

Beck, M. Increased time spent in a natural setting related to an increase in pro-environmental behaviors and pro-environmental attitudes in adolescents. (2010)

The research questions addressed in this capstone are: 1) Does an increased amount of time spent in a natural setting increase the chances of pro-environmental behaviors in adolescents? 2) Does an increased amount of time spent in a natural setting help develop or strengthen a bond between adolescents and nature? The methodology to answer the questions included both self-reported surveys completed by the students and objective observations made by the researcher. Literature both supporting and refuting the questions are presented along with the numerical data collected during the research study. Conclusions from the study include a high level of pro-environmental behaviors and beliefs by students in the study and anecdotal evidence of an increased interest in pro-environmental choices by adolescents.

INCREASED TIME SPENT IN A NATURAL SETTING RELATED TO AN
INCREASE IN PRO-ENVIRONMENTAL BEHAVIORS AND PRO-
ENVIRONMENTAL ATTITUDES IN ADOLESCENTS

by

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To Clayton and Janet Beck, my parents, who taught me to love the Earth.

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CHAPTER ONE

Introduction

The Earth is in peril. Fossil fuels are being burned at rapid rates that are driving oil prices up and causing an increase in the global temperatures which will lead to melting ice caps, melting glaciers, and untold effects on ecosystems that are just barely surviving. Natural Resources are being used and abused at a rate that defies sustainability, and rapid consumption is everywhere. (Gore, 2006 and D.O.E., 2009) With these thoughts in mind, I embark on three-month study of pro-environmental behaviors in adolescents.

This chapter will include the research question and the hypotheses related to that question. It will provide the rationale for why I feel research in the area of environmental attitude and behavior is important and will give an overview of the study reported in this capstone.

Research question and hypotheses:

The questions the research in this capstone attempts to answer are:

- 1) Does an increased amount of time spent in a natural setting increase the chances of pro-environmental behaviors in adolescents?
- 2) Does an increased amount of time spent in a natural setting help develop or strengthen a bond between adolescents and nature?

The hypotheses related to these questions are:

- 1) I believe that an increased amount of time spent in a natural setting will result in an increase in incidents of pro-environmental behaviors displayed by the adolescents involved in this research study.
- 2) I believe that the bond between the adolescents involved in this study and nature will be developed or strengthened by an increased amount of time spent in a natural setting.

Rational for research:

To understand why the beliefs and actions of the future generation regarding the health of the Earth is so important to me, it is necessary to go two generations back from my own. My grandparents were extremely economical people, not only out of choice but also, out of necessity. Both my mother and father's parents were raising large families (seven and 11 children respectively) during The Great Depression and World War Two. Waste was something that could not be afforded. To give a few examples of how every material was used to its maximum lifespan, I include a brief listing here of how objects were used and reused by both families:

- * Flour sacks were sewn into clothing, dishtowels, sheets, and other fabric needs.
- * Cans were washed, crushed down and brought to the local drop site to be re-smelted into tanks and other steel fabrications for the war effort.
- * Peelings from fruits and vegetables were used to slop the hogs and feed the rabbits, which when full grown were the family's meat supply.
- * Bath water was heated and, beginning with the oldest child and ending with the youngest, was used for the entire family on bath night.

- * Butter and ice cream were made from the farm's milk.
- * Large gardens were planted and produce was canned to last the family through the winter until the next garden could be planted.

The list could go on and on, but the point has been made. My parents raised their children with the same sense of respect for the Earth's resources and recycling of goods with which they had been raised. While growing up, no food was ever wasted in our home. Disposable dishes, which became vastly available after World War Two, were not used, even on picnics. Every child had chores to do and clothing was handed down from the oldest to the younger children until the clothing wore out, it then became scrub rags or material for quilt squares.

We (the seven children in my family) were taught by our parents that the Earth's gifts are to be used wisely and with respect. Littering was forbidden and walks included bags to pick up the refuse that "careless people" had thrown out of their cars on the way past. . From that start, looking at global impacts of habits and behaviors was not a great leap. This upbringing is why I am so passionate about not only doing the right thing as far as the Earth and its citizens are concerned, but with sharing that passion with my students and community. I want to pass along not only the information but also my love of the Earth and my desire for the Earth to be inhabitable for generations to come.

