

Abstract

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Jeffery, V. What effect does an exposure to nature have on students during their school day? (2009)

The purpose of this study was to investigate if nature had an effect on student's moods and behaviors during their school day. Students were surveyed before a nature experience to determine how they felt on a typical school day when they do not go outside for classes. On the day of the nature experience, students were surveyed again to see if they felt any different. Students were surveyed about several indicators of their moods and behaviors such as their ability to focus, concentrate and stay on task, their ability to be creative, their stress and anxiety levels, their attitudes towards school and classes, their ability to pay attention, their risk of getting into trouble, their level of tiredness and their level of being calm and relaxed. While more research is needed, it was concluded from the data that nature has a positive effect on student's moods and behaviors.

Achievement

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WHAT EFFECT DOES AN EXPOSURE TO NATURE HAVE ON STUDENTS
DURING THEIR SCHOOL DAY?

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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 1

INTRODUCTION

Getting Started

The idea of sitting down to write my professional thoughts of my graduate studies is daunting for a number of reasons. First and foremost, I am the mother of two young children – one, a precocious and constantly busy four year old girl, and the other, a laid back six month old boy. They couldn't be as opposite or more enjoyable in every way. I am also fortunate to have met a husband who shares such similar interests. We have been best friends since the day we met at a college that drew us there for similar reasons. We pursued similar tracks in our undergraduate studies and then decided to return to school to earn our teaching licenses. We both teach middle school science in the same building. We decided to pursue the same graduate degree program. My husband and I have discovered the amazing joys of parenting now. We both have a great respect and fondness for the outdoors that we have incorporated into our lives. One of the significant differences in our lives is that he was fortunate enough to have completed his Masters before time was as valuable as it is now.

Our life together is much busier these days – both personally and professionally. It has been exciting to visualize my capstone but it has been difficult to find the time to get it on paper. In a way, having a family has been a driving force in the maturation of my wide array of changing ideas. Nature is so much a part of our family life for so many reasons. Paul and I have both benefited from it throughout our lives, we want to offer the

same to our own kids. It has now become part of our parenting style to get our kids outside as much as we can because we feel so strongly about what it can do for people, especially the young. I now find that the topic I have settled on directly affects our family life just as much as it will of the students I teach.

In addition to a busy family life, I have grown to fully appreciate how busy a day in the life of a teacher can be as well. The notion of digging an inch deep and a mile wide has nothing on what quality teachers have to do during their typical day. I think that great teachers want to do what is best for their students and are willing to make these efforts as earnestly as they possibly can. Given all this hustle and bustle, I am committed to stay focused on why I went into education, which is the love to educate. I love science and nature and I love to help younger people understand how it all works.

Given all the demands of teachers, students are also feeling the crunch of stressfully busy lives – in addition to just being kids. I wonder what giving kids a “break” would do for them. Not a break from learning, but a break from traditional learning environments and strategies. In my study, I want to see what giving kids a bit of “good old fashion fresh air” would do for them during their hectic school days. So this is what I want to investigate – what effect does an exposure to nature have on students during their school day?

The theme and questions of my current focus came to me with the help and encouragement of my “grounding force,” my family. When I get home, family comes first. As a parent, raising the healthiest kids I can is my priority. I want to help them

achieve their full potential personally, professionally and psychologically in every way a proud parent would hope for. The past few years, putting my family first strengthened my developing thoughts on the burning questions. I didn't want to spend the time or energy on a project of this magnitude unless it meant that I could use the information for something important in my career. I am learning that the information I want to apply to my own students can even affect my own family as well. Even though my capstone question focuses on the effect of nature on students, I believe that what I have learned about the need for nature exposure during a child's life extends to my own family as well.

A Younger Nature Lover

In order to explain how I got to this point in my life and the questions I would like to answer through my research, I have to go back much further than simply "before kids." My focus on children and learning and nature studies began a long time ago with some of my own childhood memories. Now that I have my own kids, I can appreciate how early experiences can influence the development of a person. I was asked once to write a personal timeline paper on who influenced my nature development. Immediately, memories of my grandfather, who provided some of my first memorable nature experiences, flooded my thoughts.

Possibly one of my most pivotal memories was when my grandfather shared his bird identification field guide with me. Years of being used on road trips and visits to the lake resort and cabin left this special item worn and tattered. I remember paging through the illustrations of all the various bird species and wondering where they all lived. One

of the first birds my grandfather helped me identify was the red-winged black bird. Even though this bird is as common as a robin on a spring day along the roadways of Minnesota, being able to put an actual name to something was magical. To me, the world made a bit more sense. I looked forward to visiting my grandparents so I could page through more birds to learn what their names were. I didn't realize it then, but I was learning about my sense of place in this world. It was liberating for me being so young and feeling as if I belonged to something larger than myself.

The world suddenly expanded beyond what I knew around me. Even as a young person, I was so enthralled with this book, it could hold my attention for a long time. I know I am a nature minded person, but I wonder if nature and being outdoors has this same affect on people who would not call themselves nature minded? I wonder if nature can grab people's attention and hold on to it to help them focus and pay attention. This would of course be a benefit in the classroom.

I also remember my grandfather taking me fishing. He took me fishing in his boat in the summertime and in his ice house in the winter. The memories of these experiences are still vivid – from the earthy smell of the bait to the gentle, almost metallic sound of the water lapping against the aluminum boat in the summer. Better yet, I recall the winter and can still see the warm steam that would rise from the mug of tomato soup that my grandmother packed for an afternoon in the ice house. Even the sweet minty smell of his tobacco is as if he is sitting right next to me. I remember how my grandfather would teach me to hang the bait on my line. Worms and minnows, even

leeches; we always used live bait. I remember at first being squeamish about the leech wrapping itself back onto my fingernail. I wondered if it could suck blood through my nail if I left it there long enough. Finally, the kaleidoscope of sunsets we watched as the sun would sink across the icy lake. Even though there would be a chill rising up my spine from the cold damp air settling into me after a long day outside, it didn't bother me. The colors were unlike anything I had seen before! The memories I have are so vivid and full of senses. Being in nature helped awaken my creative and imaginative side. I wonder if being outside helps others do this as well?

I don't think it was his intention, but what he taught me gave me an appreciation of nature that was so endearing it has stuck with me for life. Something as simple as baiting my own hook was a life lesson of self-confidence and nature appreciation. This taught me that nature wasn't "gross" like so many kids can learn early on. I didn't know it at the time, but as I reflect on memories like these, I realize that they taught me to appreciate nature and being outside unlike anything else for me while growing up.

As I grew older, nature and being outside was still alluring. I remember the excitement of creating worlds only I could relate to in my backyard. I knew that I was playing make believe, but it didn't matter. It gave my creative mind a whole world to invent. I recently saw the motion picture *Bridge to Terabithia* (Lieberman et. al, 2007). Thinking of my own childhood, this movie reminded me of the creative power a child's mind and the power that nature has over it. Even the simplest of backyard environments can become an alternate universe to my young mind. Does this happen for other kids as

well? I know it does for my daughter, who is only four years old. She is already developing her creativity as she plays outside.

I moved around a lot as a younger child. Looking back and reflecting on the places I grew up, I can remember the yards and outdoor spaces much more clearly than I can the inside of the houses. As a kid, I wouldn't have thought this was significant, but when I contemplate it as an adult, it was probably much more significant than I ever would have thought on my childhood development. I wonder if kids who spend more time outside have similar experiences and paths into adulthood as I?

Before I even entered kindergarten, I lived in California and Washington as well as Minnesota. I have one very vivid particular memory of living out West and collecting tadpoles from a muddy puddle by our home and bringing them home in a pail to watch grow. Has it stuck with me because it had such an impact on my life? I vividly remember a lot of little critters that I saw or brought home. Did this in some way help in my own development as a person? Noticing differences, counting things, watching things grow and change, I wonder what might have happened had I not had these experiences? Would I have taken a different path into adulthood?

As a kindergartener back in Minnesota, we lived in an old farmhouse with some land where I was able to wander the property. One time, I caught a field mouse that was running across our yard when my dad was mowing. I grabbed it and ran up to my dad to show him. It bit me and I remember my terrified parents on the phone with poison control as my dad sucked my bleeding finger because of their fear for rabies! I also

discovered a den of rabbits here. They couldn't have been bigger than a child's hand, but they were old enough to run all over when I took off the grass that covered the hole. My mom and I ran around with a box picking up each one. My parents let me try to raise the rabbits in our living room. To be honest, I don't remember if they survived, but I remember very clearly the experience of caring for them.

At this house, I learned how exciting life could be. I understood what metamorphosis was even before kindergarten because of this house. I had a firsthand experience watching it happen...at our dinner table. One day at lunch I told my mom about the "grape" that was hanging from our kitchen table. The "grape" turned out to be a monarch butterfly chrysalis that my parents allowed me to watch as it transitioned into a butterfly. I could go on with other stories, but the main point is that I never had to look very far to learn about and experience nature. This house was never dull and I was lucky. I learned so much about how life worked at this house and the nature that surrounded me as I played. I learned about life cycles, death and paying attention to details. Nature was all around me all the time. The memories are clear because it was interesting, but I wonder if seeing the things I saw and doing the things I did helped me reach certain developmental stages in my life that were critical to a young person? I will never know for sure, but I suspect that they did.

When I was in early elementary school, we moved again for a short time. Our neighbor family across the street had found an abandoned duckling. All the neighborhood kids got involved with caring for this little duck. It was fun watching it

grow and change. I feel it is important to note that most of the memories I am sharing also included kids playing outside. No matter where I lived or what I did, kids were outside.

I think I was in second grade when we moved again. We lived in a quiet suburban house with a small yard. I remember the brush in the backyard that separated our property from the neighbor behind us. For a kid, it was like secret hiding place to play. It was like our own little world. As I grew old enough to ride my bike around town with my friends, we would meet at the local park any season of the year. Whether it was ice skating or riding our bikes, this was the place to be. I don't see kids playing outside as much as I remember doing myself. I live in a very suburban residential town – almost every home has kids living there. But I don't see them. There are a few at the park from time to time and maybe a few riding by on a bike, but considering how many of them make up our town's population, they are hidden from view. Is this changing our society and culture in ways we don't know? If kids are playing differently these days, what affect does this have on them, if any?

In sixth grade, our class went to Camp Isabella Nature Center. One pivotal memory from this experience was when we were told to “survive” outside on a cold winter day with only 3 matches, a kettle, and the knowledge they gave us about making tea from the wilted Labrador Tea leaves and snow that we could find in the woods. We were split up into small groups to go out and fend for ourselves. I can still practically taste that bitter warm brown water with the bits of leaves and twigs floating around in it.

But that bitter brew never tasted so sweet because I made it while “surviving in the brutal wilderness,” as I remember it. I felt so empowered with my independence and strength that day. I remember that all of my classmates loved the experience as well. Even the ones who typically were less enthused about school really got into the nature experience. At least for a time, everyone’s attitude towards school was at an all time high. That personal triumph had more of an impact on me than I ever would have thought. I could go on and on with stories all having to do with my growing up in the outdoors. The houses I lived in, the schools I have attended, and some caring adults gave me things that many kids do not get, especially in the more urbanized and suburbanized neighborhoods these days.

I discovered myself more during my next few years of junior high school. Even though I was growing up, I didn’t lose touch with my interest in nature. It just changed a bit. We moved again to a house that had a wooded backyard. I remember making a small path in the wooded area, and even though I was older, I would still go there and let my imagination wander. I imagined that this “trail” was larger than it really was and would take me to wilder places. Again, I was lucky to have this in my own yard.

There was a park a couple miles from our house called Big Willow. When I got old enough, I would bike here alone. It had a crushed granite trail through the park and a floating bridge you could cross one end of a large pond to the other. The park was named after this huge willow tree in the center of the park. It was big enough to climb up into on several “levels.” The main trunk of the tree was so big it almost made a room in the

center. Kids would climb up into this tree to play. I would ride my bike onto the floating bridge. In the center, there was a larger floating deck area where you could sit among the cattails and reeds. As summer continued, the plants would grow tall enough so that you couldn't see the roads or anything else anymore. If you sat on the deck, you felt almost alone with the blue sky above you and the reeds and cattails hiding any hint of the city. All the way through high school, I continued going to this park by myself because I loved the quiet. I spent a lot of time there. In fact, reflecting back, much of my independence developed there. It was close enough to home to be "safe," but far enough from home to feel away and on my own.

My parents always had a strong trust in me which helped make me a very independent person. This independence continued to grow as I entered college and left home. All of these stories reinforce the rich memory of my time outdoors as a child. What I thought of as "normal" growing up isn't what most kids get to experience as much today. From what I learned through my research, it seems as though kids are growing more and more disconnected from nature at even younger ages, a time when it may be more important than ever.

The memories from my childhood only go back as far as I can remember. I have been told by my parents that I was crawling on the ground eating bugs well before I could remember this. I know that my own memories of nature had several positive effects on my own personal development. But I wonder if my earlier experiences, before I have a

memory of, also contributed in some way? I had never thought of this question before I had kids.

My daughter, Taylor was a fussy baby. She would not hesitate to let us know when she needed something. Mainly this was by crying. Mainly what calmed her was simply holding and rocking her but we found that being outside almost always calmed her down almost immediately. It was amazing to us that a baby, only a few weeks old would calm down when taken outside. How did she know? Was there something about being outside that even a baby could respond to in a calming manor? I know that nature can calm my thoughts very well, but what about kids and even the very young? This was interesting to me. Does a baby need very early exposure to nature to fully develop? Taylor also had a mild dose of jaundice and needed mild treatment for it. The treatment was to simply place her by a window in only a diaper for some time each day. Is it built into our human DNA that we actually *need* nature – both physically and mentally to mature?

Young Adulthood – Still Interested in Nature

My choice of colleges to attend couldn't have been a better fit for me for several reasons. One reason, in particular, is because this is where I met my husband, Paul. Another reason is that the campus was nestled into one of the most beautiful settings in central Minnesota. The College of Saint Benedict and Saint John's University provided me with an amazing place to develop my sense of place that would take me into adulthood. The campus of Saint John's, in particular, was paradise for a nature lover.

Paul and I were literally friends from the day we met. We soon realized we had similar interests in learning and the outdoors and became best friends. We would walk around the beautiful campus on our way to class, hike and cross country ski on the miles of trails through the woods, camp on the island, canoe on the lake, star gaze on the “tundra,” bird watch, and just learn to appreciate and love the world around us. The few years we spent at that place helped us become independent young adults, enthusiastic to explore, and develop this into our way of life.

Having this environment as my backdrop for higher education couldn't have been better for me, either. I was challenged academically here which was wonderful, but stressful and difficult at the same time. I clearly remember choosing places to study with open windows or views of nature, which were abundant. I could easily take breaks and get out into the fresh air so readily there. It cleared my mind on countless occasions which allowed me to return to studying refreshed and ready to focus again. I truly think this helped me be successful in college. If this was true for myself, I wonder how nature affects other learners. Does it help them focus, concentrate, and pay attention like it did for me?

Adulthood – Life Choices, Difficult Times and Sharing What I Have Learned

On a hiking trip Paul and I took to Michigan's Pictured Rocks National Lakeshore, we watched some people kayaking the beautiful waters of Lake Superior and we decided we needed to buy kayaks to get us onto the water rather than just near it. So our first big purchase together was a pair of used sea kayaks with gear. This became our

main form of recreation and determined our destinations for several years thereafter.

Even when we needed to settle into an “adult” working life, we tried to incorporate nature into our lives. Paul and I got married and began our careers in education. Not long after this, we began to pursue our graduate education courses through Hamline University.

The first class I took towards my graduate degree was a course titled “Minnesota Biomes.” Our instructors were Mike Link and Craig Prudhomme with the Audubon Center of the North Woods. I instantly knew this class was pure experiential education in the outdoors. I had always known I had loved the outdoors and as I began my teaching career, I loved this, too. I was also a very good student all through my schooling years. It came easy for me and I had a positive attitude about school and classes. But this type of class was new to me and I rediscovered my love of learning in a whole new way. I wonder if bringing students into nature can do this for them as well? Could it give them a better outlook or attitude? Through this class and others similar to it, I was beginning to realize that I could bring together my love of the outdoors and teaching my students about the passions I had.

In my second year teaching, a fellow coworker and I took over an elective class called Minnesota Wildlife. We transformed this class into a dynamic one of environmental studies of Minnesota. We began taking the kids out to a small wetland area about a quarter of a mile from the school grounds. The school ran on a block schedule with ninety minute classes which allowed us to easily make the short hike to the wetland and back to work on field based environmental studies. We studied everything

from water quality testing and bird identification to invasive species and nature journaling. What I loved the most, however, was that it got kids outside and they really enjoyed learning outside. They actually learned through doing something in nature rather than just reading about it. As I was getting settled into teaching high school life science as well as taking my own graduate classes, I was also beginning to think about my possible capstone topics and questions. This process started over 6 years ago and my ideas have evolved quite a bit throughout this time.

Even though my ideas have changed somewhat, they have all had something to do with getting kids outside to learn. In the Minnesota Wildlife class that I taught, I could tell that kids liked getting outside. I have no data to back this up other than the observational data of watching kids and talking to them while we were out. I noticed that kids loosened up and seemed to enjoy learning the topics of our class better than if we were inside learning about the same things. An additional benefit was developing better relationships with kids when we went out. I found myself talking to students about their own interests more than I would if we had been in a classroom. Even when we were out there actively learning, the atmosphere of our “classroom” was much more relaxed and open. The students even seemed to be having fun learning!

I found that going outside to learn worked so well in my environmental science class that I decided to extend the idea to my other classes as well. I started taking my biology students outside to learn when it applied directly to our curriculum. We mainly went out during the ecology unit because it obviously worked well with the curriculum. I

found that the other units were more difficult to justify, but from time to time, we would even go outside on a nicer day to read outside. Each time, student's moods and attitudes seemed to improve.

After five years of teaching high school, I transferred to a different district and started teaching middle school Earth Science. This school developed something called "responsive hour," which was basically an elective class for the middle school level. The teachers were mainly given the freedom to develop a class with much more flexibility than the more traditional "core" classes. Even though we were encouraged to make these classes related to our primary curriculum and meet our district and building learning goals, we didn't have to worry about meeting all of the same state and national curriculum standards the way we did in our other classes.

I decided to design my responsive hour class around what I had learned myself while working on my graduate level classes. In addition, there was an energetic eighth grade history and geography teacher in my building who was also enrolled in the same Masters program through Hamline University. Brianna (Brie) Messick was just beginning her courses while I had finished all of mine except for this research process. It was exciting to design this class with another person because it allowed us to "team-teach," a rare opportunity in the traditional public school setting. Also, she had such similar interests as I had but was coming from a whole different perspective in academic disciplines, hers is social studies and mine science.

