frame of trimesters instead of semesters there were some aspects of the methods design that would no longer work. I had planned on collecting baseline data in a cold month of the semesters with both January and February as options. With the trimester schedule I no longer had a class that was given in both the colder months and the warmer months. The only class that went outside during the colder months was science so the second trimester was not a usable observation period because using my science class would have too much bias and not enough data. The third trimester would be great for taking the students outside and gave teachers plenty of time to teach two lessons in the warmer weather during the 9 week class. I needed to change the baseline data collection within what was approved by the Human Subject Committee.

The redesign had two possible ways to collect baseline data. Ideally, teachers would collect student engagement data during lessons taught indoors during the observation week. Unfortunately, this would not work for the high school rotation
classes because each day, the students that attend the class vary greatly. With mental health appointments, attendance issues, work training, and skills groups the students in any class is different every day and every hour. In order to reduce the variables, the baseline for the high school students on the 6 period rotation schedule would be taken from the data collection that the school already uses for all students.

After I determined the baseline collection for engagement, I also needed to find a baseline for behavior and attention. Initially, Staff and students were asked to fill out a survey on a day when the students received instruction in their regular indoor classroom. Teachers attempted to have students fill out the survey during indoor lessons, however they found that most of the students refused to fill them out, stating that they didn’t care if they filled it out and that they did not want to be in class. These attempts were made in the high school rotation classes and it was determined that without the incentive of being able to start a lesson they were looking forward to, it would not be accurate information. The information I would have collected from the indoor surveys would only be from students that were already engaged and would not give an accurate baseline, therefore students were no longer asked to fill out the survey for lessons being taught indoors.

Limitations

Some of the limitations of this study are influenced by both the staff and student participants as well as the nature of the school. Many of the teachers were new to the school this year. As with most years, there is a high turnover of staff in special education, especially when working with students that demonstrate high behaviors. New teachers have a lot of things that they are trying to learn and establish in their first year, and may not have the same experiences as teachers that have been there for several years.
of the ten classrooms participated in teaching academics outside, including my classroom. I felt that having my classes in the study would create bias, for the following reasons: the lessons I teach lend themselves to being taught outside, and I often directly teach about the natural environment, and I have over ten years of experience teaching outdoors. The three classrooms that did not participate, gave common reasons for opting out. These include not having enough time, being unsure how to teach to the required standards in their subject, being uncomfortable teaching outdoors. The most common reason given is concern that if the students are not behaving well indoors, it would be even harder to take them outdoors.

One of the main limitations of this study was the amount of participants available. This school had no more than 87 students at a time, many of them not there for the entire trimester. This allowed a very small sample size for this study. It is very common for Level IV setting schools to have very small numbers of students with a high turnover. Roe and Aspinall (2011) stated that any research conducted using young people with mental health problems or behavioral difficulties are most likely to have a small number of participants. Another limitation was the duration of the study. It would have been ideal to have two observation periods or be able to use the entire school year to obtain more data.

Student limitations were closely related to the same reasons why they attend a Level IV school. Attendance is a big issue and some students miss so much school that they are unengaged by just not being there. We were not able to assess those students as they did not participate in the outdoor lessons. I believe if those students attended daily and were taught outside, the district would see an increase in their level of engagement.
Many of the participants in this study have mental illness that affect their ability to engage in academics. While I hope that bringing them outdoors will reduce stress and increase their general health and wellbeing, getting them to attend class is the first step. During a mental health crisis they are not school ready and are not engaged due to the nature of their mental illness.

I mentioned earlier that students did not want to fill out the student survey on the days that they were not being taught outside. The natural reward for filling these out on an outdoor lesson day is that the class gets to go outside and start the lesson. In contrast, on a day inside students did not have a natural reward for filling it out and some may have viewed it as another assignment that they just didn’t want to do. The most frustrating limitation on the research was the amount of change that happens daily and within the school year in special education. The student population is always changing and the school must make changes to best meet the students’ needs.

As part of this study I asked teachers how their lesson outdoors met the targeted standard. Going into the study, I did not have a baseline for how lessons taught indoors met standards. It is very common for many things to interfere with a planned lesson. Part of the teaching process is evaluation of lesson design and adaptation. It would have been beneficial to include a similar survey question for meeting standards while teaching inside.