Besides the lessons my parents taught me, other facets of my childhood influenced my belief system related to the Earth. Reflecting upon my childhood, I first think of running and playing tag in fields overgrown with native grasses. Sprawling silently in that same grass when hide – and – seek was the game. Then there were the

woods, I could and did stay in the woods all day long. Friends and I would collect wildflowers, pine cones, leaves, and other plant life to run our “restaurant”, we would ride our bicycles or walk through the trails that had been cut by older children, we would collect old fallen tree limbs and boards to build forts out in a stand of trees, and in the winter, we would sled down those same trails we walked in the summer. It was a grand adventure if we found some scat or animal tracks to follow. There was no fear from what we may find at the end of the tracks or when the scat became too fresh. There was nothing in nature to be afraid of. Those woodlands and fields had been my play place from the time I had been very small. It had been the play area for my siblings before me. It was natural to wake up in the morning, have breakfast and go outside until mom called me in for supper. The television was not on in my home during daylight hours when I was growing up. Children played outside, that’s just how it was.

My childhood was different from what I am observing where I live today. Unfortunately, I have noticed that children are missing from nature. When I watch children playing today, I often ask myself, “What has happened? Why aren’t they enjoying the outdoors, running, being free?” Then I stop to wonder if children today really know how to play outdoors without playground equipment or other toys being available to them. From what I have observed in the past two years, my answer would have to be, “No. Children today are not or do not know how to just play.” Friends’ children look at me expectantly if I suggest we go outdoors. When we get outdoors, however, they ask which toys we are going to play with or which park we will visit. The children do not know how to just go out and play in nature. Rarely do I see children in

my neighborhood just playing. They are either riding their bicycles, electric cars, or dirt bikes around and around the paved roads or are on elaborate swing sets in their own yards. That is, if they are outside at all. It is all too often that I find myself and a few other adults in my neighborhood the only humans out of doors, no matter what the weather.

My childhood experiences and the bond that I formed with nature at a young age have inspired me to adopt habits that are pro-environmental. Or, as I like to tell my students, my habits are Earth-friendly. Our Earth cannot fix itself; it will take the efforts of all citizens of the world to bring back sustainable use of our planet's resources.

Because I believe so strongly that all citizen's can make small changes to their lifestyles that could result in cumulative large changes for the good of the Earth, I began including more Environmental education into the Biology courses at a rural, Northern Minnesota high school. Environmental education can assist young people in gaining confidence in their own abilities to make a difference in the world. (James, 2007; Vickers & Matthews, 2002) I feel that environmental education should be required in every school's K-12 curriculum, but, until that day arrives, how effective would adding some nature time into the regular curriculum be to developing student's appreciation for the Earth? Richard Louv, in his book, *Last Child in the Woods* (2008), introduces us to the idea of Nature Deficit Disorder. This disorder is defined by Mr. Louv, as the increase in children's inability to maintain focus and behave in educational settings due to their lack of connection with nature and their increased focus on fast paced video games and television shows.

My plan is to take Mr. Louv's view one-step further. By increasing young people's quiet time out in nature, I wish to see if it changes behaviors from practicing pro-environmental habits sometimes, to practicing pro-environmental habits most of the time. I also wish to observe if the increased nature time increases my student's connection with the Earth.

Key terms used in this capstone:

The definition of the term as it is to be used in this paper is the definition given.

Appreciation: Valuing highly. (Thorndike, 1983. p. 54)

Earth friendly behaviors: Practices in everyday life that maintain or improve the Earth's environments. Examples include: recycling paper, metals, and plastics, turning off water and lights when they are not in use, and not littering.

Environmental Education: Curriculum centered on the resources of the Earth, their use, sustainability, ability to be renewed, and how use and abuse of these resources affects humans and other inhabitants of the planet.

Natural setting: An area not developed by human beings or an area meant to be used to enjoy plants and animals in an unstructured habitat, such as a park.

Nature journal: A record of a person's thoughts, perceptions, ideas, and drawings while in a natural setting. Entries may be guided with a question or topic from the instructor or left to the writer of the journal to choose.

Positive attitude: Viewing an object, action, or behavior as good or helpful. The action that is chosen when viewed as helpful.

Pro-environmental behaviors: See Earth-friendly behaviors.

Self-efficacy: A person's belief that he or she has the ability to make a difference or attain a goal. Belief in one's own abilities.

Assumptions:

I am assuming that, with the group of students that has been chosen to participate in the study, there will be an overall positive feeling toward going outdoors and working with nature journals. These particular students have, in the past, remarked that they enjoy journal writing in other subject areas and have shown themselves to be open to new experiences.