Since most of our graduate program's focus has been learning about Minnesota's natural and social histories, we had an almost unlimited palette to design our class around. Another very unique resource our school has available to us is a forty acre plot of woods directly across the street from us. It was purchased by the city several years ago. A wood chipped trail was installed just a few years ago which made it usable to hundreds of kids to learn in a natural, outdoors setting more easily.

So Brie and I designed our class around Minnesota's history from a natural perspective while using the woods to enhance the class. We take our students outside about twenty percent of the time. Our class adapts to the seasonal changes that happen outside and to the needs of our students that also change since we get a whole new class each quarter. Teaching this class helped me develop my ideas for my research even more. Brie and I found that kids loved being outside for class. We would even get comments that this was their favorite class. Interested parents at conferences would ask us what the heck we were teaching in this class because their students liked it so much and wouldn't stop talking about it. This reinforced for me that there is something about teaching kids outdoors and how intoxicating it is to them.

On a recent trip outside with this class, we taught the kids how to use GPS units. They found their first "geocache." But almost at the same time, another group that was close by had also found a recently dead saw whet owl near the base of a tree. The excitement grew. They all had a chance to see an owl up close and it was the same species we had been teaching about the previous day. We had some time before we had

to head back inside and the kids asked us excitedly if they could “go explore.” Eighth graders ran about like little kids to explore the fallen trees, the rest of the trail, or whatever they wanted for a couple of minutes. The mood had changed even more.

It was an amazing teaching day and on our way back in, Brie and I were saying how we thought that some of these kids would probably remember this day for the rest of their lives. That is powerful for me as a teacher. Moments like this are why I teach. Although I have had great days in the classroom, they could never compare to an experience like this. I want to know how taking kids outside can affect the rest of their day.

As a classroom teacher, I have firsthand experience with student’s disconnect from nature, which seems to be much more of the norm rather than the previous stories I shared. For example, I find there is misunderstanding about where our food comes from and how it relates to “nature.” My students seem to have a lot of misconceptions in their prior knowledge about food and its connection to the environment even though both communities I have taught in still have a strong degree of agricultural backgrounds.

Many of my students could rarely make the connection between farming and the more “natural” world. For example, when we discuss how energy intensive it is for humans to consume beef versus grains in their diets, they struggle with the reasons why. This misconception continues, even after they have learned the basic principles of ecology. This is a concern for me because I believe it marks a direct misunderstanding of how we as humans are connected to nature for the food and water of our own survival.

Another anecdotal example comes from recently teaching about climate change and our role in responsible action. Most students would state that they wanted to be an active part of solutions, but would still fail to see past how the choices they made had a direct affect on nature. They could easily make the connection about how nature and the environment affected them, but had a more difficult time understanding how they affected nature and their environment through their own lifestyle choices. I realize that many students, especially in the middle school years, can be egocentric by nature but I am noticing firsthand that they have a real disconnect with nature and their role in it. It seems to me that they are losing a vital connection to their natural world. These examples provide me with a reason I would like to see if giving students a dose of nature could help them in some way. According to the literature, which I will review in the following chapter, several studies exist and more are building that support the idea that nature has a positive effect on kids in many ways.

Nothing could prepare me for the difficult news that my one and only sibling, my younger brother, had been diagnosed with terminal brain cancer. His battle lasted about seven years and throughout this time, myself and my family were faced with significant emotional toil. Although we have many wonderful memories to look back upon, this was the worst thing a family could go through. My brother was a pillar of strength for the rest of us in many ways and he left behind an amazing legacy, even at only 25 years old. For myself, I found a lot of peace during this time. Being outside and taking breaks from the hospice process helped relieve a lot of stress and anxiety for me during this time. I could come back to him and feel a bit more refreshed. I continue to find this feeling through

nature. I told him before he died that I would remember him every day and I have kept my promise. I told him that nature was my church, and that any place I went, I could find peace in all the beauty around me. Although the world seemed so cruel and unfair when he was experiencing his struggles and pain, he continued to find the beauty and good in everything, despite this. I admired him for this.

There was a story about a dragonfly that a family friend gave to us after Will had passed away. The story goes somewhat that the dragonfly, when it lived in the water could never understand where it's friends were going and why, when they felt the urge to climb up onto the reeds and out of the water and never return. The dragonflies all made a pact with each other that the next one to leave would return to tell the others what was so special in that other place. They failed to realize, however, that each of the dragonflies would try and try again to return to their friends under water but could not because they had changed from larvae into a beautiful flying beast. All the dragonflies above water would fly back and forth on top of the water to try and tell their friends below that it was beautiful up there, but could never reach them. They had changed and were not allowed to return.

This beautiful story is an ideal example of how I find strength from the natural world. I have always been "nature-minded" and have found much more peace, spirituality, and understanding of how the world works through science and nature than anywhere else. It just makes sense to me. In my brother's passing, I continue to find peace in knowing his body and spirit have been recycled into the things I find beautiful

every single day. Every glimmer of sunlight, dance of spring leaves, and rush of wind across my face reminds me of him and of the beauty in the world, despite the pain.

Nature is both cruel and honest and I find emotional serenity in that. I wonder if students can find emotional support through nature like I do. I would expect that it can.

What is Nature's Effect on Students?

I realize I am starting small. I would really like to know how it influences their whole student career and life, but this is beyond the realm of what I am capable of right now in my career. There are several limitations to my study that I can think of. Class size is a huge factor for me to feel successful with this study. My typical class size is about twenty eight students. In only one of my classes do I have paraprofessional support. Brie and I currently have eighteen students total in our responsive hour, which makes an ideal student to teacher ratio. When I take my traditional Earth Science classes out, the ratio is approximately twenty-eight to one. I wonder if this much larger ratio will affect my results.

Classroom management issues can also be a huge determining factor to the success of my study. If I have to divert my attention to others the day we go outside, this could affect the other student's experiences as well. We are also limited by time. Our classes are only fifty two minutes in length. While this is enough time to get out to the woods across the street from our school and make the $\frac{3}{4}$ mile loop, it can get tight when you consider all the different ability levels. I don't want the students to feel "rushed" while they experience nature. Depending on ability level while we are outside, the lesson

and path we take might have to be altered to accommodate any differences. If each class gets a slightly different nature experience, this could affect the data as well.

In my research, I don't necessarily want to learn about students comfort level for the outdoors or what they learn outside. Instead, I want to understand how being outdoors during the school day affects the rest of their day in terms of moods, behaviors, attention span, and creativity for example. I also realize it is difficult, if not impossible to measure this from a single day's sample, especially in the long run. However, I do want to find out if there is a measureable effect, positive, negative, or no real difference, during the same day they have the experience. I will compare their responses to what they feel is a "typical" school day for them, a day where they spend their time inside the classroom. I want to know if their attitudes, moods and behaviors change at all from a nature experience.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Louv (2005a) discusses what he believes is a shift in our culture and younger generations loss of their connections with nature. He reviews research that has been done regarding people's varied connections with nature and what it can do for us and what the lack of it might be doing to our culture and kids, in particular. Louv explains:

Nature-deficit disorder describes the human costs of alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses. The disorder can be detected in individuals, families and communities. Nature deficit can even change human behavior in cities, which could ultimately affect their design, since long- standing studies show a relationship between the absence, or inaccessibility, of parks and open space with high crime rates, depression, and other urban maladies. (2005a, p.34)

While he describes what an absence of nature can lead to, Louv also recognizes the benefits of nature when it is present in people's lives. He states:

Nature-deficit disorder can be recognized and reversed, individually and culturally. But deficit is only one side of the coin. The other is natural abundance. By weighing the consequences of the disorder, we also can become more aware of how blessed our children can be – biologically, cognitively, and

spiritually – through positive physical connection to nature. Indeed, the new research focuses not so much on what is lost when nature fades, but on what is gained in the presence of the natural world. (2005a, p. 34)

This chapter will begin with a brief cultural history of Americans and their relationship with nature. I feel that in my own teaching and life experience, I have noticed a shift in young people’s relationships with nature and outdoor play and think it warrants a review of what might be happening within our culture as a whole. This section will continue with what others have found that supports what nature and outdoor play can do for people, especially children and students in a typical classroom setting. Studies that consider nature’s effect on academic achievement and creativity, nature as a multisensory learning environment, nature as rehab or treatment for troubled teens, nature’s effect on mental health, nature’s effect on students with Attention-Deficit Hyperactivity Disorder (ADHD), and nature’s effect on child development will be discussed. This chapter is a summary of what was found.

History of American Connections with Nature: The Three Frontiers

Louv (2005a) borrows an idea presented first by an historian from 1893, Frederick Jackson Turner, to describe the evolution of American’s relationship with nature as three “frontiers.” Jackson presented his “frontier thesis” as an explanation of how America’s development was characterized by the opportunity for free land and Westward settlement. Jackson argued that this frontier was “the meeting point between

savagery and civilization” (as cited in Louv, 2005a, p. 17). Jackson felt this first frontier defined early American culture and what he described as having a “restless, nervous energy; that dominant individualism” (as cited in Louv, 2005a, p. 17). Louv adds some specific events such as “immigration, the industrial revolution, and the Civil War” (2005a, p. 17) that he felt helped shape our early American culture and the individualism that Jackson proposed.

Louv builds on Jackson’s frontier thesis to describe the further evolution of American culture into two more distinct “frontiers” based on our evolving relationships with nature. He describes what he calls the “second frontier” of the early 1900’s, a culture that more romanticized their relationship with nature rather than their dependence on it. Louv gives the example that if the first frontier’s heroes included people who pioneered the land like Lewis and Clark and Davey Crockett, the second frontier was characterized by Americans like Teddy Roosevelt and Edward Abby, who considered themselves frontier explorers in a more trophy sense in what he calls “suburban manifest destiny” (2005a, p. 18). Louv mentions that this second frontier had an almost imaginary relationship with nature. He generalizes people of this second frontier generation as wanting to celebrate a more domesticated and controlled version of nature; they wanted to preserve nature’s more aesthetic characteristics.

Louv marks the beginning of the “third frontier” with the end of the U.S. annual survey of farm residents in 1990. He noted that the farming population had dropped in the United States from almost half in 1900 to almost none 90 years later, a decrease which prompted the decision that the farm survey now irrelevant. Louv suggests that

this decision meant the baby boomer generation might be the last of Americans who would feel an attachment to the land and water through their knowledge of and relationships with farming. He says that the culture of younger people in our country no longer have this connection to farming.

He feels the youth that make up this third frontier are characterized by several trends that he feels need to be investigated more. These trends include:

A severance of the public and private mind from our food's origins; a disappearing line between machines, humans, and other animals; an increased intellectual understanding of our relationship with other animals; the invasion of our cities by wild animals (even as urban/suburban designers replace wildness with synthetic nature); and the rise of a new kind of suburban form. (Louv 2005a, p. 19)

This is an almost absolute disconnect to nature and what it provides for us.

Laltoo (2009) attempts to put the behaviors shown in kids with ADHD in perspective from a historical standpoint and a change in our culture, similar to the changes Louv proposes. The behaviors or "symptoms" of ADHD are often seen as being negative in today's culture, especially for boys, who may have actually benefited from them at one point in our history. She says:

Throughout most of history, energetic boys were particularly prized for their strength, speed and agility. Their energy and physicality would have been directed in constructive ways doing farm chores, climbing trees and playing in

nature. It is only recently, with the urbanization of our culture and the disconnect from nature that symptoms of ADHD are seen as a disorder requiring medical intervention. (para. 5)

Regardless of the benefit nature might have on children, not all people are in agreement that there has been a shift in how kids spent their time in previous generations. Cleary (2008) suggests that Louv might be too sentimental in his evidence. He argues that “Nostalgia is not science. No matter how amusing the anecdote, it’s a story” (p. 14). Cleary asks the questions if there is actual scientific evidence to support how much time children spent outside in previous generations, what they did while outside and how we can compare children in modern times with those of the past without this evidence. He suggests that Louv is being too nostalgic that every kid went outside to play innocently and to find themselves as he describes in his book. Cleary suggests that kids also had other things to do, just like in the current generations. He feels that kids are relieving their boredom through the use of all the modern tools in addition to being outdoors. Cell phones, TV, computers, and video games, are all options children today in addition to being outside playing and he is ok with this. Cleary feels that in moderation, children will not suffer by being exposed to these as well. He does, however, agree with Louv and support the idea that kids should be exposed to the outdoors in positive ways and if this includes technology, it is good.

Cleary (2008) argues the reason children don’t play outside as much should be blamed on adults themselves for encouraging this behavior and all the negative stigma

about being outdoors such as poor city planning with unsafe walking areas, crowded streets unfavorable for bike riding, fear of abduction and complaints of uncomfortable weather conditions. He suggests that kids need to have an adult role model in order to experience nature and that they won't necessarily do it on their own. In a way, he is both in argument and agreement with Louv. But bottom line, he agrees that kids should get outside a lot to not only expand their world beyond their own neighborhood and develop a sense of independence to learn to be in the outdoors on their own, but also to treat each discovery as a treasure and to make nature something they experience every day.

Literature Search – Nature's Effect on Children

Nature's Effect on Academic Achievement and Creativity

In my own teaching experience, I feel that the one thing that seems to remain constant in the world of education is change. But as Louv (2005a) mentions, the current generation of kids has also changed more so than ever before which may force us to change our way of thinking about education once again.

One of the reasons education, and specifically science education, has changed since the last administration is the No Child Left Behind legislation. "One of the unintended consequences of NCLB was that a whole set of things, environmental education included, got pushed out of the classroom because of the initiative's overwhelming focus on reading and math" (Cleaver, 2007, The Indoor Generation section, para. 1). This initiative continues to affect all of America's school children.

While reading and math are important, the research suggests that nature is as well. A shift away from it might negatively affect our kids.

Wilson (as cited in Louv, 2005a) feels students are lacking real-world experience in learning and he believes that this current generation is replacing outdoor play and direct learning experiences with indirect learning through machines. He acknowledges that they are intelligent but that they are lacking somehow and suggests that something is missing in their intelligence.

Wilson provides a summary for how the evolution of the hand has affected us as a species and a culture of people. In addition, he feels it has often gone unnoticed and underappreciated for the huge impact it has on us. Wilson explains that our current societal norms do not always fit with what the hand was evolved to do, allowing us to survive in our natural environments, for example. Wilson states: “how do we begin to tolerate the modern world we live in? Where is the fulfillment for a modern office- or factory-worker performing automated or repetitious tasks within a physical and social context that scarcely resembles any environmental ensemble from the formative eons of human prehistory” (1998, p. 12)? He continues to question if the way we live today – our hobbies and activities such as playing video games, watching activities on TV. and taking weekend hunting and fishing trips are ways we as humans are satisfying our “hunter-gatherer” legacies. Wilson relates this change to how we might be altering the timetable and direction of future human evolution.

In 2005, when Louv brought the idea of nature deficit disorder to the public’s view, research to support nature’s effect on kids was few and far between. Much more

existed for adults, but even so, there was a limited body of evidence. But Louv and many others who have studied nature's effect on children would agree that we shouldn't have to wait to reap the benefits of nature. Louv suggests that "even the most extensive research is unlikely to capture the full benefits of direct, natural experience" (2005a, p. 109). He discusses the highly subjective and difficult to measure quality of nature's benefits on creativity and spiritualism, for instance and offers this example to support what he means:

As the sign over Albert Einstein's office at Princeton University read, 'Not everything that counts can be counted, and not everything that can be counted counts.' We don't have to wait for more, needed, research to act on common sense, or to give the gift of nature – even when it might seem to be too late. (2005a, p. 109)

Gardner proposed his theory of multiple intelligences originally in 1983 which expanded our understanding of intelligence beyond the standard I.Q. tests to include several types of intelligences based on how people best learn. He says that "each learner's intelligence profile consists of a combination of relative strengths and weaknesses among the different intelligences" (Moran, Kornhaber, & Gardner, 2006, p. 23). Recently, Gardner added an eighth intelligence, called "nature smart." This intelligence is characterized by paying attention to details and student who would learn best in the outdoors or by studying nature or natural phenomenon. The naturalistic intelligence is "the ability to distinguish and categorize objects or phenomena in nature"

(Moran, Kornhaber, & Gardner, 2006, p. 25). If this is true, teachers are not fully reaching an entire set of learners by not giving them exposure to nature when they learn.

Many people interested in nature's positive effect on kids would agree that the benefits seem to be there, but that more objective scientific research needs to be done.

Fife explains:

The connection between investing in environmental education and academic success is finally gaining credibility. Research confirms that learning capacity is explained through experiential learning. Students benefit just by being outside.

The environment appeals to multiple learning styles. When the classroom is a forest, swamp, or field, observation, critical thinking and problem solving abilities increase. (2007, para. 8)

Louv (2005a) discusses the testing phenomenon that heightened in the late 1990s doesn't allow for time to teach students hands on in a natural, outdoor setting like Fife credits.

He believes part of the problem in current generations is that recent educational trends are leading us down the wrong path.

The country of Finland seems to take a different approach to education and the results seem to be promising. Louv (2005a) considers a review done by the Organization of Economic Cooperation and Development in 2003. They found that while the United States placed in the middle of the pack for literacy and math, Finland beat out thirty-one other countries, including us, by placing first in the literacy category and the top five in science and math. Among other possible indicators for their success, it seems they

encourage play and outdoor exposure several times throughout their day, as well as valuing environment-based studies.

For some countries, bringing the outdoors to students goes beyond the schoolyard. Louv, (2005a), mentions several examples of Scandinavian cities that are using “green” architecture in their city and school planning. While the changes are mainly credited for an aesthetic improvement, the more natural designs are also felt to improve everyone’s concentration and make them more productive – children and adults alike. Helping kids concentrate would ultimately lead to improved academic success.

Faber Taylor, Kuo & Sullivan (2001b) discuss the negative outcomes faced by inner city children such as lower academic achievement, delinquency, and teenage pregnancy. They say that in order for children to avoid these outcomes requires self-discipline which in turn requires them to utilize direct attention. They say that this direct attention can be improved through contact with nature. They studied children living in an inner city area with varying levels of green space near their homes. They found that children’s performance on tasks involving concentration, impulse inhibition, and delayed gratification were significantly improved in girls but not for boys when they had green space near their homes. They also found that girls spent more time nearer their homes and boys ventured further away and suggested that green space in distant areas might benefit boys equally. This research suggests that green space can help children concentrate, in addition to avoid other negative behaviors, which would benefit them academically as well.