Limitations will be present in any research. Despite these challenges, I was able to gain valuable information within the methods design that will help guide instruction in the future. After completing the observation period and reviewing the data, I have found many areas that could use further research.
Previous Research

The literature review focused on five components; Traits of outdoor education, Effects of Nature/Natural systems on student learning, Nature-based Therapy, Experiential Learning, and Types of learning styles most common in Special Education. This study included elements of all the above components either directly, or indirectly through student and staff interviews. The very design of this study brought in two main elements of outdoor education, integrated academic subjects and use of an outdoor classroom. The main thing I have always enjoyed is taking students outdoors to learn core subjects like math and language arts.

With making sure that my teaching was not included in this study it became all the other topics that were taught. The topics being taught outdoors, included math, reading, writing, and current events were not separate outdoor activities rather they were fundamentally linked to student Learning (Comishin et al., 2004; Eick, 2001; Eick 2011). As in the study by Wilson (1994), many of the subjects needed for special education like social skills, life skills, emotional regulation, independence, and work readiness can be integrated into the curriculum using the outdoor learning area.

This study also had the benefit of a developed outdoor classroom. The 9 acres adjacent to the school are part of the MN School Forest Program with the support of the Township, who owns the land. Students were an integral part of this development through various projects; building picnic tables, building a sheltered white board, developing trails, building benches, and buckthorn removal. This participation has fostered a sense of ownership and understanding of the area. Just as in the study by Eyler (2009), during the project, there was increased attendance, positive attitudes, and
academic benefits. Students combined their academic studies, problem solving, and engagement. Louv (2006), Students with special needs learn best with a hands-on, direct approach.

Figure 5.1 Outdoor Learning Area

Figure 5.1. Sheltered white board and picnic tables made by students and staff in 2015 and 2016

In the study by Weise (2012) being connected to a place, allows us to introduce students to small topics that they can make a difference on. Teachers can facilitate stewardship projects to clean up a pond, field, or woods to help students increase their self-esteem, foster a deep sense of pride and connect them to the natural environment at their school. I believe that the students’ connection to their natural environment is evident in the positive results of my study.
In Kelz, Evans, & Roderer’s study (2015) researchers found that children at that school had significantly reduced blood pressure compared greening was added to the school area. Many of the students made comments in their interviews about feeling calmer and more relaxed outside. Even though blood pressure was not assessed it is one of the benefits of feeling calm and relaxed. Children have the most to gain from spending time in nature every day. This will help with their school performance, sleep, social skills, self-esteem, and cognitive function (Nisbet & Lem, 2015).

Roe and Aspinall (2011) concluded that nature and natural settings can be helpful in managing difficult behaviors in young people. It can have a positive impact on mood and anger, which will then have a positive impact on health and well-being. This study supports those findings as there was a decrease in student behaviors and students stated they felt calmer. Students also mentioned in the interviews that they like going outside when they are upset because it helps them calm down. They have been learning how to use natural settings and mindfulness as self management tools in their social skills groups and therapy groups.

My data also confirms the results of studies by Taylor, A. F., Kuo, F. E., & Sullivan, W. C. (2001: 2001) and Taylor, A. F., & Kuo, F. E. (2009) that examined the effects of exposure of different physical environments on children with ADHD. Their results showed significantly better concentration, attention, and cognition after being exposed to a park with natural settings. My results show an increase of engagement which can lead to better attention and cognition.
According to Bialeschki (1981) students with special needs do not have the same access to environmental education due to lack of information, experiential programs for all ages, physical accessibility, inadequate transportation, staff awareness towards special populations, as well as attitudinal barriers such as discrimination. In my experience, all of these barriers to access are real. Teachers are afraid to take special education students outdoors because of a fear that being outside the school will reduce control of student behavior. Proper training and support will decrease teachers’ fears and they will learn new behavior management strategies when outdoors. They will observe decreased student behaviors and understand the benefits and importance of including lessons outdoors.