The other assumption I am making is that this group of students will be very open and honest with me in their feelings regarding nature and spending time outdoors, as I have been their teacher for two consecutive years and they have come to me in the past with a variety of personal concerns and stories.

While forming or re-forming a habit takes time and practice, once a habit is formed, it is often difficult to break. I am hoping that by sharing my beliefs and habits regarding the Earth with my students, I can start them on a pathway to realizing that they can make a difference regarding the refuse, water, habitat, and air pollution problems. One person can make a difference, a class of forty certainly can have an impact – especially if each of those forty students bring their newfound knowledge and habits home to their families. The practice of Earth-friendly habits could quickly become common practice in our small community...and with some talking and modeling; they could become common practice across a much larger area. Hopefully, if we all believe we can make a difference, the Earth will someday be out of peril.

Overview of the capstone:

The remainder of this capstone will lead you through a review of the literature associated with adolescents' views of nature, their beliefs regarding the state of the planet, and methods of changing the behavior and beliefs of adolescents regarding the Earth. Chapter Two will also contain literature that disputes the ability to change behaviors and attitudes of adolescents regarding nature.

Chapter Three will lead you through the research methodology used in the study. It will include time-lines, survey questions, and objective research methods used with the students. Demographic information about the age, gender, and racial make-up of the study group and the school in which the study takes place may also be found in this chapter.

Chapter Four will give the results of the research in graphic and statistical form. The manner in which the results support or refute the hypotheses stated in Chapter One will also be included in the fourth chapter. The mean of the data from student surveys shall be the main form of data used to determine if a significant change in behavior has occurred. Graphical data shall be used to determine a significant change if the mean of the numbers is not an accurate determination of a significant or insignificant change.

The fifth chapter will share what has been learned by the researcher during the process of the study, will tie literature from Chapter Two to the results obtained during the study, and will point out implications and limitations of the research data. Recommendations for future research on this topic and a plan for communicating information learned during the research process may also be found in Chapter Five.

CHAPTER TWO

Literature Review

This chapter will contain findings of published research related to children's attitudes, behaviors, time spent in nature, and their experiences in nature. There will also be references to Louv's interviews (1990, 1994, 2007, 2008) of people and his interpretation of research related to the previously named topics in his book, *Last Child in the Woods* and article, *No Child Left Inside*. Research supporting and refuting the hypothesis stated in chapter one will be presented.

Adolescent attitudes and experience regarding nature:

Prior to ascertaining if an increased amount of time in nature will lead to an increased appreciation of nature, one should look at the attitude of adolescents toward nature in general. There seems to be a myriad of views regarding how teens view a natural setting.

Some developmental psychologists, such as Stephen and Rachel Kaplan, report "adolescents prefer to be somewhere where they are able to participate in some activity." (Kaplan, 2002. p.232) The Kaplans also assert that teens want to be in more developed versus natural places. The "adolescents find time spent in nature lonely and boring" (p.239), while spending time with friends in a more built up setting more fun. Although the Kaplans' study found that some adolescents prefer a built up setting, not all adolescents prefer built up areas. A portion of the research in this study addresses

elements in students' backgrounds and if the rural students have different views than urban students. Therefore, one should find the background of the adolescent whose preferences are being sought. If the young person was raised in a rural versus an urban setting, the preference of the young person may have been influenced by the location with which he or she is most familiar. Teenagers who are raised in an urban setting are more prone to have negative feelings toward nature because, they report, there is fear of the unknown and adolescents feel more comfortable in a built up area.

The Kaplans also report that adolescents are at a stage in life where social networking and connection with peers is more important to them than other things. "It is not that the teens dislike or do not care about nature, they are on a 'time-out' while they concentrate on other things." (p. 252) The idea of adolescents being on a time out or not truly connecting with nature during the teenage years has also been noted by Richard Louv. In *Last Child in the Woods* (2008), Louv interviewed a ninth grade boy regarding a family trip to one of the United States better known natural areas, the Grand Canyon.

After seeing the canyon from several different vantage points, I was ready to leave. Although the canyon was magnificent, I felt that I was not part of it-and without being part of it; it seemed little more than a giant hole in the ground.

(p. 69.)