The State Education and Environmental Roundtable issued a report which reviewed how students in environment-based programs compared to their peers on standardized tests. According to the report:

The observed benefits of EIC (Environment as an Integrating Context for learning) programs are both broad ranging and encouraging. They include better performance on standardized measures of academic achievement in reading, writing, math, science, and social studies; reduced discipline and classroom management problems; increased engagement and enthusiasm for learning; and, greater pride and ownership in accomplishments. (Lieberman & Hoody, 1998, Executive Summary Section, para. 4)

This report suggests nature and environmental based learning programs offer a wide range of benefits to multiple learning disciplines.

Bergin (1999) wrote about what influences kids on classroom interest levels. Among the many factors he studied, “biophilia,” was one of the factors that he feels helps generate classroom interest and motivation. While he asserts that the evidence can be what he calls “sketchy,” he said there was evidence that kids can be motivated by it.

According to Pergrams and Zaradic (2007), scores in science and other subjects for elementary school students improve after being immersed in science and nature. They referenced the success that California has experienced in their testing scores after science was emphasized again. According to this study submitted by the American Institute for Research, “Children who attended outdoor school significantly raised their

science scores by 3 points (27 percent), as measured by a pre- and post-survey administered immediately upon their return to school” (2005, p. 38).

According to a 2005 study by the New Mexico State Parks and the Public Education Department, outdoor based education has several benefits to students. The study found:

Outdoor, interactive education can improve student academic achievement, increase standardized test scores, reduce discipline problems, increase teacher job satisfaction, increase enthusiasm for learning and build resource stewardship and citizenship skills. (Asmus-Otero, 2007, para. 4)

Asmus-Otero notes the connection between kids technology use and their disconnect with quality interactions with nature and academics. She reports:

The average American youngster now spends more time watching television (1,023 hours per year) than in school (900 hours per year). Studies show that watching over 10 hours a week negatively affects kids’ academic achievement. In addition, studies show a link between “screen time” (watching television or playing video games) and childhood obesity, both nationally and locally. (2007, para. 10)

Cleaver also refers to the work of Day quoting him saying: “if you use the environment as an integrating theme across the curriculum, test scores go way up” (as cited in Cleaver, 2007, The Indoor Generation section, para. 4). Day feels that you can’t

just go outside to gain these results, however. He feels that you have to bring it back to curriculum and when you apply that together you will see improvements. According to Cleaver, Day also says “One of the unintended consequences of No Child Left Behind was that a whole set of things, environmental education included, got pushed out of the classroom because of the initiatives overwhelming focus on reading and math” (as cited in Cleaver, 2007, The Indoor Generation section, para. 1).

Charles not only mentions the multitude of health related problems that kids experience from an absence of connections with nature but also the benefits from having the exposure. She adds that natural learning environments do not have to be complex to gain benefits. Any setting with natural features will work for “calming antsy minds and increase both children’s ability to concentrate and their creativity” (as cited in Cleaver, 2007, The Indoor Generation section, para. 2).

Melber and Brown (1998) studied informal science education in kids with disabilities. They found that when these students learn in locations outside of the traditional classroom, including the outdoors, students benefit from increased motivation which leads to improved learning. They say that it helps not only students with disabilities, but all students, learn science and that the learning gains are vital when trying to teach to all learning styles.

The website for the Campaign for Environmental Literacy in 2007 explains the importance of environmental education to improving student science achievement because it connects kids with real world learning. They say the benefits extend beyond science into reading, math, and social studies as well. The website reports that schools

using the environment for learning had improved academic achievement, less discipline problems, more excitement for learning and greater student involvement as well as more student ownership in learning. They also report that environmental education improves critical thinking and life skills as well.

The idea of using the environment to learn is nothing new to education. Louv references the work of John Dewey, an educator from the early 1900's. Dewey campaigned to get kids outside and in their local communities to learn. Louv quotes Dewey: "Experience (outside the school) has its geographical aspect, its artistic and its literary, its scientific and its historical sides. All studies arise from aspects of the one earth and the one life lived upon it" (as cited in Louv, 2005a, p. 201). Teaching through experiential learning and in the local environment, as Dewey suggests, encourages students to utilize their senses to study the world.

Rosenow studied kids enrolled in the First-Plymouth Early Education Programs over six years and found that children need visual-spatial relationships with nature to learn best. This has led her to develop curriculum for her program which includes a complete outdoor classroom and play area. According to Rosenow, the outdoor learning environment provides a place to learn to appreciate nature and develop their observation skills. She feels an outdoor environment can provide a multisensory learning environment and says:

Visual-spatial learning is an area that is often under-emphasized in early education programs, but we've found that it's a crucial part of helping each child reach his or her potential. Visual-spatial skills actually help children with

reading, writing, math and science. They need to connect with the environment. They need to know how and where they fit in our natural world. They need to touch, see, hear and act out what they learn from nature. (as cited in Andersen, 2004, p. 1)

Stephenson (2002) explored how and why teachers are using multisensory environments with their students. She found that they intended to stimulate student's senses and provide relaxation but she also found that this was not supported by research data or solid proof. Stephenson found reference to something called 'snoezelen' used for disabled children and young people. Snoezelen seems to have been developed in Holland in as early as the 1970s to be used for adults living in residential institutions for the disabled. The idea is that a multisensory environment provides sensory stimulation and relaxation for the participant. She found references describing it to provide stimulation of the senses by use of "music, light, gentle vibrations, tactile sensations, and aromatherapy" (Stephenson, 2002, p. 77). Although she found that these multisensory rooms and environments are being used often in therapy and teaching there is little scientific evidence that they actually help. But there seems to be ample circumstantial and anecdotal evidence among teachers who use it. She reports:

The purported outcomes of the use of multisensory environments are spread over several continua around the themes of control and autonomy; use of the senses; development of motor skills; exploration and development of cognitive skills; soothing and calming agitation; and building of trust, relationships and

communication. (Stephenson, 2002, p. 77)

If multisensory environments benefit students and nature is described as a multisensory environment, it would make sense that the two could be seen together.

Creativity is a much more subjective to measure, but even so, there is some evidence that suggests that nature can have a positive effect on it. Kellert reports that:

For many adults, these early childhood experiences of nature constitute a treasured emotional legacy that they draw on for personal creativity. Pioneering psychologist Edith Cobb reports in her study *The Ecology of Imagination in Childhood* that many highly gifted persons cite the memory of particular childhood environments as an emotional basis for their creative production.

(2002, p. 71)

Nature's Effect on Troubled Teens, Student's Attitudes Towards School and Behavior

In addition to the academic benefits nature seems to offer students, it also seems as though nature is being used as a sort of treatment program for troubled teens, even. A program for at risk teens in Norfolk Virginia who have been referred by the court system for family problems, truancy issues or criminal behavior allows them to enter a day treatment program that uses nature as the "therapy." One of the adults who provides guidance to the troubled teens describes herself as a horticultural therapist. Scott said these kids are "connected to life again through nature" (as cited in Russell, 2007, p. 10).

The kid's descriptions of the program seem to give them a sense of purpose in their lives. They worked on goal setting and learning through nature. Scott used nature because she feels that being outdoors with nature provides a positive learning environment, especially for kids with ADHD, and has a calming effect. Scott says "Flowers, birds, the outdoors, fresh air, people that love'em, they're safe. They calm down. Weeding and pruning can be very therapeutic" (as cited in Russell, 2007, p. 10).

Louv (2005a) recalls his encounter with a group of teenagers on probation who were offered the experience of a lifetime. The group was given the chance to spend a couple of weeks out of the inner city into tribal villages of remote Alaska. Louv said some of the kids had never been out of the city before. Among the positive comments the young people said about their trip and what they had learned about themselves, Louv summarized the group's experience, "They learned about *sha-a-ya-dee-da-na*, a Tlingit word that loosely translates as "self-respect," by being in nature, and by associating with people who had never been separated from it" (Louv, 2005a, p. 110). The young adults claimed to return to their homes changed in some way, a positive way, by the challenges they faced while in the wilderness. Louv saw this change in the faces of the kids who were addicts, gang members, and con artists. He said "At least for a while – a day, a week, a year, or perhaps even a lifetime – they were changed" (Louv, 2005a, p. 111). While nature's affect on troubled teens might be difficult to measure and evidence might be scarce, these anecdotes provide support that even the toughest of kids can soften when given the chance and the right circumstances.

In addition to the anecdotal evidence that nature and getting kids outside during the school day can positively affect moods, attitudes and behaviors, several studies (Barros, Silver & Stein, 2009; Peacock, 2006) back up this claim. Peacock studied the effects of getting students out into their local environments to learn through multiple visits to the same area, something called Guardianship Scheme (GS). There was a wide array of positive outcomes reported, included a better attitude towards school work. Based on responses from students, Peacock said “the positive statements were all made in the animated tone of voice that exuded good memories- clearly, going out to ‘work’ in a rock-pool, a wood, a kitchen garden, a pond, or simply in a novel environment, enhanced their positive feelings for what they often did not think of as work” (2006, p. 20).

In addition to improved student attitudes, behaviors were also noted as improving. Peacock summarized the effects:

A very wide range of activities was planned and engaged in across the schemes visited, covering attitude change, fun and enjoyment, skill development, knowledge of the environment and behaviour change. Teachers felt that the GS was successful in achieving all these objectives, especially attitude and behavior change. Raising self-awareness and self-esteem, being more cooperative, team awareness, respect, learning to listen, curiosity, stimulation, and above all, ‘a good day’, were often mentioned, over and above the knowledge and skills linked to their specific context. (2006, p. 22)

As a classroom teacher myself, I can say from experience that when these descriptions are met, negative classroom behavior is significantly decreased.

Cohen (1993) describes nature's connection to psychology to explain how people's disconnect with nature can cause feelings of isolation and dysfunction as well as even leading to the destruction of nature. Cohen believes that people can reconnect to themselves by having exposure to nature and natural settings and that we are suppressing what he calls our "natural senses" which leads to negative human behaviors such as smoking, greed, and violence. He says that we as a species are so connected to nature that everything is connected and to take away nature from us results in negative consequences for our survival, health, and behavior.

According to Kuo and Sullivan (2001b), throughout history, vegetation has been associated with crime and fear. Tradition from the past encourages people to clear vegetation to prevent this in areas such as parks, university campuses, and public spaces. They said that the greatest concern for crime these days is in the inner city. Their research, however, suggests that to combat crime vegetation should be encouraged, at least certain types. They found that high-canopy trees and well-manicured green space actually combated crime and fear. They report: "In sum, there is a variety of evidence suggesting that vegetation may be linked to lower levels of crime in residential neighborhoods, particularly poor inner-city neighborhoods. Residential vegetation has been linked with a greater sense of safety, fewer incivilities, and less aggressive and violent behavior" (Kuo & Sullivan, 2001b, p. 349). If this is the case in neighborhoods,

what might the effect be on children and students? Does green space and green exposure reduce negative behaviors as well?

Kuo and Sullivan (2001a) also studied the effects of natural areas on aggression. They reasoned that anger and violence could be associated with mental (attentional) fatigue. If this was true, contact with nature, which helps alleviate mental fatigue, would also reduce anger and violence as well. They studied inner city neighborhoods with varying levels of green space because they felt these areas especially had chronic mental fatigue and higher rates of aggression. They found that:

Violence scores were significantly lower for residents living in green conditions than those living in barren conditions. Furthermore, this pattern held for both the more mild forms of violence and the more severe forms of violence. Both mild violence rates and severe violence rates were significantly lower in the green condition than in the barren condition. (Kuo & Sullivan, 2001a, pp. 558-559)

In response to their results, they suggest that Kaplan's attention restoration theory offers the most supportive link between green space and aggression levels.

Nature's Effect on Stress Levels and Mental Health

It has been known for some time and goes without saying that exercise provides benefits to physical health. But there is evidence that exercising where it is "green," as in the outdoors, could even benefit mental health as well. Pretty (2007) stated:

In addition, there is growing evidence from the UK, Scandinavia and the US that

being active outdoors (“green exercise,” for short) can also bring substantial mental health benefits by reducing stress levels and enhancing mood. Here in the UK at the University of Essex, our research has shown that from walking and horse-riding to fishing and running, regardless of level of activity or time spent, physical activities improve psychological well-being by enhancing mood and self-esteem and reduce anger, confusion, depression and tension. Exercising with others also seems to improve social networking and connectedness. Of our subjects, three-quarters felt less depressed, tense and angry after green exercise; two-thirds reported an overall improvement in mood, and almost two-thirds an improved level of self-esteem. All groups showed gains in average self-esteem and mood levels. (p. 32)

Pretty also collaborated with Hine and Peacock. They reviewed studies in addition to their own for nature’s benefits to mental health. In their 2006 report, they began by reviewing that mental health has usually meant an absence of illness but they show concern for this model because it doesn’t explain how mental health can have a positive impact on us. They felt that good mental health can determine how we feel, think, learn and communicate, how we create and maintain relationships with people and how we deal with stresses in our lives.

They said that most of our healthcare system focuses on when people get ill, not on keeping them healthy in the first place. They related this notion to our view of nature, that we tend to care only when harm has been done. Through their studies, they conclude

“It is well established that the natural and built features of the environment affect behavior, interpersonal relationships and actual mental states” (Pretty, Hine, & Peacock, 2006, p. 144). They suggest that we change our thinking to preventing problems which can allow people to remain healthy, and this is often less costly, too. They say we need to create places where people can stay healthy.

In their research with green exercise, or exercising in the outdoors, Pretty, Hine, and Peacock have found there are mainly three levels of being engaged with nature during exercise. The first level is viewing it either from a window or through artwork. The second level is having nature nearby, and being in its presence. The third level is the most actively engaged, where people are participating directly with nature such as in hiking, camping, or gardening. They found that “green exercise” in one of these levels of environments significantly improved people’s mental states – such as self-esteem and general mood and well-being. They reported:

As a result of green exercise, there was a significant improvement in self-esteem in nine out of the ten case studies (the fall in self-esteem was where participants had an arduous and long day in the rain). The largest change was detected amongst the participants in the forest activities, followed closely by the fishing group. (Pretty, Hine, & Peacock, 2006, p. 146)

It seems that the strongest benefit was from the group with the highest levels of nature exposure but that any exposure to nature can help people’s mental states.

Pretty (2007) found that when people exercised outdoors they had better moods and more positive self-esteem as well as reduced tension, confusion, depression, and reduced anger levels. He found that 90% of people reported having a boost in self esteem after taking a walk through a park. On the other hand, he found that after walking in a shopping mall setting, 44% of people reported decreased self esteem. In response to this data, he stated “Clearly, nature delivers important health benefits if we reorganize lifestyles and behaviors” (Pretty, 2007, p. 32).

Frumkin thinks doctors have overlooked nature as having healing qualities and thinks they need to consider animal and nature therapy, using natural things to help people who are ill. He said “We need to identify which kinds of nature contact are most helpful, for which patients, and for which medical conditions. One day, we may find we can prevent or treat illness by prescribing gardening, or pet ownership, or vacations in beautiful places” (as cited in Vidal, 2003, p.8). But he also states that more research is needed and that most tends to focus on pharmaceutical drug or technology based treatments instead.

Studies by Kaplan and Kaplan have shown many benefits of being in nature to a person’s psychological health. They wrote about how having a natural environment nearby can provide people with basic needs that enhance our health. They reported: “The Reasonable Person Model (RPM) bridges environmental factors and public health domains by focusing on meeting people’s informational needs. RPM posits that people are more reasonable-cooperative, helpful, constructive-when the environment satisfies such needs” (Kaplan & Kaplan, 2003, p. 1484). They continue to explain how nature

can bring a wide range of benefits. They report: “The powerful effects of the natural environment are striking because they apply so broadly yet do not require extensive exposure in terms of either time or space” (Kaplan & Kaplan, 2003, p. 1487).

Overall, it seems that a healthy, wholesome life depends on human’s contact with nature. (Frumkin & Louv, 2007; Kellert, 2002) The research suggests that it is a necessary factor in people’s psychological well-being. In fact, Frumkin and Louv feel it is so important they suggest it is tied to public health. They state: “When we protect land, do we protect public health? Intuition, experience, and theory suggest the answer is yes” (2007, p. 1). They continue: “A theoretical basis for the notion that nature contact is good for health has been expanding. In addition to intuition and theory, we now have evidence. And increasingly the evidence suggests that people benefit so much from contact with nature that land conservation can now be viewed as a public health strategy” (2007, pp. 1-2).

Pergrams and Zaradic (2007) call the large amount of time people spend watching movies, playing video games, and using the internet, “videophilia.” They state that:

The average person spends six hours a day – more than 2,200 hours a year – in front of movie and video screens, almost a one-third increase since 1988. Young children in the United States, meanwhile, spend more than two hours a day just in front of the TV – as opposed to about four minutes a day of unstructured time outdoors. (Improves All Test Scores section, para. 5-6)

They said that videophilia is associated with negative physical and mental health and that it “has been correlated with negative psychological and physical effects including obesity, loneliness, depression, attention problems and greater social isolation due to reduced time with friends and family” (Evils of Videophilia section, para. 1).

Melber and Brown also noted benefits to students’ social development as well. They say “Informal science-learning experiences, or learning experiences that occur outside a traditional classroom, are one way these authentic, inquiry-based experiences can be shared with students. These experiences’ collaborative nature can support social and self-esteem goals” (2008, p. 36).

Burdette & Whitaker explored how free play, especially unstructured and in natural settings is essential for children’s overall well-being, including how kids affiliate with others and emotional affect. They report:

Unstructured, active play with others, including with parents, siblings, and peers, is a major opportunity to cultivate social skills. This process can cultivate a range of social and emotional capabilities such as empathy, flexibility, self-awareness, and self-regulation. Such capabilities, sometimes referred to together as “emotional intelligence,” are essential for successful social interactions in adult life. Emotional intelligence contributes to success in the workplace, and it is the foundation for success in the intimate social relationships, such as between parents, that become the primary models for children’s social development. (2005, p. 48)

They continue listing other benefits of other positive emotional indicators. They say “Although it has been the subject of little scientific inquiry in young children, free play has the potential to improve many aspects of emotional well-being such as minimizing anxiety, depression, aggression, and sleep problems” (Burdette & Whitaker, 2005, p. 48).

A study on elementary school teachers found that one of the places they used to help them cope with stress was nature and the outdoors. The study focused on elementary school teachers because they have such long days in constant contact with the same group of children and have little opportunity for relief during their day which can result in a high stress potential. The study (Gulwadi, 2006) found that teachers with high stress levels tended to seek out nature as a place for restoration more than other forms of stress relief and more than in teachers with lower stress levels. This suggests that people who experience high stress levels tend to seek out nature to deal with their stress levels, whether they know why or not.