**Implications and Recommendations**

Based on the results of this study, it would be beneficial to have academic subjects taught in an outdoor classroom. This type of instruction can meet the requirements of different learning styles, increase student engagement and attention, and decrease student behaviors. This can be done by taking an indoor lesson and teaching it outdoors. Or by designing a lesson using the outdoors to meet a specific standard, such as measuring the height of a tree to teach measurement skills. There are many resources for teaching lessons outdoors that meet language arts, math, and science standards.

One of the suggestions from the teacher interviews is to require staff to teach a specific number of classes outdoors. This will not only stress the value of outdoor lessons but will also encourage teachers who are reluctant. Providing training and
offering individualized support will also help staff increase their comfort levels and gain experience.

The completed study raises many questions that could be further research topics. How does teaching an academic subject outside affect student learning? Can they learn a concept better and retain information more if it is taught outdoors with a hands on activity? Can teaching outdoors be used as an intervention for a student that is having high behaviors as a way to decrease behaviors and increase their engagement?

A study by Taylor and Kuo (2009) showed there was significantly better concentration, for students with Attention Deficit Disorder, after being exposed to a park with natural settings versus a more urban setting. I am curious to research the lasting effects of teaching outdoors. Would these effects continue once they return to the indoor classroom as it does with exposure to a park with natural settings? How long can these benefits of being outdoors last? If studies show a positive effect that lasts for more than an hour, schools can adjust schedules so that students have access to outdoor space a few times a day during instruction.

Educators can use this information to improve their connection to students. In an environment where the weather dictates spending more time indoors, nature can be brought indoors. Visual images of nature, plants indoors, and smells of nature can all enhance the indoor environment. New schools can incorporate elements of the natural environment into building design. Finding ways to increase student engagement may also help bridge the achievement gap.
Summary

Teaching academic subjects in an outdoor setting does have a positive effect on student engagement, attention, and behavior. Several teachers also enjoyed being able to teach a lesson outdoors during this study. I believe that having a developed outdoor classroom, a school forest, and protocol for taking students outside will benefit students in special education. Many lessons in Language Arts, Math, Social Skills, and Science can be conducted outdoors.

I will continue to teach any subject I teach outside, when I am able. Many of the teachers that participated in this study will also continue to teach outdoors. Not only are students more engaged and pay better attention, it gives them a positive experience that they can relate to at school. Many of the students in special education have not had a lot of success in the traditional school setting and have had many negative experiences. If I can get just one student to like being at school for even a short time then I know that I have improved that student’s likelihood to have future success in school.
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Appendix A

Student Survey
Student Survey
Class _____________________ Student Number _____ Date ________

Pre-assessment

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<td>I’m looking forward to class today</td>
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<td>How ready am I to pay attention</td>
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<td>My energy level</td>
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Post-assessment

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<td>I learned something new</td>
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<td>I enjoyed class today</td>
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<td>I paid attention during instruction</td>
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<tr>
<td>My energy level</td>
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Appendix B

Student Interview Questions
Interview questions for Students

1. Have you had any lessons taught outside? Which classes and teachers?

2. What types of things did you learn when you were outside?

3. How did you feel about school when you were outside?

4. What type of behaviors did you have outside? Did any of those behaviors have you removed from class?

5. What do you like and dislike about learning outside?

6. What is something you would like add to do outside with school?
Teacher Survey

Class ___________________________  Date ____________

Pre-assessment

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<td>I’m confident to teach outside</td>
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Post-assessment

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<td>Number of students _____ Number engaged in lesson_______</td>
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<td>Students were engaged</td>
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<td>Students paid attention during instruction</td>
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<td>Students show positive behaviors</td>
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<td>How my lesson met standards</td>
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Comments:
Appendix D

Teacher Interview Questions
Interview questions for Teachers

1. How many times did you teach outside and what types of things did you teach when you were outside?

2. How did you prepare for a lesson outside?

3. Did all your students go outside and what was your plan for students who refused to go outside?

4. What did you like and dislike about teaching outside?

5. What type of student problem behaviors occurred outside? Did any of those behaviors disruptive to the class to the point of sending them inside?

6. Did students pay attention to instruction and participate when outside?

7. What suggestions do you have for other teachers trying to prepare for lessons outside?

What additional support do you need?