It has also been asserted that young people do not see the larger picture where nature is concerned. Peter H. Kahn, Jr. (2002) called this "environmental generational amnesia" in the book *Children and Nature*. Children grow up "seeing the level of

pollution around us during the formative years as ‘normal’ and thus missing just how polluted things truly are.” (p.106)

Perhaps it is true that the level of pollution around us becomes normal and acceptable to us, however, the level of pollution that is acceptable to an individual could be changed via increased interaction with a more pristine natural area. As Bunting and Cousins found in their 1985 research, children aged eight to sixteen years (these being the age ranges included in the study) have an overall positive attitude toward nature. Their study was in regard to the variations that appear to have an impact on what they termed “environmental disposition”. Bunting and Cousins looked for the connections between environmental dispositions, extra-curricular activities, age, gender, and where the young person lived (rural vs. urban). They used the Children’s Environmental Response Inventory to determine the research subjects’ environmental disposition and an activity checklist to ascertain children’s participation in a variety of activities. The Children’s Environmental Response Inventory is a survey for students aged eight to sixteen that determines a child’s environmental personality. Bunting and Cousins coined the term environmental personality to describe a young person’s disposition toward the nature. “Differences are found among responses to the eight domains: Pastoralism, Urbanism, Environmental Adaptation, Stimulus Seeking, Environmental Trust, Antiquarianism, Need Privacy, and Mechanical Orientation.” (p. 725) Age, gender, and geography of residence were collected with each group of students being studied. Bunting and Cousins

also found, as did the Kaplans, where a child grows up, rural areas versus urban areas will have an affect on the young person's general attitude toward nature and the outdoors.

Along with the geographical setting in which a child is raised, the values a child is taught also play a role in their environmental consciousness and behaviors as they age. In a cross cultural study, Aoyagi-Usui, Vinken, and Kuribayashi (2003) found that children in Asian countries are raised with a

blending of environmental thinking and traditional concepts of honoring parents and family security. Whereas western children are raised with the idea that environmental concepts are contrary to traditional values...In the Netherlands and the United States, environmental values are linked with altruistic values that are perceived to be contrary to traditional values, while in Japan, Bangkok, and Manila, environmental values are linked with both traditional and altruistic values. (p. 30)

In their study, they defined three types of values, "Biospheric-altruistic values include unity with nature, respecting the earth, and a world at peace, equality, and social justice. Egoist values include authority, wealth, and influence. Traditional values include honoring parents and elders, family security, and self-discipline." (p.25) The study conducted by Aoyagi-Usui, Vinken, and Kuribayashi was part of the larger Global International Survey. They surveyed people in Japan, Bangkok, Thailand, Manila, the Philippines, and the Netherlands. They also used previously collected data by the George Mason University research group to compare the data they colleted with that of the

United States. Other studies also refer to the values with which a child is raised contributing to his or her overall attitude toward nature and the environment.

Meinhold and Malkus (2005) conducted a study in three high schools to determine if knowledge of nature, attitudes they were taught during younger years, and the level of self-efficacy of the adolescent play a significant role in environmental behaviors displayed during the teen years. They chose high achieving schools in the cities of Seattle, Portland, and Los Angeles and distributed a survey to all students in each of the three high schools who had signed parent forms to participate in the study. The results from the self-reported student surveys show there is a “significant linear relationship between pro-environmental attitudes and adolescents’ environmental behaviors.” (p. 521)

This is not to say that environmental attitude is completely a “nature” topic when considering a nature versus nurture comparison. Nature versus nurture refers to whether behaviors are in peoples’ genetic make-up (nature) or if the behaviors are more likely to be found due to the environment the person was raised in and the attitudes and beliefs of the family that person is a part of (nurture). Environmental attitudes in young people can be changed from either anti-environmental or neutral environmental attitudes to a more positive environmental view. Previous research studies indicate involvement in and exposure to natural settings are positively related to change in young people’s perceptions regarding nature.

Stephen Kaplan (2000) reported in his article, *Human Nature and Environmental Responsible Behavior*, that if you allow or encourage people to be more involved in

developing programs and activities regarding positive environmental behaviors, they will begin acting in a more pro-environmental manner. In the report, Kaplan introduces the Reasonable Person Model: a new approach to teaching pro-environmental behaviors. In the Reasonable Person Model, people are taught to view pro-environmental behaviors as improving their lives instead of the popularly used altruistic approach, which Kaplan asserts often makes people feel they are giving up quality of life in order to practice pro-environmental behaviors. Kaplan includes a description of how the altruistic approach and the Reasonable Person Model differ:

The altruism-centered approach is seen have having several inadvertent consequences, including contributing to helplessness and stressing sacrifice rather than quality-of-life enhancing solutions...This alternative approach has three goals: to provide a durable source of motivation, to reduce the corrosive sense of helplessness, and to generate innovative solutions that people do not perceive as threatening their quality of life. (p. 491-492)

Kaplan concludes his article with his thoughts on why an alternative approach may be more effective than the most popularly used approach:

People are likely to resist doing what they are told to do and may even attempt to undermine the entire effort; furthermore, such an approach would be a waste of talent and ingenuity. Telling people what to do ignores the possibility that there may be significant local variants in how best to achieve a particular goal. Being responsive to such local variation might lead to a diversity of solutions, providing

the basis for a culture of exploration, innovation, and involvement that will be both satisfying and responsible. (p. 505)

Meucci and Schwab (1997) evaluated four different pilot projects in four separate communities throughout California regarding environmental programs and pro-environmental behaviors in children. The idea for the research was “based upon Paulo Freire’s ideas about raising political consciousness through open dialogue.” (p. 1) They explain how the project progressed:

We engaged children and youth to define what were relevant environments for them and possible solutions to problems affecting them. Using a variety of approaches, the young people defined their identities within their community, mapped problems they found relevant, interviewed residents and local officials, analyzed the issues, and formulated strategies through problem-based learning, theater, video production, and community organizing...In each of our pilot projects, the children spontaneously raised the need to reserve the erosion of safe common spaces in which young people can gather, work, and play together...They clearly showed themselves to have relevant, perceptive, and creative contributions to make a public discourse that is otherwise generally distorted by fear and ideology. (p. 3 &4)

Meucci and Schwab found that children, like adults, want to be involved in the decision-making process regarding environmental programming and activities. Anything

you are personally involved in will mean more to you than merely being given information either verbally or in written form.

Nature and nurture work together in the scheme of environmental attitudes and behaviors. There are psychological reasons why people do or do not exhibit pro-environmental behaviors. Bramberg and Möser (2007) assert, “Pro-environmental behavior is best viewed as a mixture of self-interest and of concern for other people, the next generation, other species, or whole ecosystems.” (p.15.) They indicate through the results of their meta-analysis that there needs to be some intention to act and an objective to that action before any pro-environmental behavior will occur. Their meta-analysis was set up to replicate and expand upon Hines 1986/7 meta-analysis studying “psycho-social determinants of pro-environmental behavior,” (p. 14) The current meta-analysis supported Hines’ findings that there is a correlation between psycho-social variables and pro-environmental behaviors. Bramberg and Möser go on to identify eight determinants of pro-environmental behavior and the relationships between those determinants and action. Their results indicate that mere knowledge is not enough, there must be incentive prior to any action taking place.

Adolescent environmental experience:

In an attempt to change environmental attitudes in adolescents, some researchers have taken teens out of their natural environment and placed them in a natural environment for a week or two. Stephen and Rachel Kaplan (2002) have written reports from their research with adolescents at a nature camp set in Michigan. The immersion of the young people in a weeklong program has resulted in a reported change in attitude and

behavior toward the environment. The Kaplans found that the adolescents involved reported, via written surveys, an increase in positive attitude and an increase of practiced pro-environmental behaviors after the immersion experience as compared to prior to the experience.

Yet, an immersion program, while good at creating the possibility of behavior change, is not necessarily the only manner in which nature experiences can lead to attitude and behavior change. Cynthia Thompson (2002) explained how shorter forays into nature over an extended period of time could also lead to feelings of ownership and positive behaviors in adolescents. Thompson encourages involving teens in local environmental issues and giving them responsibilities in the local environment can lead to long lasting changes in environmental attitudes and behaviors. As evidence from one of her studies she states:

Slowing down the pace of their lives and immersing themselves in the sounds and movements of birds, small mammals, and insects had a significant impact on the way these teens began to think about themselves. They started to comment on their relationship to the weather, other species, the run of the river, and the quietness of this place as if self was reflected in the sanctity of this land, and it furthered their passion to protect its integrity. In protecting this piece of land, they were protecting a piece of themselves. (p. 269.)