Even research done on the role of nature setting posters in an office environment resulted in lowered stress and anger levels for some people which of course benefits mental health. Researchers state “Aside from anger, stress is another well-documented workplace problem” (Kweon, Ulrich, Walker, & Tassinary, 2008, p. 357). From their research, they found: “We found that nature and abstract art posters have a significant influence on state anger and stress for male participants but not for female participants” (Kweon, Ulrich, Walker, & Tassinary, 2008, p. 374). They add that: “This (stress- and

anger-reducing) effect of posters tends to be greatest when nature content is present in the posters” (Kweon, Ulrich, Walker, & Tassinary, 2008, p. 374).

It is well known that adults experience stress in response to their careers. But what about children and students? Most of the research on nature’s effect on mental health in the past has focused on adults but a growing body of evidence is shifting to children as well. Burdette and Whitaker state:

Even the lives of young children are full of emotional stresses. These stresses, experienced by the child’s brain, result in a number of physiologic responses in the body, collectively referred to as “allostatic load,” that can impair children’s health. Gross motor play may be an important mechanism to dampen allostatic load. (2005, p. 48)

Wells and Evans studied whether having nature near a child’s home would decrease the amount of stress they experienced. They found that children did indeed experience less psychological stress when they had nature near their home. In fact, the more nature they experienced, the less distress they felt when experiencing stressful life experiences. They concluded: “Consistent with our hypothesis, the results of this study suggest that the presence of nearby nature moderates or buffers the impacts of life stress on children” (2003, p. 321).

Nature's Effect on ADHD and other learning disabilities.

Research suggests that nature has a beneficial effect on many aspects of a child's life from academic achievement and creativity to their mental health. It seems it may also have a positive effect on student's ability to pay attention. According to the research, this effect seems to hold true for regular education students as well as those with learning and attention disorders, among others. Louv (2005b) mentions the rise in ADHD diagnosis by 33 percent from 1997 to 2002 and that prescriptions to treat these diagnoses have risen as well. He said that from 2000 to 2003, there was a 369 percent increase in ADHD drug spending for kids under the age of five. He affirms that even though scientists cannot explain this increase that the disorder is still very real and that a possible cause of ADHD symptoms is overstimulation.

An analysis study conducted on Ritalin use, a medication commonly used for the treatment of ADHD symptoms, found that doctors in Hawaii prescribe much less Ritalin than the rest of the nation. As cited in the article (Ritalin use, 2001), Dr. William Sheehan, a child psychologist from Honolulu suggested a possible factor in this is the warm climate where kids can let out their energy easier than many other kids around the nation. This suggests a connection between nature and outdoor exposure and reduced ADD/ADHD symptoms.

Kuo and Faber Taylor (2004) found that being active outdoors reduced ADHD symptoms better than other settings. Their results seem to extend to a broad range of students and that students with confirmed ADHD diagnosis might benefit from this

exposure as well as those without. They also mention other studies and the benefits of nature exposure saying:

Studies involving a variety of measures, treatments, populations, and research designs have produced evidence of enhanced attention after exposure to natural views and settings. “Nature” experienced in a wide variety of forms has been linked to superior attention, effectiveness, and effectiveness-related outcomes. (2004, p. 1580)

However, not everyone fully accepted these benefits, at least without further study. Canu and Gordon wrote a letter to the editor in response to Kuo and Faber Taylor’s study saying the study has methodological limitations and doesn’t offer evidence that convinces them of the effectiveness of nature as a treatment option. They said it is not clear if the benefits would extend to other groups. So it seems that even though some benefits are seen from nature exposure, a more conclusive body of research is needed.

A study by Rojas and Chan (2005) agree that there are possible benefits from using green outdoor spaces with kids with ADHD but they also note that more research is needed as well. They noted the work of Kuo and Taylor, but cautioned the use of nature as sole treatment options. They did say that outdoor activities likely offer general physical and emotional benefits to healthy kids and can be recommended in addition to the standard ADHD treatments without harm. While these researchers that caution the

positive results say that more research is needed and that nature may not provide exclusive treatment for ADHD symptoms, it does still seem that benefits are present.

And it seems the benefits extend beyond those with diagnosed ADHD issues. According to Rosenow, outdoor, natural environments provide students a chance to improve their visual-spatial skills that will help them not only academically but also with special needs students. She says: “visual-spatial skills have proven effective in helping children with special needs from verbal language delays, autism, Asperger’s Syndrome, to Attention Deficit Disorder” (as cited in Andersen, 2004, p. 01). Lombard (as cited in Ford, 2008), describes an additional disorder that benefits from nature exposure. Sensory Processing Disorder (SPD) can affect how children learn and puts them behind their peers in terms of development. She says that SPD is most common in people with autism spectrum disorder and Asperger's disorder and that it also tends to overlap those with ADHD as well. Senior (as cited in Ford, 2008), agrees that children with these disorders need important touch experiences like playing outdoors and says these children would benefit from outside play.

Berman, Jonides, and Kaplan published a report of two experiments that showed by experiencing nature directly or by viewing pictures of it can restore a person’s ability to pay attention, which they call “attention restoration theory (ART)” (2008, p. 1207).

They say that:

Imagine a therapy that had no known side effects, was readily available, and could improve your cognitive functioning at zero cost. Such a therapy has been known to philosopher, writers, and laypeople alike: interacting with nature. Many

have suspected that nature can promote improved cognitive functioning and overall well-being, and these effects have recently been documented. (2008, p. 1207)

These experiments tested mental functioning and attention restoration after interactions with natural versus urban environments. They found that walks in nature significantly improved test scores and that walks in urban areas decreased scores. They also tested if viewing pictures of natural versus urban areas made a difference, of which they found no consistent changes. However, people did report that viewing pictures of natural settings was significantly more refreshing and enjoyable than looking at urban areas. From this data, they conclude: “Taken together, these experiments demonstrate the restorative value of nature as a vehicle to improve cognitive functioning” (Berman, Jonides, & Kaplan, 2008, p. 1211).

The research on ART mainly applied to adults at one time, but Faber Taylor, Kuo, and Sullivan (2001a) wondered if it could apply to children as well. They studied children with diagnosed attention deficit disorder (ADD) and found it do be true as well. The greener the environment children with ADD were exposed to, the greater their attention functioning and the less sever of their ADD symptoms. They tested two hypotheses to see if activities in green settings versus other settings made attention deficit symptoms more manageable afterwards and if symptoms were more manageable with greener everyday environments. They found that both hypothesis were supported by the data. The more green the activity and environment meant better symptom management.

They report: “The findings above indicate that there is a relationship between nature and attentional functioning in children with ADD. This is consistent with Kaplan’s theory that contact with nature leads to attentional restoration” (Faber Taylor, Kuo, & Sullivan, 2001a, p. 68). They stated the following:

This study is the first to indicate that the theory applies to at least a subpopulation of children, children with ADD. Thus, there is now evidence that Attention Restoration Theory applies to both adults with normal attentional functioning and children whose attentional functioning is compromised. Together, these findings provide some indication that the nature-attention relationship may apply to children. (Taylor, Kuo, and Sullivan, 2001a, pp. 72-73)

They continue to suggest that these findings suggest children with ADD can reduce their symptoms and improve their ability to pay attention by spending time, preferable every day, in a green area.

More recently, Faber Taylor and Kuo (2009) examined how a short 20 minute walk in three different physical types of environments (a park, a neighborhood, and downtown) can effect attention abilities in children with ADHD. They report: “Children with attention deficits concentrated better after walking in a park than after either of two other settings. The effect of a dose of green was substantial – roughly as large as the deficit due to ADHD and roughly as large as the peak effect of extended-release methylphenidate” (p. 406). They suggest that this strong evidence that nature, even in small doses, can be a powerful additional treatment tool for those with ADHD.

Nature's Effect on Childhood Development – Developing Sense of Awe and Wonder

According to Carson (1956), a child's sense of wonder is best developed by simply playing and observing and imagining with nature. She also goes on to declare that in order for a child to fully develop their sense of wonder and have it continue into their adult life, that they need an adult to guide them. She seems to have been before her time in what she realized about the benefits of exposing kids to nature. She states:

A child's world is fresh and new and beautiful, full of wonder and excitement. It is our misfortune that for most of us that clear-eyed vision, that true instinct for what is beautiful and awe-inspiring, is dimmed and even lost before we reach adulthood. If I had influence with the good fairy who is supposed to preside over the christening of all children I should ask that her gift to each child in the world be a sense of wonder so indestructible that it would last throughout life, as an unfailing antidote against the boredom and disenchantments of later years, the sterile preoccupation with things that are artificial, the alienation from the sources of our strength. (p. 42-43)

The research supports Carson's reflections that nature has positive effects on children's lives. Some people and researchers even feel that nature may be an imperative part of a child's development and when it is lacking may be contributing to some of the problems we are seeing in our younger generations and recent culture, Louv's "third frontier." According to Louv (2005a), children have played and worked outside in nature for all of human history. He notes that only in recent generations is this changing in our

Western civilization. He feels that nature also helps instill a sense of awe and wonder in humans throughout our development. Based on the work of several studies, he doesn't seem to be alone in feeling this way. Is nature exposure critical to child development in addition to helping them reach their full social, academic, and mental health potential?

Far beyond developing one's sense of awe and wonder is the human developmental necessity for nature. According to Kahn, "The biophilia hypothesis asserts the existence of a fundamental, genetically based, human need and propensity to affiliate with life and lifelike processes" (1997, p. 1). Kahn (1997, 1999) conducted a thorough review of the biophilia hypothesis and its effect on children, specifically. He gives the brief history of early humans based on evolutionary accounts that they lived on African savannas and that better chances of survival depended on the landscape. For example, water was not only a necessity for life but also defense from predators and enemies and a lure for other animals which humans could then hunt. Kahn reports that much research has been done on people's preferences of landscapes and in general, people seem to prefer natural landscapes over built landscapes for these supposedly evolutionary advantages. He suggests that if certain landscapes provided human survival and reproductive success, it became an evolutionary advantage and that these landscapes cultivate our sense of emotional well-being.

Kahn (1997, 1999) reviews the literature for both strengths and weaknesses. One weakness is the fact that the genetic basis for biophilia remains a hypothesis. Another weakness is what he calls the possible contradiction between biophilia and biophobia. In addition to people preferring certain aspects of nature for their survival, people also fear

many aspects for survival as well, such as fearing a poisonous snake and that the one word biophilia connotes only the positive. From an evolutionary standpoint, fear also provided safety and success. In terms of Kahn's research, he suggests:

In my interpretation, the research literature speaks relatively strongly for the proposition that people have a need and propensity to affiliate with nature, and that such affiliations can be of both a positive and negative kind. Such negative affiliations do not, in my estimation, undermine the biophilia hypothesis. Rather, following Wilson's lead, the challenge is to integrate both positive and negative affiliations within a larger framework. I also think it goes without saying that we are biological beings with an evolutionary history. Thus, I believe that any account of the human affiliation with nature needs to build on, or at least dovetail with, evolutionary theory. (1997, pp. 27-28)

This body of information clearly suggests that humans in general need nature, at least from an evolutionary standpoint. In terms of children's developmental psychology and biophilia, Kahn concludes:

Thus, in line with the biophilia hypothesis, it may be that there are aspects of nature itself that help give rise to children's environmental constructions. If so, nature is not a mere cultural convention or artifact – as some cultural theorists might suggest – but part of a physical and biological reality that bounds children's cognition. (1997, p. 54)

According to Crowley, “Some experts believe children who spend hours alone, watching television or playing computer games, are also at risk of becoming socially isolated. An analysis of children’s artwork, a joint project of Oregon State University and the Kaye Academic College of Education in Israel, confirmed that trend” (2006, p. A21). They found that when kids were asked to draw their favorite activities, most kids would draw themselves playing sports. But “of the remaining 60 percent of kids, one in four drew pictures of themselves playing alone or watching TV by themselves” (Crowly, 2006, p. A21). O’Malley stated: “They spend less time developing social skills and getting along – things that we all need later in life, in the workplace or elsewhere” (as cited in Crowly, 2006, p. A21). O’Malley continued saying: “Left unattended, we’re looking at a future of people who don’t have the social skills and some of the moral development that comes with social interaction” (as cited in Crowly, 2006, p. A21). Is the disconnect with nature that younger generations are experiencing affecting their child development so much that it will affect the future of our culture as a whole?

Kellert (2002) studies the human-nature connection in terms of cognitive development and Bloom’s taxonomy of cognitive development that most teachers should be aware of which refer to relatively easy levels of comprehension and development to more complex critical thinking skills. He says that nature offers children, especially younger children the chance to classify, label, and name things around them which is consistent with the lower levels of Bloom’s taxonomy levels of development. The term biophilia was used earlier to describe human’s affinity towards nature. Kellert refers to similar work that extends the idea to child development. He states:

Anthropologist and veterinarian Elizabeth Lawrence uses the provocative term *cognitive biophilia* to suggest that images and symbols of nature are often used to aid human communication and maturation. Even in our modern society, which is characterized by extraordinarily inventive fabrication, images drawn from the natural world continue to provide an unrivaled, irreplaceable contest for challenging children's cognitive development. For children, nature is the richest, most detailed, and most readily available informational contest they are ever likely to encounter. (2002, p. 69)

Summary

Dearhoff maybe sums it up best by quoting the early work of Maria Montessori who said "in nature, children find strength" (2006, para. 22). The literature suggests that mom was right to go outside and play. Nature's effect on academics, creativity, concentration, troubled teens, student behavior, mental health, and child development seems to be beneficial and possibly even necessary. While there is a multitude of anecdotal evidence to support this notion, there hasn't been as much scientifically documented evidence until recently. The research that does exist suggests that exposing children to nature is beneficial in many ways and until more data is collected, will not harm them at least and playing and learning in the outdoors can provide a remarkable environment to grow up and develop one's sense of wonder in.

CHAPTER THREE

METHODOLOGY

Study Overview

The purpose of this study will be to investigate the effect on student's moods and behaviors throughout their day after bringing them outside and giving them a nature "experience." A survey will be given to students before the day they go outside to gather baseline data on how they rate their moods and behaviors on what they feel is a typical school day for them, one that is spent indoors. This will be called the pre-survey. This data will be compared to data collected in another survey that will be given on the outdoor experience day to determine if there is a difference. This will be called the day-of survey.

Based on a review of the literature, it would seem that giving students an experience with nature during their school day, referred to as "biophilia" by Khan (1997, p.1), an innate human need and desire for nature, would benefit them on multiple levels. "If so, nature is not a mere cultural convention or artifact – as some cultural theorists might suggest – but part of a physical and biological reality that bounds children's cognition" (Kahn, 1997, p. 54). This study is to discover if nature has an effect on students for one day and not to assess the success of an entire curriculum, however.

Student Demographics

For this study, 112 eighth grade students will be surveyed. Students range in age from 13 to 14 years old. There are 59 (53%) boys and 53 (47%) are girls. The ethnicity

and numbers of the students include 99 Caucasian, 2 African American, 4 Hispanic and 7 Asian/Pacific Islander. Four of the students are identified as English Language Learners (ELL) and nine have been evaluated and receive special education services. One student is mainstreamed into regular science and history core classes from an in school alternative learning program (ALP). Students enrolled in this ALP program typically qualify for a variety of reasons from health issues, discipline issues, truancy issues, to performing below grade level.

School Schedule

Students arrive to school at 8:00 a.m. and leave at 3:05 p.m. A typical school day includes a twenty five minute homeroom class, six fifty-two minute classes including their four “core” classes of language arts, science, history, and math, and two “alternative learning block” (ALB) classes which rotate between physical education, family and consumer science, and health. Class periods for the core classes are first, second, fifth, and sixth period. The ALB classes are usually during third and fourth period. Students are taught by a teaching team of four core teachers who share most of the same students.

Some of the students cross to other teaching teams. This means they have a different core teacher for one or more of their classes instead of the regular core teachers on our teaching team. Two students cross teams for a special education math class, four students are English language learners (ELL) and cross teams for their language arts class, five students cross teams for a reading class called Read180, a lower level language arts class. The one student from the ALP program crosses teams for history.

Terms of the Study

*Senteo Assessment Software*TM (Senteo, 1995-2008). This is a technology used for taking student survey data. Students use an individual hand-held remote system to enter their responses electronically. The results are sent to the teacher computer where it can be collected, compiled, and transferred into a Microsoft Excel spreadsheet.

Student Survey

Students will be given the pre-survey before the outdoor experience day to determine how they rate their moods and behaviors on a typical school day spent indoors. They will be given the day-of survey on the day they go outside. The data will be compared to indicate any change in behavior and mood on a typical day versus an atypical day when they had a class period of nature experience in their science class. On each survey, students will rate indicators of their moods and behaviors such as ability to focus, concentrate, and stay on task during class, their ability to be creative if asked, their levels of stress and anxiety, their general attitude towards school and classes, their overall ability to pay attention for class, the likelihood of them to get in trouble, their level of tiredness, and their level of being calm and relaxed. These questions were chosen based on a review of the literature that suggests a positive correlation between getting students outside for part of their day and their moods and behaviors. Each of these questions are on a scale of 1-10.

The pre-survey is slightly different than the day-of survey. In addition to the questions it will ask about their moods and behaviors, it will also ask questions about

their comfort levels with being outdoors in natural areas, how much of their free time they would like to spend outdoors, how much technology they would like to use in their free time, the effect that nature normally has on them ranging from being stressful to peaceful, if whether they believe spending time outside is healthy or not, if whether they think students would benefit by spending more time outside or not, and if kids their age should spend more time outside or not. These questions were also rated on a scale of 1-10 and included only to get an idea of how students perceived nature and the effect it might have on them.

The day-of survey will be given to students in each of their core classes (other than science) and will ask them to rate their levels of these indicators at that moment in time. This is to see if their moods and behaviors change throughout the day and if a certain timing of a nature experience makes any difference. For instance, will the students who go outside in the morning benefit more or less than those who will not go outside until afternoon? The question I am aiming to answer is: *Does a nature experience have a positive effect on a student's mood and behaviors?* The surveys will be given electronically with the Senteo Assessment Software.

Once the data has been collected from both the pre-survey and the day-of survey, it will be analyzed to see if there is any difference. The day-of survey results will also be analyzed to determine if students who have a nature experience in the morning differ at all from those who don't get a nature experience until the afternoon.

Because some of the students on our team crossover to other teachers on different teaching teams, they will need to take the survey in a slightly different way through a

paper and pencil version. The survey will be given to their teachers for them to complete during their crossover classes. These other teachers will also be briefed on taking the survey to keep the conditions of the survey as similar as possible. It will be requested that the teachers take the survey from the students when they are done and place them in my mailbox to minimize the risk of losing the surveys.

The following items below are materials that will be used in the study. These are included as part of the study.

- Student pre-nature exposure survey. APPENDIX A
- Student post-nature exposure survey. APPENDIX B
- Permission form to go off school campus and into the wooded area.

APPENDIX C

- Graphic organizer worksheet to write reflections and expectations.

APPENDIX D

- Letter of Permission from the school principal to survey students.

APPENDIX E

- Directions for proctoring survey. APPENDIX F

Nature Experience

The intention of the research is to discover if giving students a nature experience by bringing them outdoors during their school day can influence their moods, behaviors and levels of concentration throughout the rest of their day. A nature experience in this study will be considered a guided walk through a segment of a heavily wooded city park

trail. Since the results of this study are to discover if nature has an effect on students for one day and not to assess the success of an entire curriculum, students will be given a guided nature experience and will be expected to complete an assignment during their time outside. Students will be given a graphic organizer notes sheet to write down their reflections and thoughts while learning outside. This is to keep the class expectations for accountability as similar to a “normal” class day as possible.

Students will be given specific guidelines for behavior while learning outside. They will also be asked to write these expectations down on their graphic organizer notes sheet before going outside. These expectations include listening quietly when the teacher is talking, keeping their hands and feet to themselves, following directions, and staying close as a group. It will be explained to students that an outdoor learning environment can be different than being in the classroom. For example, it can be more difficult to see and hear the teacher and it can take more time to transition from one activity to another if students are scattered in an open area. Also, because this is not a typical or “routine” class day inside, it can be tempting for students to misbehave, especially in the spring.

The teacher will lead a guided hike through a forty acre plot of a heavily wooded path during their normal science class period. The teacher will direct the student’s attention to several curriculum related topics while outside such as rotation and revolution of the earth, sunrise and sunset times and directions, the current moon phase, recycling of earth materials as well as some life science topics such as tree and spring wildflower identification. The intention of the study is not to assess the students on curricular related themes this day, however. The decision to lead a guided hike related to

curriculum topics versus pure unstructured free play in a natural area stems from the fact that this is an atypical experience for the students and too much unstructured student activity may falsely affect results. The researcher wanted to ensure the students have as much of the same level of structure as a typical class day.

Timeline

Students will be surveyed on two separate days, the pre-survey given on a day spent indoors and the day-of survey given on a day spent outdoors. The time of the year for this study is based on student comfort and an appropriate time of year to take a large number of students outdoors reasonably without needing to worry about dressing appropriately for inclement weather, for instance. Students will be given the pre-survey later in the school year so they can make a well formed assessment of what they feel their “typical” moods and behaviors are. The day-of survey will be given in the early spring as soon as the weather is favorable for taking students outside.

At the beginning of the school year, a letter will be sent home to parents asking permission for their student to go off the school grounds and into the wooded area. The school principal will also be notified and asked for permission to survey students in order to collect data from them. Permission and study information will also be given to the Human Subjects Committee at Hamline University for review.

Students will take the pre-survey in their science class. They will take the day-of nature experience survey in each of their other core classes during first, second, fifth, and sixth periods.

Limitations of the Study

There are several factors that could influence the study results. On a normal school day, an ELL paraprofessional is in the room during second period to help students with limited English abilities. This is the only class period that I have another adult in the room. This could influence the results of the study because even though the paraprofessional is assigned to certain students to help, it can be very helpful to have another adult in the room to even minimize possible misbehaviors from the non-ELL students. Dealing with discipline issues could affect not only the results of students involved in the misbehavior, but also the impressions of the other student's outdoor experience.

Teacher to student ratio could also be a factor that can influence behavior. My average class size is 28 students. When taking students outside, this number can become difficult to manage. Depending on ability level while we are outside, the lesson and path we take might have to be altered to accommodate any differences in ability levels and time. If each class gets a slightly different nature experience, this could affect the data as well.

Using the Senteo Assessment Software can present a technology limitation if it doesn't work properly or if other problems happen. If the crossover students do not take their survey or if surveys get lost, this could also present a problem for the study. An additional limitation faced is student attendance. If there happens to be a high number of students absent the day of the nature experience, this will of course influence the number of students from which to draw data.

Another limitation of the study is simply how students respond to the survey and how they interpret the questions. On the pre-survey, when they are supposed to respond based on what they feel is a typical day for them spent inside the classroom, they might respond based on something that happened to them before class. For instance, they could have had a fight with their best friend, lost their homework, or experienced something else that could influence how they respond. This same goes for the day-of experience. Students in middle school can experience a whole range of emotions in a short amount of time. It might be difficult for them to identify what a “typical” day is for them.

Summary

Students will be surveyed before the outdoor nature experience day as well as the day of the nature experience. Survey results will be compared to see if there is any difference in their moods and behaviors from what they feel is a typical school day spent indoors for them versus a day where they go outside. Analysis of the data will include graphs to visually represent trends, if any.

CHAPTER FOUR

RESULTS

The purpose of this study was to investigate whether taking students outside and giving them a nature “experience” during one of their class periods would affect their moods and behaviors throughout the rest of their day. The results consist of two surveys given to students, one given before an outdoor nature experience and the other given the day-of a nature experience. The survey questions were objective as possible and asked students to rate their answers on a scale of one to ten. The pre-survey included the same questions as the day-of survey but also included subjective questions. The additional subjective questions on the pre-survey were also on a scale of one to ten.

Survey Result Notes:

- Percentages shown in graphs are rounded to the nearest hundredth.
- Pre-Survey indicates the set of questions given to students before the outdoor experience day.
- Day-of survey indicated the set of questions given to students on the day of the outdoor experience.

Pre-Survey Questions

Question 1: Rate your comfort level for being outside in a “natural” or “wilderness” area (like camping, hiking, being in the woods, etc.).

1 = lowest level of comfort, 10 = highest level of comfort.

Question 2: Rate your preference for where you would like to spend your free time.

1 = indoors at all times, 10 = outdoors at all times.

Question 3: Rate your preference for HOW you would spend your free time.

1 = only with technology like cell phone, mp3, TV., computer, etc., 10 = without any technology.

Question 4: What effect does being outside or being “with nature” (like on a hike or walk or camping, etc.) normally have on you?

1 = very stressful, 10 = complete calming.

Question 5: Do you think it is healthy and good for you to spend time outdoors and with nature?

1 = not healthy at all, 10 = very healthy.

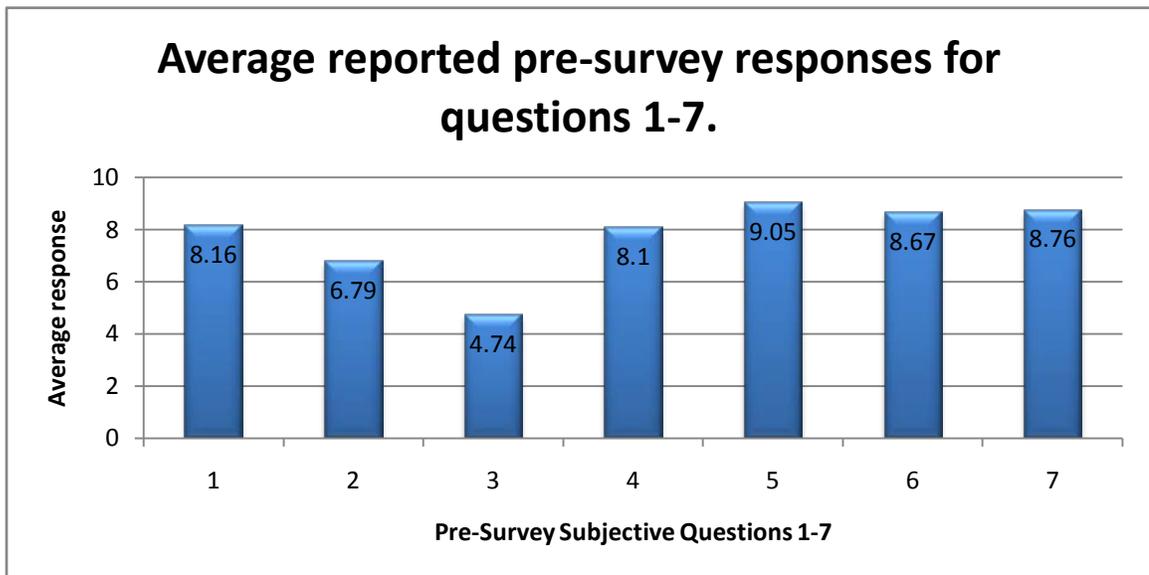
Question 6: Other than for recess after lunch, do you think it would benefit students to go outside during the school day?

1 = no, not at all, 10 = yes, very much.

Question 7: Do you think kids your age should spend more time outside?

1 = no, not at all, 10 = yes, much more.

Figure 1: Average reported pre-survey responses for questions 1-7.



Summary of Results:

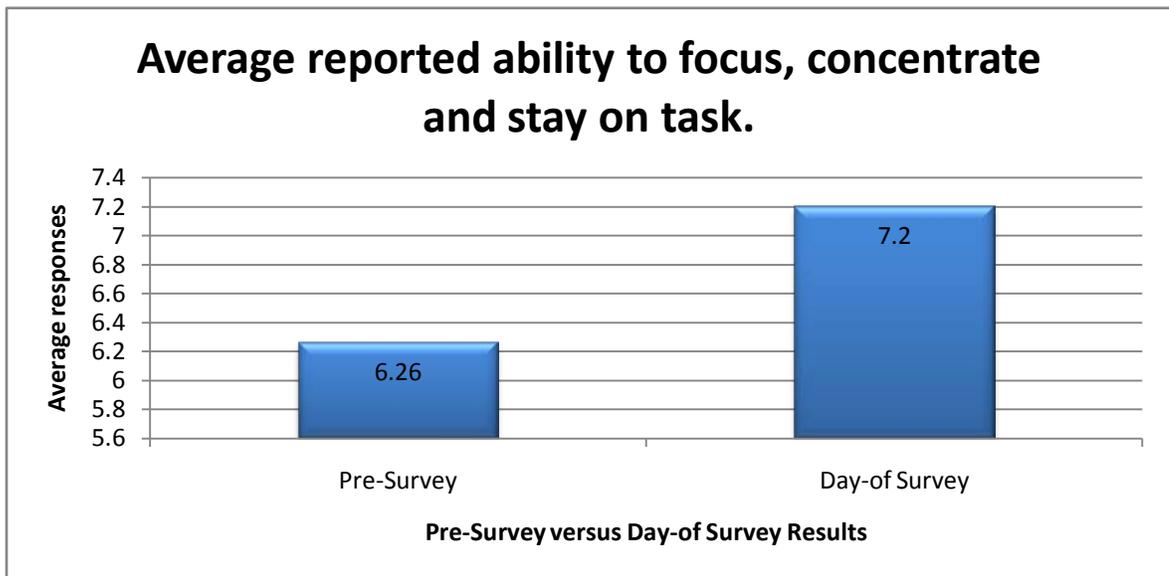
Figure 1 shows the average student response from each of the pre-survey questions 1-7. For question one, before the outdoor experience, students reported an average score of 8.16 for their comfort level while being outdoors in a “natural” or “wilderness” area (10 being the highest). For question two, they reported an average score of 6.79 for their preference for where they would like to spend their free time (10 being outside all the time). For question three, students reported an average 4.74 for how they would like to spend their free time (10 being spending their time without any technology). For question four, they reported an average 8.10 for the effect that being outside or with nature has on them (10 being complete calming). For question five, students reported an average of 9.05 for if they felt it was healthy and good for them to spend time outdoors with nature (10 being very healthy). For question six, they reported an average 8.67 for feeling it would benefit students to go outside during the school day

other than just for recess (10 being very beneficial). And finally, for pre-survey subjective question seven, they reported an average 8.76 for if they felt kids their age should spend more time outside (10 being much more).

Day of Survey Questions

Question 1: On a scale of 1-10, rate your level of being able to focus, concentrate, and stay on task (10 being the highest).

Figure 2: Average reported ability to focus, concentrate, and stay on task

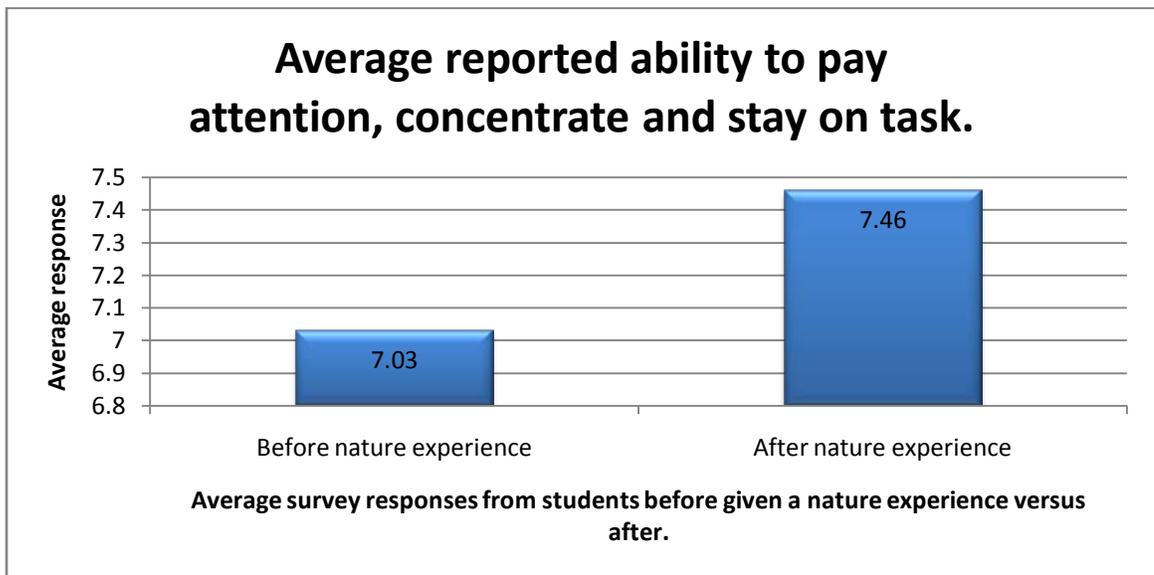


Summary of Results:

Figure 2 shows students reported feeling more able to focus, concentrate, and stay on task on a day they go outside (7.20) compared to a day they do not go outside (6.26).

The reported average increase was a value of 0.94.

Figure 3: Average reported ability to focus, concentrate, and stay on task

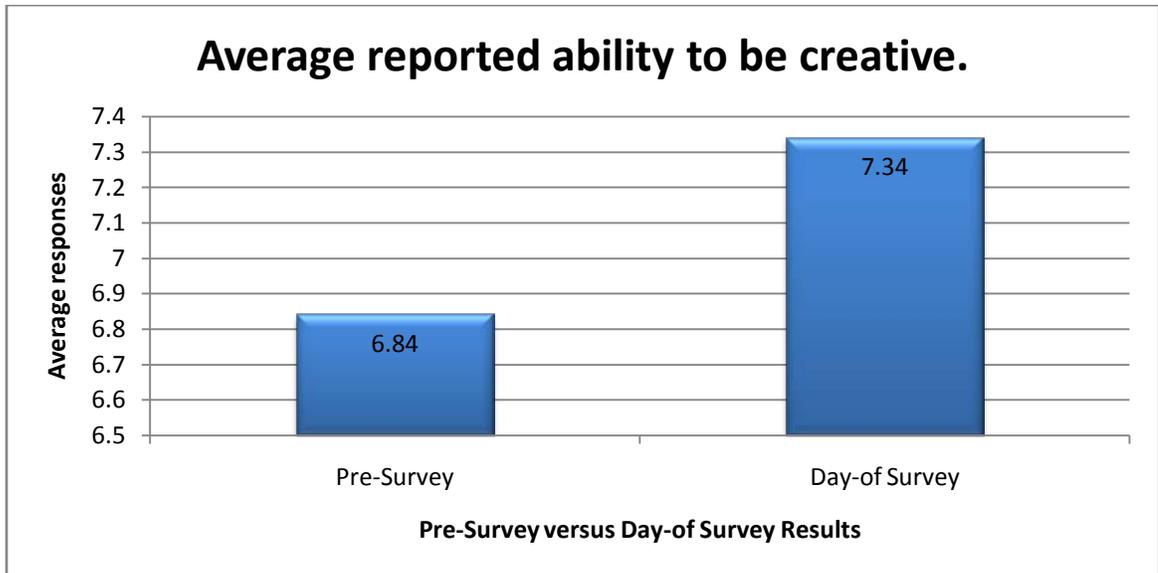


Summary of Results:

Figure 3 shows students reported feeling more able to pay attention, concentrate and stay on task better after they went outside (7.46) compared to before they went outside (7.03). The average reported increase was a value of 0.43.

Question 2: On a scale of 1-10, rate your ability to be creative (10 being the highest).

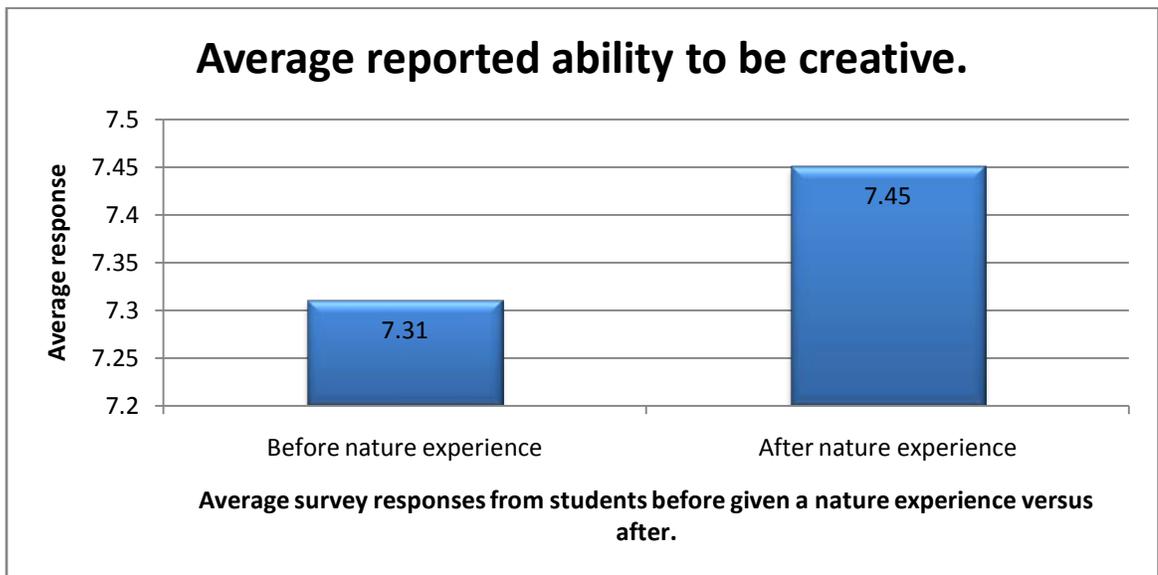
Figure 4: Average reported ability to be creative



Summary of Results:

Figure 4 shows students reported feeling more able to be creative on a day they go outside (7.34) compared to a day they do not go outside (6.84). This is a value of 0.50 increase.