Nature and healthy development:

Hannes Weingart is quoted in Day's 2007 book, *Environment and Children* as saying: "Alienation from nature...is inevitably linked to alienation from ourselves. This estrangement from our own humanity is certainly one of the main reasons for the numerous social and political problems besetting our society." (p. 207) Weingart's assessment of the need for nature to ensure proper societal conditions is supported by others. As far back as the early 1900's, the Native American people tried to teach the rest of us how nature contributed to the healthy development of humans. Luther Standing Bear was quoted as saying, "Man's heart, away from nature, becomes hard; [the Lakota] knew that the lack of respect for growing, living things soon led to a lack of respect for humans too." (Louv, 2008. p.123)

Jean Piaget, the well-known psychologist, was also quoted in Day's 2007 work. "Knowledge develops as a relationship-network, dynamically interweaving connected elements." (p.4) Based upon Standing Bear and Piaget's comments, knowledge and development should then include an early and continual connection to nature. Their comments lead one to think that humans are connected to nature whether wanting to admit and nurture that connection or not. Though Standing Bear and Piaget were speaking of different topics, together they offer a basis for teaching and learning about the environment. For,

trees, gardens, animals, water and views provide many physically and emotionally healing benefits, in addition to enhancing a child's knowledge of the natural

world. Indeed, if we are to save this planet, exposing children to the wonders of nature at a very young age is essential. (Anita Rvi Olds in Day, 2007. p.172)

We need to expose children to the natural world, not only for them to build a bond with nature and the environment, but also for them to develop life-long skills. As Crain states in his 2001 publication entitled, *How Nature Helps Children Develop*:

Rough ground is important for children. It gives them opportunities to explore and observe nature, and it often contains enough loose parts (such as fallen branches and old lumber) to permit creative building. Sometimes it may even be sufficiently ample to give children a chance to develop a sense of being part of the natural world. (p.24)

Malone and Tranter (2003) found that allowing children free time in nature creates a link between their own experiences and the child developing “environmental cognition”. (p. 300.) Their study, *School Grounds as Sites for Learning: making the most of environmental opportunities*, observed a myriad of activities related to core school subjects that could occur out of doors as easily as indoors. They also found that lessons learned out of doors often produced higher levels of cognitive development as opposed to those same lessons taught indoors. Robin Moore’s (1997) research regarding children’s rights as related to accessible nature, support Malone and Tranter’s findings. Moore’s study was concerned with the amount of nature that is available to children and the impact that the lack of play space has on those children's development. Her findings

show that a connection to nature is needed for the healthy development of the child and for the Earth's future. E.O. Wilson, in his book *The Creation*, supports the importance of allowing children to form a bond or attachment to nature not only for the good of the child, but also because, "A child's mind opens to living Nature early. If stimulated, it then unfolds in stages that strengthen the bond to nonhuman life." (2006. p.142)

If young people are not given the opportunity to form a bond, how are they to later view nature as something necessary for their survival and well being?

Unfortunately, lack of opportunity seems to be the norm across the United States.

Malone and Tranter's (2003) school grounds study also found that children need wild spaces not only for physical development, but also for cognitive development and to learn to appreciate the environment around them. They mapped where a selected group of children played during recess on school grounds that had a varied make-up. Children were observed noting the type of play (physical activity, social play, creative play, etc.) and also what land type on the school grounds the children were in as they played (paved, grass, natural landscape, etc.). Children were also surveyed as to where they most enjoy playing outdoors and why. Malone and Tranter state:

Many children have lost access to traditional play environments, including streets and wild spaces, partly through parental fears about traffic danger, bullying and 'stranger danger', partly through the loss of natural spaces and partly through perceptions of what is best for children. (p.284)

They also found that many areas where children played in previous generations are off-limits to today's children due to fear of lawsuits, and property rights. "When neighborhoods are not supportive of children's needs, children are limited in their capacity to experience and explore their environments and engage in cognitive play and outdoor learning-behaviours that lead to the development of environmental cognition." (p.285)

Richard Louv (2008) tied all of the previous assertions together when he stated, "The children and nature movement is fueled by this fundamental idea: the child in nature is an endangered species, and the health of children and the health of the Earth are inseparable." (p.355)

Environment and citizenship:

You could find the mention of producing "good citizens" in a number of mission statements for Minnesota public high schools. Research shows that increased exposure to the natural world can assist in developing good behavior, a social conscious, and other traits associated with good citizenship. In *Beyond Ecophobia*, (1996) David Sobel notes, "When empathy and exploration are supported at the appropriate, critical periods in children's development, connectedness with the earth can serve as a wellspring for social action." (p.33)