Figure 5: Average reported ability to be creative

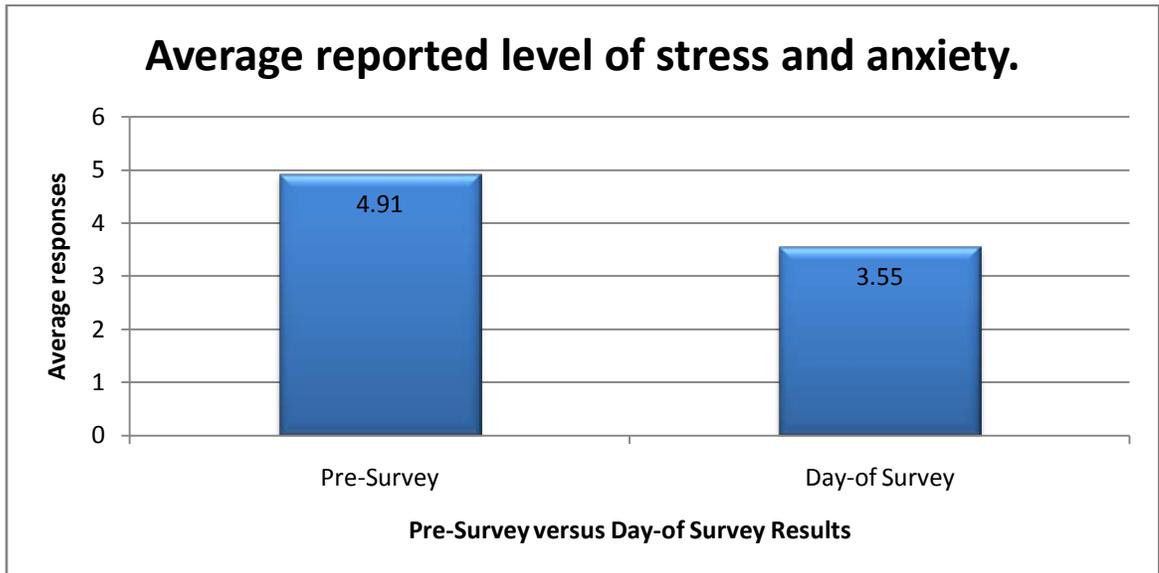


Summary of Results:

Figure 5 shows students reported feeling more able to be creative after they went outside (7.45) compared to before they went outside (7.31). This was an increase of 0.14.

Question 3: On a scale of 1-10, rate your level of stress and anxiety (10 being the highest).

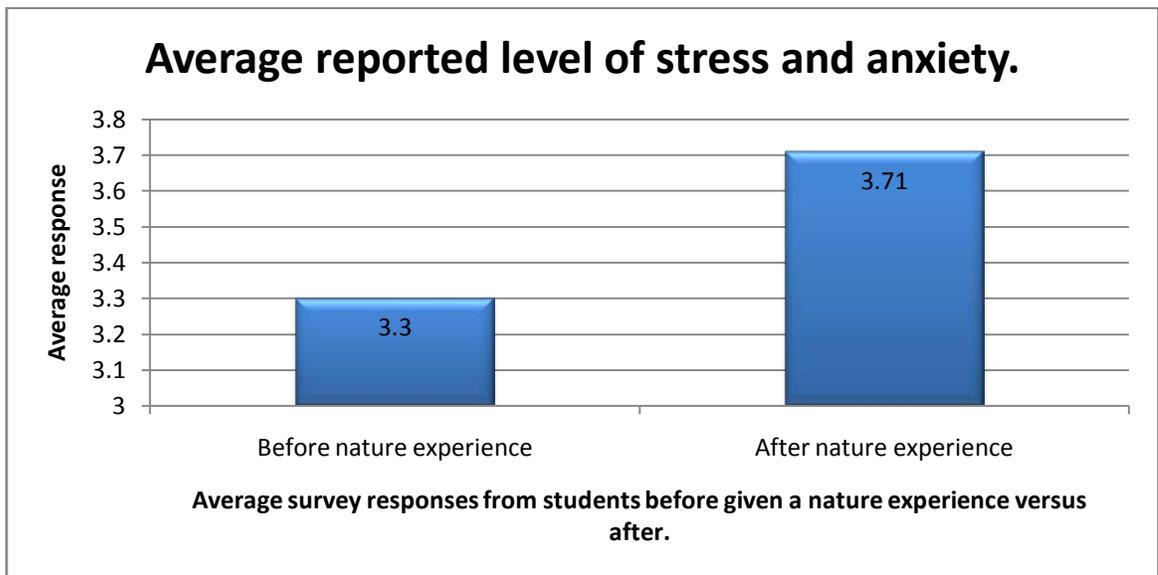
Figure 6: Average reported level of stress and anxiety



Summary of Results:

Figure 6 shows students reported feeling less stress and anxiety on a day they go outside (3.55) compared to a day they do not go outside (4.91). This is a decrease in their reported level of stress and anxiety by a value of 1.36.

Figure 7: Average reported level of stress and anxiety

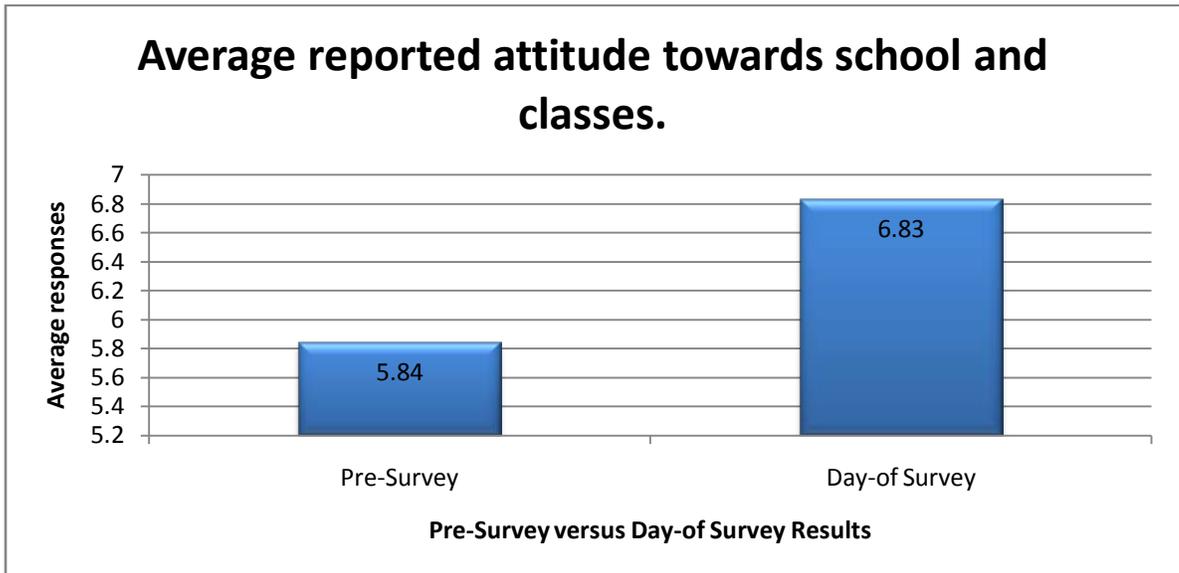


Summary of Results:

Figure 7 shows students reported feeling more stress and anxiety after they went outside (3.71) compared to before they went outside (3.30). This is an increase of 0.68. It is important to note that students reported a higher level of stress and anxiety after going outside (3.71) on the day of the nature experience, but that it is lower than the reported level of stress and anxiety on a day they do not go outside at all (4.91) [figure 6].

Question 4: On a scale of 1-10, rate your attitude towards school and classes (10 being the most positive).

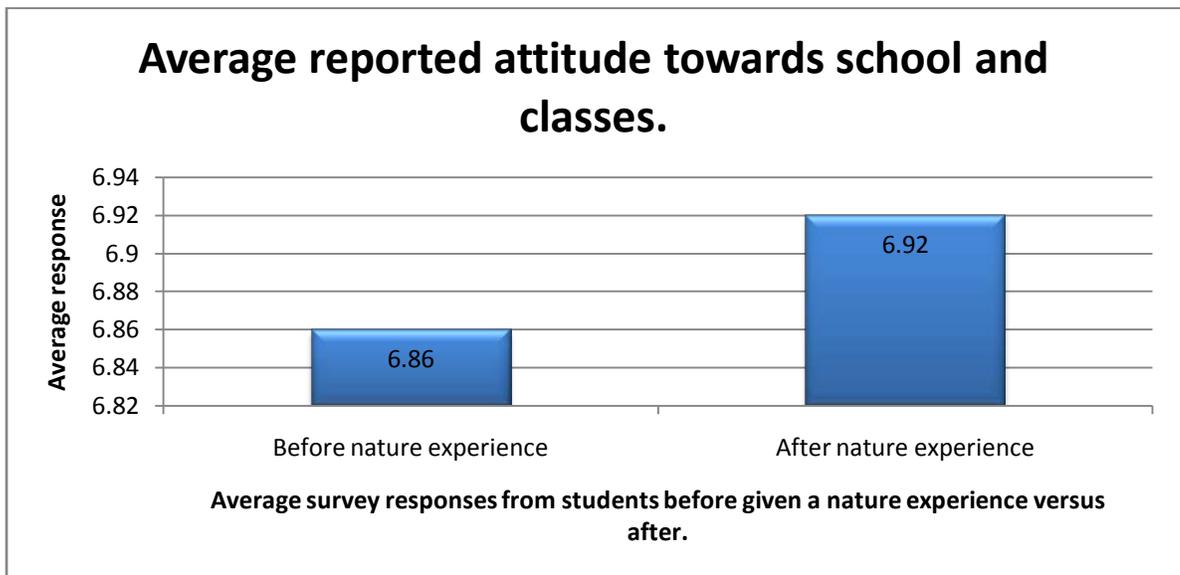
Figure 8: Average reported attitude towards school and classes



Summary of Results:

Figure 8 shows students reported feeling a more positive attitude about school and classes on a day they go outside (6.83) compared to a day they do not go outside (5.84). This is an increase value of 0.99.

Figure 9: Average reported attitude towards school and classes



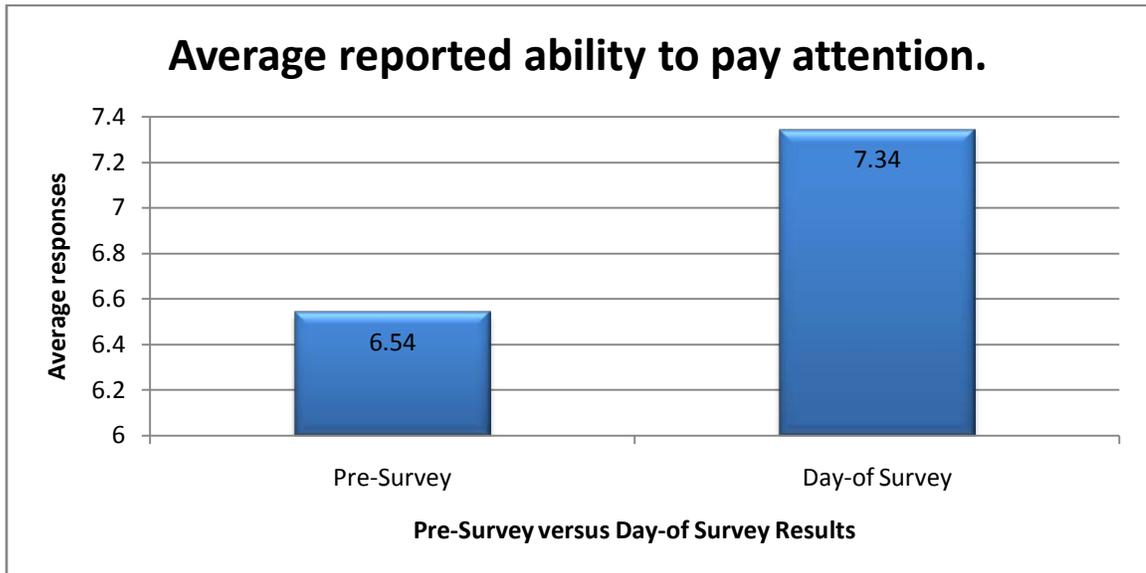
Summary of Results:

Figure 9 shows students reported feeling a more positive attitude towards school and classes after they went outside (6.92) compared to before they went outside (6.86).

This is a small increase value of 0.06.

Question 5: On a scale of 1-10, rate your ability to pay attention (10 being the highest).

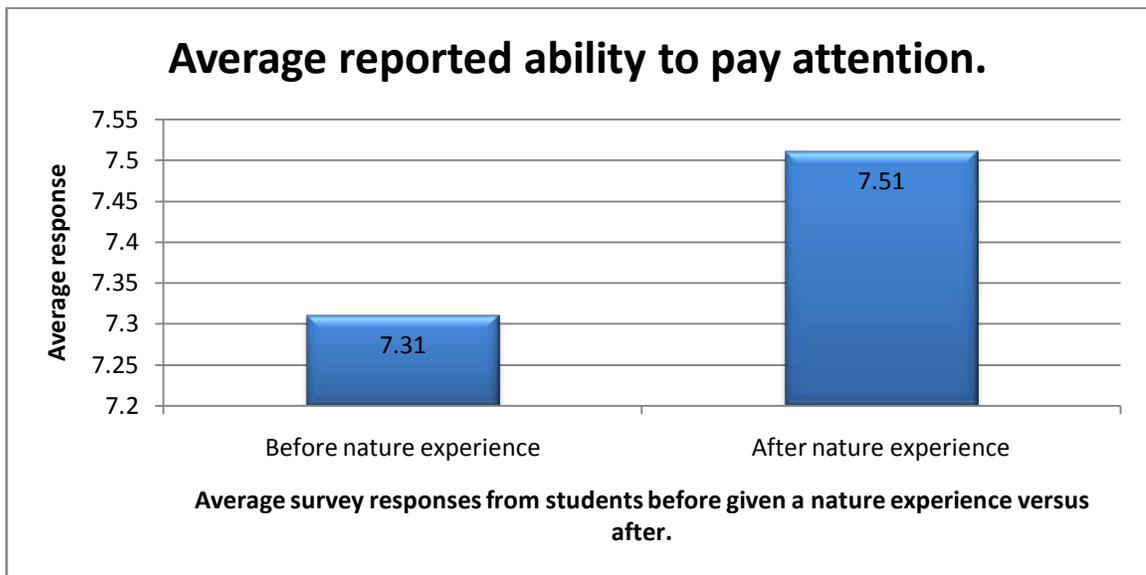
Figure 10: Average reported ability to pay attention



Summary of Results:

Figure 10 shows students reported feeling a higher ability to pay attention on a day they go outside (7.34) compared to a day they do not go outside (6.54). This is an increased reported value of 0.80.

Figure 11: Average reported ability to pay attention

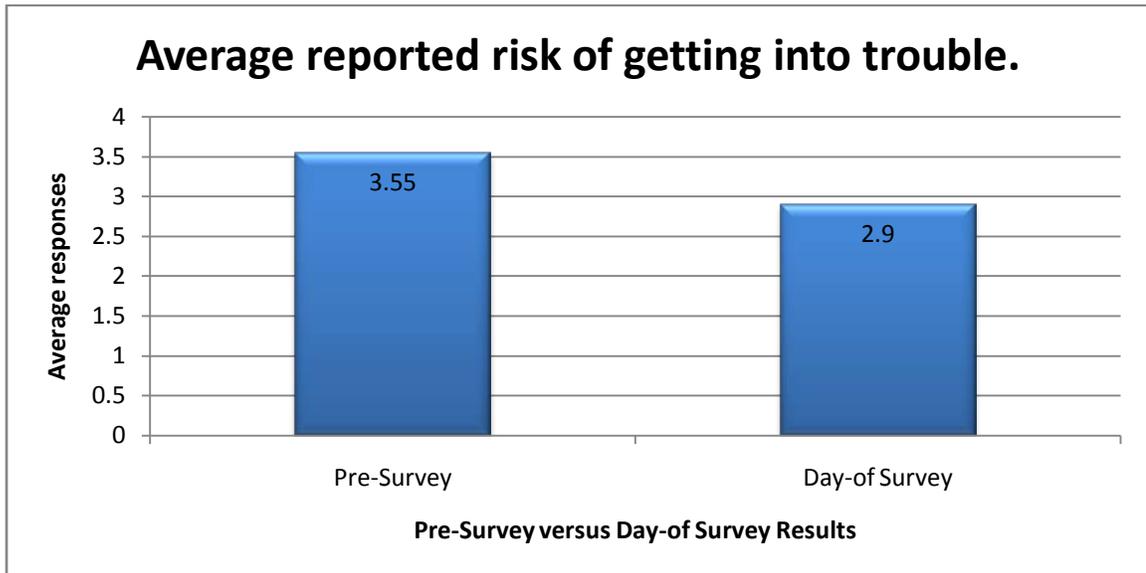


Summary of Results:

Figure 11 shows students reported feeling a higher ability to pay attention after they went outside (7.51) compared to before they went outside (7.31). This is an increase in reported value of 0.20.

Question 6: On a scale of 1-10, rate your likelihood of doing something that could get you in trouble (10 being highest).

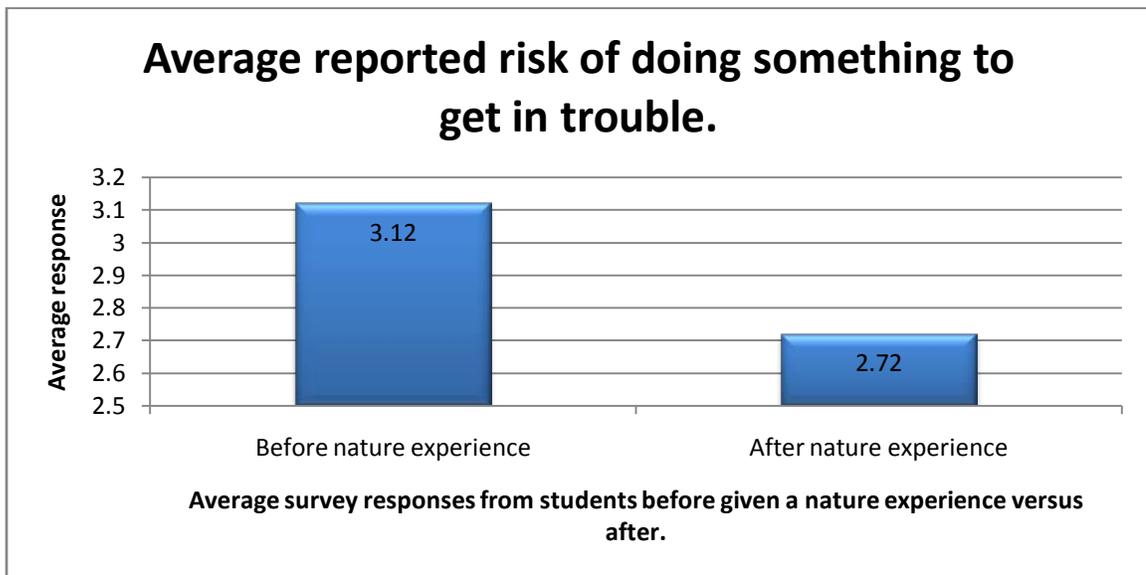
Figure 12: Average reported risk of getting into trouble



Summary of Results:

Figure 12 shows students reported feeling the same level of risk of doing something that could get them in trouble on a day they go outside (2.90) compared to a day they do not go outside (3.55). This reflects a decrease in reported risk of getting into trouble by a value of 0.65.

Figure 13: Average reported risk of getting into trouble

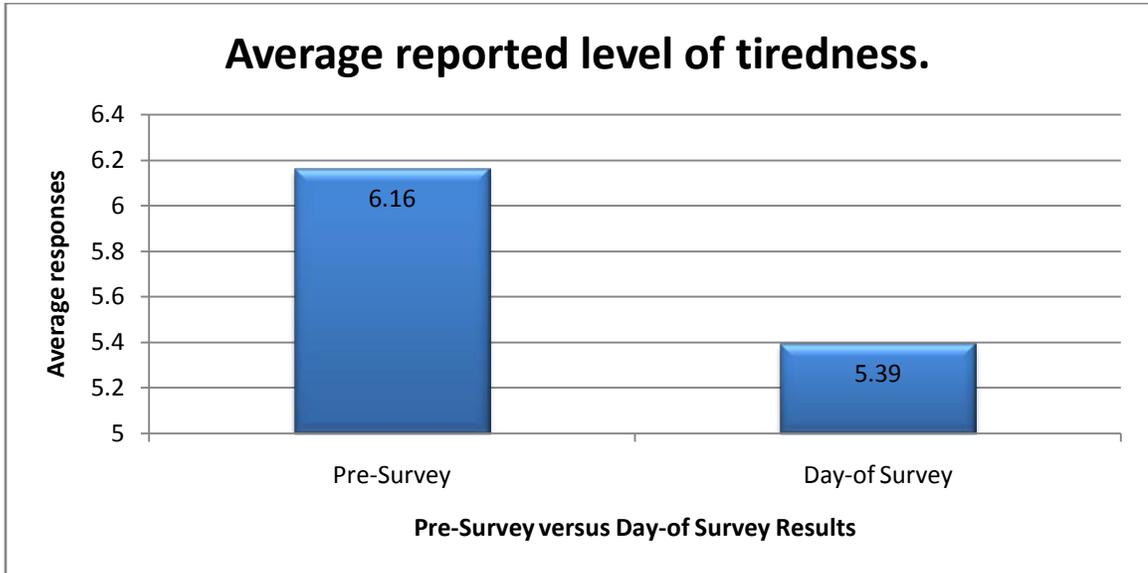


Summary of Results:

Figure 13 shows students reported feeling a slightly lower risk of doing something that could get them in trouble after they went outside (2.72) compared to before they went outside (3.12). This is a decrease of 0.40.

Question 7: On a scale of 1-10, rate your level of tiredness (10 being highest).

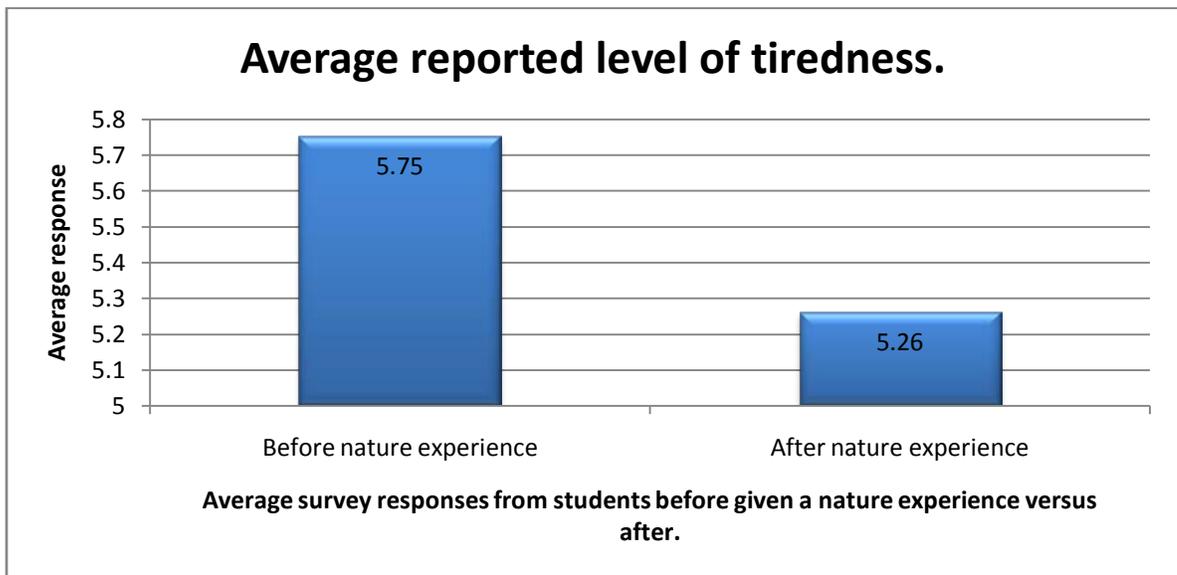
Figure 14: Average reported level of tiredness



Summary of Results:

Figure 14 shows students reported feeling a lower level of tiredness on a day they go outside (5.39) compared to a day they do not go outside (6.16). This is a decrease in reported value of 0.77.

Figure 15: Average reported level of tiredness

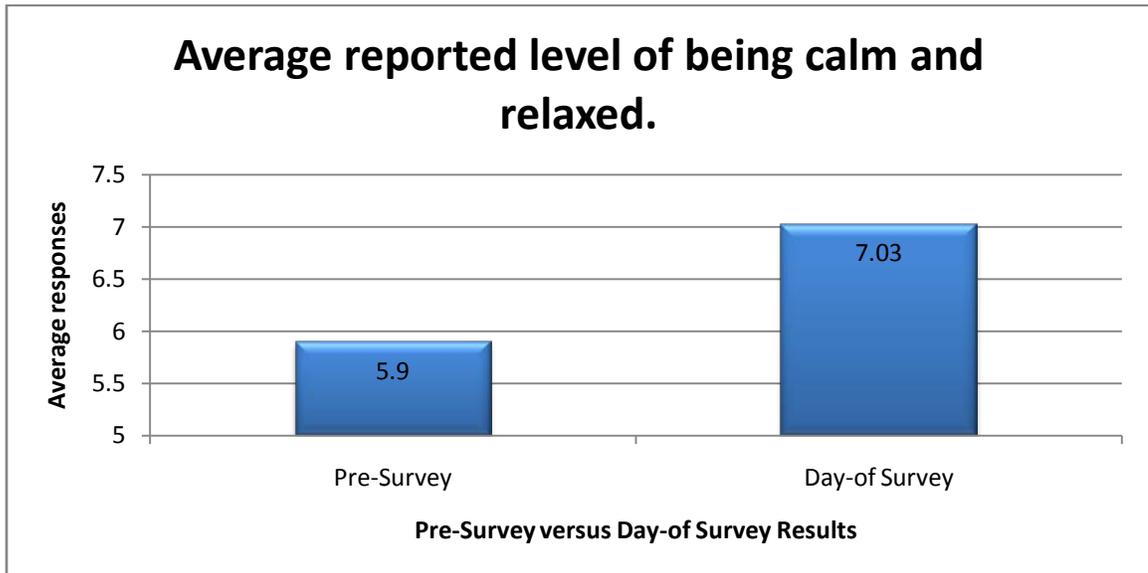


Summary of Results:

Figure 15 shows students reported feeling a lower level of tiredness after they went outside (5.26) compared to before they went outside (5.75). This is a decrease reported value of 0.49.

Question 8: On a scale of 1-10, rate your level of being calm and relaxed (10 being most calm and relaxed).

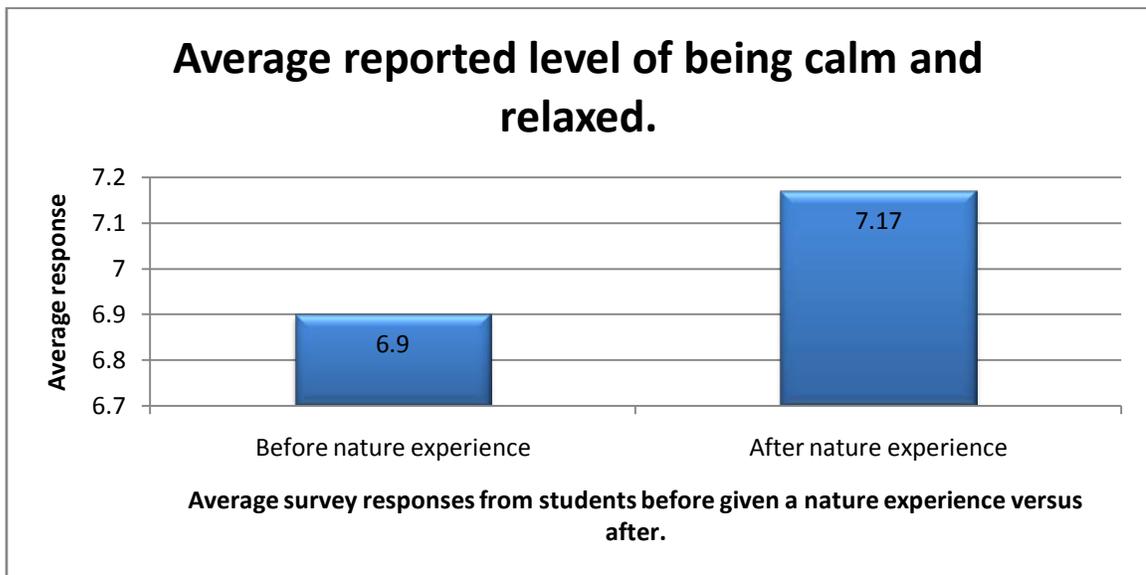
Figure 16: Average reported level of being calm and relaxed



Summary of Results:

Figure 16 shows students reported feeling a higher level of being calm and relaxed on a day they go outside (7.03) compared to a day they do not go outside (5.90). This is a reported increase of 1.13.

Figure 17: Average reported level of being calm and relaxed



Summary of Results:

Figure 17 shows students reported feeling a slightly lower level of being calm and relaxed after they went outside (7.17) compared to before they went outside (6.9). This is a reported increase of 0.18.

CHAPTER FIVE

CONCLUSIONS

This chapter will reflect on the major learning and conclusions of the study. For each question, results of the study will be tied back to the hypotheses discussed in chapter two. It will also consider the limitations of the study and its findings, take into account implications of the results for policy, stakeholders, financial, and educational organizations, offer recommendations for future research, and discuss plans for communicating and using the results. A brief reflection on the educational growth of the author will be included as well.

Reflection on major learning and conclusions:

The results of this study support the idea that giving students an outdoor experience, other than for recess, can positively influence their moods and behaviors throughout their day. This is compared to a school day when they do not go outside other than recess for their core curricular classes. Results showed that students recognized that being outdoors has benefits for them. In the pre-survey, students responded to some general questions about how and where they spend their free time as well as some of the perceived effects nature has on them.

According to *Figure 1 Average reported pre-survey responses for questions 1-7*, the results suggest students believe that spending time outside has a positive influence on them (calming, healthy and beneficial) and they report feeling that students should spend

more time outside (all reported averages are above a value of 8, 10 being the highest of values). But when asked where they would like to spend their free time, students report a lower value (6.81, 10 being outside all of the time). This suggests that even though students perceive that nature might offer benefits to them, they are less likely to spend their free time outdoors. This would support the idea of offering time for students to get outside during their school day since they might not choose to go outside on their own time. According to a review of the literature from chapter two, many researchers support the idea of getting kids outside more for many reasons, from academics to mental health. If it is so important that students have contact with nature, schools might be the only place that can likely offer this experience to them.

The data that compares student's pre-survey responses to their day of nature experience responses, and the data that compares student's responses before going outside to after going outside supports the idea that getting students outdoors and with nature during their school day benefits them in many ways. Analysis of the data will be done for each individual question.

Ability to focus, concentrate and stay on task.

Louv (2005a) mentions a trend in Scandinavian countries that use greenery in their architecture and landscape setting not only to beautify an area aesthetically, but because of the notion that it also improved people's concentration and productivity. Faber Taylor, Kuo & Sullivan (2001b) explain that their research on inner city youth

found that children with more green space were able to concentrate better and avoid negative situations.

The data collected in this study support these ideas as well. Students reported feeling more able to focus, concentrate and stay on task on a day they went outside compared to a day they stay inside. This was based on a combined average score of all students in all hours. For the day of the nature experience, students reported feeling a higher level of being able to pay attention, concentrate and stay on task after they went outside compared to before they went outside (Figure 3).

It is important to note that students reported a higher average value of being able to focus, concentrate and stay on task even before going outside on the day of nature experience (7.03) versus the pre-survey reported average value (6.26). This indicates that even before students went outside, they had a higher perceived level of being able to pay attention, concentrate and stay on task on the day they were going to go outside, even though they hadn't yet gone outside. It is unknown why students would have responded differently on these two days but one could guess that students were excited about going outside, which is atypical of a normal school day. However, when comparing the average reported values before going outside to after going outside (Figure 3), the data still supports the idea that students are more able to pay attention, concentrate and stay on task after going outside compared to staying inside. One can conclude that students perceive a higher level of being able to focus, concentrate and stay on task on a day they go outside compared to a day they do not go outside. In addition, students perceive their

ability to focus, concentrate and stay on task being higher after going outside than before going outside. This supports the idea that nature can help them focus, concentrate and stay on task.

Ability to be creative.

Charles (as cited in Cleaver, 2007, The Indoor Generation section, para. 2) states that natural environments are good for “calming antsy minds and increase both children’s ability to concentrate and their creativity.” Cobb reports that artistically gifted people recall childhood memories and their environments to help them with their creativity (as cited by Kellert, 2002, p. 71).

The data collected in this study supports Charles’s and Cobb’s theory that nature can help children be more creative. According to Figure 4, students reported feeling more able to be creative on a day they went outside compared to a day they do not go outside. This was based on a combined average score of all students in all hours. For the day of the nature experience, students reported feeling a higher level of being able to be creative after they went outside compared to before they went outside (Figure 5).

It is important to note that students reported a higher average value of being able to be creative even before going outside on the day of nature experience (7.31) than the pre-survey reported average value (6.84). This suggests that even before students went outside, they had a higher perceived level of being able to be creative on the day they were going to go outside, even though they hadn’t yet. This is compared to the day in

which they did not go outside at all. Similar to the previous question, it could be that students were excited about the fact that they were going outside, even though they hadn't yet. However, when comparing the average reported values before going outside to after going outside (Figure 5), it still supports the theory that students feel more creative after going outside. One can conclude that students perceive their ability to be creative as higher after going outside compared to before going outside. This supports the theory that nature can help their perceived level of creativity.

Level of stress and anxiety.

Pretty (2007) and Pretty, Hine, & Peacock (2006) explained the results of their studies on exercising where it is "green" (in some level of being with nature) and found that people reported lower levels of stress and better general moods and self esteem after being in a green environment. A study (Guldwadi, 2006) on elementary school teachers found that one of the places they used to help them cope with stress was being with nature and being outdoors. They found that the teachers with high levels of stress seek out nature more than other stress relieving settings. Kweon, Ulrich, Walker, & Tassinary (2008) found that posters of nature in office settings, even, reduced levels of stress for males in the workplace. Wells and Evans (2003) found that having nature near children's homes can help them cope with stressful situations.

The data from this study does not support what other researchers have found about the effects of nature on stress levels. As shown in Figure 6, students did report a lower average level of stress and anxiety on the day they went outside compared to a day

they did not go outside. This would seem to support the idea that nature can reduce levels of stress and anxiety. However, as shown in Figure 7, students reported a higher level of stress and anxiety after going outside than before going outside on the day of the nature experience. On the day of the nature experience, students reported a lower level of stress and anxiety before going outside than they reported for a day they did not go outside at all.

This might be because again, students were excited about going outside even though they hadn't yet. However, for some reason, students feel their levels of stress and anxiety rise after going outside. It could be that something happened in their other classes or between passing time that caused their stress and anxiety to increase. In one of their other core classes, students were being tested so this could also attribute to their increased stress and anxiety levels. The data from this study comparing perceived stress and anxiety levels before students went outside to after going outside does not support the idea that nature can help their perceived levels of stress and anxiety.

Attitude towards school and classes.

Peacock (2006) found that getting students out to a local environment to learn improved their perceptions and attitudes towards school work. He reported that students did not perceive what they were doing as "work" and that there were enhanced positive feelings in general.

The data from this study supports this idea as well. According to Figure 8, students reported a more positive attitude towards school and classes on a day they went outside compared to a day they do not go outside. This was based on a combined average score of all students in all hours. For the day of the nature experience, students reported feeling a more positive attitude towards school and classes after they went outside compared to before they went outside (Figure 9).

It is important to note that students reported a higher average value of their attitude towards school and classes even before going outside on the day of nature experience (6.86) than the pre-survey reported average value (5.84). This suggests that even before students went outside, they may have had a higher perceived attitude towards school and classes on the day they were going to go outside, even though they hadn't yet. This is compared to a day in which they did not go outside at all.

Similar to the other questions, it is unknown why students would have responded differently on these two days. It could be that students were excited about going outside. It was also spring time and generally student's attitudes seem improve to reflect the nicer weather and fact that summer is near. However, when comparing the average reported values before going outside to after going outside (Figure 9), the data collected still supports the theory that students report feeling a more positive attitude towards school and classes after going outside. One can conclude that the data supports the theory that nature can help their perceived overall attitude towards school and classes.

Ability to pay attention.

Berman, Jonides, and Kaplan (2008); Faber Taylor , Kuo, and Sullivan (2001a); Faber Taylor and Kuo (2009); as well as Kuo and Faber Taylor (2004) report from their studies that nature helps children and adults with diagnosed ADHD as well as regular education students pay attention.

The data collected in this study supports the theory that nature can help children pay attention. According to Figure 10, students reported feeling more able to pay attention on a day they went outside compared to a day they do not go outside. This was based on a combined average score of all students in all hours. For the day of the nature experience, students reported feeling a higher level of being able to pay attention after they went outside compared to before they went outside (Figure 11).

It is important to note that students reported a higher average value of being able to pay attention even before going outside on the day of nature experience (7.31) than the pre-survey reported average value (6.54). This suggests that even before students went outside, they had a higher perceived level of being able to pay attention compared to the day that they stayed inside.

As noted before, it is possible that students responded differently on these two days because it was an atypical school day and that their moods and behaviors were slightly changed simply because of this. However, when comparing the average reported values before going outside to after going outside (Figure 11), it still supports the theory

that students report feeling more able to pay attention after going outside compare to before going outside. One can conclude that the data collected in this study supports the theory that exposure to nature can help students pay attention.

Risk of getting into trouble.

Cohen (1993) reports that people need connections to nature in order to avoid feelings of isolation, dysfunction and other negative behaviors. Kuo and Sullivan (2001a, b) found that well manicured green space reduced crime, aggression, and violent behavior and also reduced what they called mental or attentional fatigue which leads to negative behaviors. Exposure to green spaces helps alleviate this fatigue which leads to less negative behaviors.

Although in this study crime and violence were not expected, students did report on their perceived risk levels of getting into trouble during their classes. As shown in Figure 12, students reported a lower perceived risk of getting into trouble on the day they went outside compared to a day they stayed inside. This suggests that nature has a positive effect on any potential negative behaviors, even before they go outside. Figure 13 shows that students also perceive an even lower risk of getting into trouble after they went outside compared to before on the day of their nature exposure.

As with the other questions, it is unknown why students reported a lower average perceived risk of getting into trouble on the day of the nature experience compared to the day they stay inside. This includes students who hadn't yet gone outside. Again, it is

possible that just the idea of going outside might help lower any behavior problems that they feel could arise. It is interesting, however, that students reported their perceived risk of getting into trouble decreases even more after they go outside which supports the theory that nature offers positive benefits to student misbehaviors.

Level of tiredness.

The data collected in this study support the idea that students report feeling less tired after going outside compared to before going outside. As shown in Figure 14, students reported a lower level of tiredness on the day they went outside compared to a day they did not go outside. This suggests that nature has a positive effect on their level of tiredness throughout their day. Figure 15 shows that students also perceive a lower level of tiredness after they go outside compared to before going outside on the day of their nature exposure.

It is important to note, however, that students reported a lower perceived level of tiredness on the day of the nature exposure before they even went outside (5.75) than on a day they do not go outside at all (6.16). It is not known why students reported a lower perceived level of tiredness on the day of the nature experience compared to the day they did not go outside. However, on the day of nature exposure, students still reported a lower level of tiredness after going outside compared to before going outside which supports the idea that nature offers positive benefits to student alertness.

Level of being calm and relaxed.

The data collected in this study supports the theory that nature can help children feel more calm and relaxed as well. According to Figure 16, students reported feeling more calm and relaxed on a day they went outside compared to a day they stay inside. This was based on a combined average score of all students in all hours. On the actual day they went outside, students reported feeling more calm and relaxed after they went outside compared to before (Figure 17).

It is important to note that students reported feeling more calm and relaxed even before going outside on the day of nature experience (6.9). This is compared to their average reported values on a day they stayed inside (5.9). This suggests that even before students went outside, they had a higher perceived level of being calm and relaxed compared to a day they stay inside.

Once more, it is unknown why students would have responded differently on these two days but it is very possible that student's moods and behaviors were modified due to the difference in their daily routine. However, when comparing the average reported values before going outside to after going outside (Figure 17), the data still supports the theory that students report feeling more calm and relaxed after going outside compare to before going outside. One can conclude that the data supports the theory that exposure to nature can help student's perceived level of being calm and relaxed.

Limitations of the study and its findings:

One of the limitations of a study like this is from personal bias of the researcher. This is important to note because even before going into the study, I had hoped for certain results. This was based on personal previous teaching experience taking students outside and seeing what it seemed to do to them. I had hoped that students would respond more favorably after taking them outside. While I remained as neutral as possible, especially on the day of the survey, my students knew that I felt nature and being outdoors was good for them. Researcher bias is a limitation with any study, and I feel that especially when working with students, it can be harder to hide. With this in mind, they may have responded a certain way due to this. While I understand that nature is not a perfect “cure” to all of student’s problems, I had hoped that my results supported the theories I had reviewed from my literature search.

On a normal school day, an ELL paraprofessional was in the room during second period to help students with limited English abilities. The day of nature exposure, she was not able to join us. This may have influence results because the ELL students might have had questions or not understood something. It also might have influenced the behavior of others due to the lack of another adult to help monitor and supervise during this time.

During fifth and sixth periods, higher levels of discipline problems tend to arise on normal school days. Students seem to “run out of steam” by the end of the day. On the day of the outdoor experience, some students from fifth period did not follow the basic directions given by the teacher which resulted in discipline issues and the teacher

needing to stop several times during the instruction, lecture, and walk portions of the class and redirect students due to misbehaviors.

During sixth period, an additional teacher joined the group. This helped manage and reduce negative classroom behaviors, but two students needed to be disciplined several times for not complying with a reasonable request. Dealing with discipline issues could affect not only the results of students involved in the misbehavior, but also the impressions of the other student's outdoor experience.

One teacher with no experience using the Senteo technology experienced some technical difficulty that resulted in students in her first hour needing to take the survey using paper and pencil. The technical difficulties continued into her second hour as well which resulted in the teacher needing to call for technical support. It was reported that it took all class hour to fix the problems. Her students were patient, but this resulted in an atypical class period. They were able to take the survey, but not until the end of class, which may have affected the results for those students.

There was one student survey I failed to get back. On the day of the outdoor experience, one student was also absent so their data was removed from the results. This equates to missing data and less information to draw conclusions from which is a drawback.

Another limitation of the study was why students reported higher levels of being able to focus, concentrate and stay on task, better creativity, less stress and anxiety, better attitude towards school and classes, better ability to pay attention, lower perceived risk of getting into trouble, lower level of tiredness, and higher level of being calm and relaxed

on the day they went outside but before actually going outside than on a day they did not go outside at all. Although it would seem unreasonable to expect that students would respond exactly the same on two different days, it was unexpected that the results for all questions asked show this effect towards more positive or beneficial levels. The limitation lies in not knowing what caused this. It is possible that some other factors affected student's perceptions of their moods and behaviors on this day other than the fact that they were going outside in science class.

Students might have been excited in general for even knowing they were going outside, even though they had not yet gone outside. From circumstantial evidence reported from the other teachers who collected survey data, it was noted that students were talking positively about going outside for science class. The teachers also reported that students were very excited to be able to go outside and this could have influenced the data collected.

Implications for policy, stakeholders, financial, or educational organizations

If the results of this study apply to other students as well, it may have many implications for other teachers and schools everywhere. For educational organizations, if our goal as educators is to meet both the social and academic needs of our students, it might be helpful for them to consider the positive impact taking student outdoors can have.

It is important to note that the data from this study was self reported from students themselves. Also, the community in which this study was done is suburban with many city trails, parks, and open land for students to utilize. Especially in the spring, many students ride their bikes or walk to school. The neighborhoods in which the students would pass to get to and from school all have some degree of nature that they would be exposed to, even if passively. Many students live in homes with their own yards with greenery, including trees. Students who do have access to their own yard all have easy access to the many parks throughout the community. There are many miles of paved trails students can access to get to these parks and most trails have trees and greenery as well.

Recommendations for future projects:

In looking at this study further, it would be interesting to find out how a nature experience on one day influences student's academic achievement. To do this, it would be interesting to give students some form of test and possibly separate students into two groups, one group who goes outside before the test and one group who does not. It would be interesting to see if this outdoor experience makes any positive difference in their test scores.

It would also be interesting to develop questions to limit any bias in student's perceptions on the day they go outside but before they actually go outside. It would be interesting to collect more data from other days as well, both on days they do not go

outside at all and from days they do go outside to average the results to see if this eliminates or minimizes any differences in their perceived levels from each question.

In the future, if further analysis were to be done, it would be interesting to run statistical analysis on the numbers to see if any differences were enough to be considered statistically significant.

Also, since the students from this school have so much access to parks, trails, and nature in general, it would be interesting to do this study in an urban or inner-city school and compare the data. Students at this school have easy access to nature. It would be interesting to see if students would respond the same if they had to work a bit harder to find “green” space, like in a field trip setting.

It is also felt that there would be no need to ask the pre-survey questions 1-7 in any future studies. The questions were asked simply out of curiosity but did not offer any relevance to the actual study itself.

Plan for communicating and/or using results:

The plan for communicating these results includes sharing them with the team of teachers who helped in this study. In addition, results will be shared with the building administrators who gave approval to perform the study. The process and results of this study will also be shared with a class of students enrolled in the class Teaching and Learning in the Environment at Hamline University during the summer semester of 2009.

Being the researcher myself, I plan on using these results with my future students. This study was based on the results of one day of nature experience and found to have mostly positive results on student's moods and behaviors. Based on the results of this study, I feel that getting student's outdoors more often than just one day could further benefit them. In addition, if students feel that an outdoor learning environment is an extension of the normal classroom, and not just a "novel" learning environment, negative classroom behaviors, or at least perceived risk of getting into trouble might be reduced.

Reflection on the growth of the author:

Reflecting on the process of this study, I feel that I have grown both personally and professionally. As stated in the introduction chapter, I wanted to pursue this project not only to investigate the potential benefits to my students but also to my family as well. After analyzing the results, I feel that getting students outdoors and giving them a nature experience during their school day can benefit them on many levels. This information could help my professional career and future decisions I make in the classroom and how I teach students. For my family, I already feel from experience that getting my own kids outside offers benefits beyond objective explanation. As a parent, what I have observed nature can do for my kids is beyond measure.

APPENDIX A

Pre-Experience Survey for students

Please respond to the following as best as you can.

1) What hour is it right now?

1 2 5 6

2) How old are you?

12 13 14 15

Please circle the number that best fits how you feel about each of the following questions, 1 being the lowest possible and 10 being the highest possible.

3) Rate your comfort level for being outside in a “natural” or “wilderness” area (like camping, hiking, being in the woods, etc.):

1 2 3 4 5 6 7 8 9 10
(scary/threatening) (complete comfort)

4) Rate your preference on where you would prefer to spend your free time:

1 2 3 4 5 6 7 8 9 10
(indoors at all times) (outdoors at all times)

5) Rate your preference on how you would like spend your free time:

1 2 3 4 5 6 7 8 9 10
(only with technology like cell phone, mp3, TV, computer) (without technology)

6) What effect does being outside or being “with nature” (like a hike or walk or camping, etc.) normally have on you?

1 2 3 4 5 6 7 8 9 10
(very stressful) (complete calming)

7) Do you think it is healthy and good for you to spend time outdoors and with nature?

1 2 3 4 5 6 7 8 9 10
(not healthy at all) (very healthy)

16) Is there a certain time of day when you feel more likely to get in trouble? If so, please list when:

Before school 1st 2nd 3rd 4th lunch/recess 5th 6th after school

17) On a regular school day, rate your level of tiredness during the day:

1 2 3 4 5 6 7 8 9 10
(not tired at all) (barely able to stay awake)

18) On a regular school day, rate your normal level of being calm and relaxed during the school day:

1 2 3 4 5 6 7 8 9 10
(I am not at all calm or relaxed) (I am very calm and relaxed)

APPENDIX B

Day-of outdoor experience survey questions

Name _____ Student ID _____ Hour _____

Circle the appropriate response:

Are you male or female? M F

What hour do you have science class? 1 2 5 6

What hour do you have science with Mrs. Jeffery? 1 2 5 6

Please rate the following for how you feel right now in this class:

Please remember, 1 is the lowest level (or you don't agree) and 10 is the highest (or you agree very much)

1) What is your level of being able to focus, concentrate, and stay on task right now?

1 2 3 4 5 6 7 8 9 10

(It is very difficult)

(it is very easy)

2) If you were asked to do something that involved creativity right now, rate how you would do:

1 2 3 4 5 6 7 8 9 10

(It would be almost impossible)

(It would be very easy)

3) What is your level of anxiety and stress right now?

1 2 3 4 5 6 7 8 9 10

(I don't have any stress or anxiety)

(I have a lot of stress and anxiety)

4) What is your attitude towards school and classes right now (10 is most positive)?

1 2 3 4 5 6 7 8 9 10

(very negative)

(very positive)

5) What is your ability to pay attention for class right now?

1 2 3 4 5 6 7 8 9 10

(I can barely pay attention)

(It is very easy for me)

APPENDIX C

Permission to go off campus and into wooded area.

Dear Parents and Guardians of 8th grade Earth Science Students:

In order to make this year as successful as possible for your student, I want to take this opportunity to introduce myself and classroom expectations. **Please return this letter signed** to verify that you have received and read this information with your student.

☺ **Reaching Potential:** Because it is my hope that all students reach their own full *academic* potential, I develop clear expectations so that learning can take place. These expectations are on back of this letter. I also want your student to reach their full *social* potential, so rules and consequences will be fair and respectful, while emphasizing student responsibility. Students should come each day prepared and ready to learn, show respectful behavior at all times, and be accountable for their actions – including putting their best effort into their classwork. **Required materials include a pen or pencil, a 3-ring binder with loose leaf paper, student’s agenda planner, and their textbook.** *I encourage students and/or parents to contact me any time extra help is needed and be an active participant in learning by checking parent portal and my TIES class website often. My teacher website can be found at: <http://www.stma.k12.mn.us/>*

☺ **Classroom Policies:** Please review the classroom contract with your student. My policies follow the school handbook guidelines. Missed work is the responsibility of the student to get, ask questions, and complete in the time given. We will go over the classroom contract in class to make sure they understand what is expected of them for this class.

☺ **Success!** Success is up to us all – the student, myself, and you! Please contact me right away if extra help is ever needed! Call or email any time at valeriej@stma.k12.mn.us or 763-497-2655, ext. 31042. Please remember to check

Parent Portal for frequent updates on student progress and my TIES website for class information!

☺ **Big Woods!** We have an amazing outdoor educational resource for our students literally right outside our classroom door. There may be times throughout the year that we can use the Big Woods, but since it is technically “off-campus,” I will need your permission to allow me to take your student out there with the class. If you do NOT want your student to participate, please write me a short note on the portion of this letter below.

I look forward to an exciting and productive year!

Mrs. Valerie Jeffery

Return by Friday, September 11

(Student) Name _____ (please print)

I have read and understand what is expected of me. I am aware that if I show irresponsible behavior at any time, I will take full responsibility for my actions. I agree to put my best effort into this class in order to be successful!

Signed, _____ Date _____

Parent/Guardian _____ (please print) Signed, _____

notes:

APPENDIX D

Graphic organizer for students

Name _____ Hour _____ Score _____ (15)

Answers:

- Are thoughtful and reflective,
- Provide detailed descriptions,
- Relate to what you learned today while being outside,
- Demonstrate good effort,

I wonder how...

Something I learned about the sky is...

Something I have never thought of before is...

Something that reminds me of another thing we learned about in earth science is...

Something that bends my brain a bit is...

I wouldn't mind learning more about...

Something new I learned about the earth today is...

The coolest thing I learned outside today is...

xiii

APPENDIX E

Letter of permission from the school principal to survey students.

November 16, 2008

Dear Human Subject Committee,

I have reviewed Valerie Jeffery's Capstone (Action Research Plan) proposal as defined and give my permission to Valerie to proceed as planned at St. Michael-Albertville Middle School.

Valerie has permission to survey students, parents and staff to complete her project in an effort to improve the defined aspects within our school setting. Please feel free to contact me should you have any questions/concerns (763)497-2655.

Thank you,

Jennifer Kelly
Principal
St. Michael – Albertville Middle School

APPENDIX F

Team directions for Proctoring Senteo Outdoor Experience Survey

First of all, thank you for taking the time out of your classes to have the students take this survey! I wouldn't be able to do my study without this! I appreciate your time.

Notes:

Please have the students take the survey at the beginning of class before instruction but after they have been settled into a normal "class mode."

Please don't guide the students to answers. The questions are pretty straight forward and I don't want them "swayed" at all in their answers. Just guide them to answer how they feel right now.

Please make it very clear that there should be no talking during the survey. Even vocal "responses" like a grunt or giggle, or sigh can influence how kids might respond. I want the most unbiased results as possible.

To get set up for kids:

- 1) Open and then minimize the SENTEO class list. It is located in the middle school, 8th grade, team 8A shared folder. You can keep this list minimized all day or open it each class period. Copy this file to your desktop!
- 2) Open the SENTEO outdoor experience survey. It is located in the middle school, 8th grade, team 8A shared folder. You can make it full screen so it is easier for the students to see. Copy this file to your desktop!

Directions for kids:

Please read and follow these word for word, like the MCA directions. Sorry it's "corny," but it just makes sure that the results are as consistent as possible between teachers. 😊
Read what is in bold. Directions for saving are also given at the end. Thanks in advance! Please call me with any questions!

Today you will help Mrs. Jeffery collect information about what affect a nature experience has on students throughout their school day. She will use this information in her paper, which will be published for others to see. Please take this survey as seriously as possible because your results will be published information. There are eleven total questions which ask you about your levels of things like concentration, tiredness, and creativity. Questions like these are on a scale of 1-10.

Please use the descriptions for each question to decide which level you are right now. You will take this same exact survey in each of your core classes to see if there is a difference throughout your school day. Please answer the questions for how you feel *right now in this class*. If this is the second or third time taking this survey, please be patient and remember to answer how you feel right now. There should be no talking or other vocal responses during the survey to keep the results as unbiased as possible. Are there any questions?

When you get a SENTEO clicker, turn it on and then find your class (your current teacher's name) and enter your student ID number (lunch number). Please raise your hand if you have any questions about this. You can now come and get a clicker and get logged in.

When you see that all students are logged in, you can press start for the first question. Please read each question out loud to students as you go. After all students answer each question, hit the next arrow for the next screen. It will prompt you to close the previous question first, hit yes. ***When you are done with all 11 questions, *please make sure to save the results as an Excel file in the team 8A shared folder*. To do this, select the SENTO tab, export results to, Microsoft Excel, and then name each class as follows:

Your last name-hour # for example: Pilney-Hour 1

After exporting (make sure you have exported! ☺), close the survey but do not save!
Yae! Thanks! Val

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