Sobel goes on to present examples of middle school age children's success making positive changes within their communities. One group of sixth grade students became pro-active regarding a toxic waste dumpsite three blocks from their school. The students' activism and persistency in calling involved officials resulted in the dump site

being cleaned up by the EPA within a year and a half of the students finding out about what was so close to their school. The other example Sobel presents is a battery recycling program planned and executed by a group of 7th grade students in their community. After learning in class how harmful batteries can be to the soil, air, and water if thrown in a landfill, and surveying the town to find what percentage of people recycled their batteries, the students obtained the participation of the local businesses in being drop off sites and the local waste collection company in picking up the batteries from the drop off points. Following the students' involvement and public relations activities, the percentage of people recycling batteries in their town rose significantly.

Young people can and do involve themselves in their communities if given the opportunity. Sobel further explains that adults need to help children foster their social activism:

In real life, there will always be a complex interplay of empathy, exploration, and social action. Empathy doesn't stop when exploration starts and social action does have a place in early childhood. Exploration of the natural world begins in early childhood, flourishes between the ages of seven and eleven and should be sustained in adolescence as a pleasure and a source of strength for the demands of social action. (p. 35)

In a newsletter (2009) sent to parents promoting the benefits of children spending time in nature, the New Jersey State Afterschool Communities Committee (NJSACC) cited work done in Berkeley, California in which an elementary school playground was

transformed from the typical asphalt cover to a more natural area with trees planted, grass, and flowers around the play area. After the change, faculty and staff noticed an increase in the ability of students to peacefully settle conflicts without adult intervention, and also noticed more creative play versus directed play. This shows that natural areas have an impact on social and emotional development in children.

The newsletter to parents went on to address emotional and cognitive development as related to time spent in nature. Richard Louv was quoted as saying, “We see increased self-confidence, better body image, and cognitive benefits. Kids who spend more time outdoors tend to do better on testing; they do better on science; they tend to play more cooperatively.” (p.2) All of the assets listed by Louv are part of becoming and being a good citizen. Minnesota schools’ missions include providing the opportunity for students to believe in their abilities and put those abilities to work for self, community, and country.

In the same New Jersey newsletter noted above, a study by The American Institute for Research was described to show that nature and outdoor programming are correlated to an increase in the following behaviors by students who participated in the program. “A 27% increase in measured mastery of science concepts; enhanced cooperation and conflict resolution skills; gains in self-esteem, positive environmental behavior and problem-solving, increased motivation to learn and improved classroom behavior.”(2009. p. 2)

While the main focus of the research at hand is changing environmental attitudes and behaviors, it is worthwhile to note that increased time in nature can have a positive

effect on the whole person. Humans are not separate from nature nor from other humans, we all have the one Earth to inhabit. If time spent in nature can increase pro-social behaviors as well as pro-environmental behaviors, it only increases the importance of providing time in nature to our young people.

Impediments to behavior change:

Will Rogers, president of the Trust for Public Land, reviewed Louv's 2008 edition of *Last Child in the Woods*. In his review he stated: "Children who don't experience nature won't grow up to cherish or protect it." (Louv, 2008.) The nature experience, or lack of it, is one of the impediments to people feeling they are a part of nature enough to change behaviors to help the Earth. Rogers and Louv are not the only people who recognize nature experience and pro-environmental behaviors are connected. In *Beyond Ecophobia*, (1996) David Sobel tells us, "What's important is that children have an opportunity to bond with the natural world, to learn to love it, before being asked to heal its wounds." (p.9)

However, exposure to nature cannot happen if nature is not present. Harold R. Hungerford (2006) asserts that youth of today have a more difficult time connecting to nature because nature is not around them in the abundance that young people could find nature in the past. Hungerford states, "Young men and women have far fewer natural area freedoms today than they did when I was a youth." To clarify, he goes on, "My adolescent environment is no longer there. Even the tall grass prairie remnants have been seriously injured by heavy machinery redoing the railroad right-of-way." (p.57)

While a connection to nature is needed for healthy development and bonds to form between the child and nature, another impediment to bonding that may not have been as severe as it is today is fear of nature. Fear of nature has shown to be an increasing impediment in several studies on the child-nature connection. Dillon, et al.(2006) state “outdoor settings can be the source of genuine fear and concern for young people.” (p. 109) Richard Louv (2008) also refers to the fear of nature as an impediment to nature relationships. Louv asserts that children often develop a fear of nature because their parents have developed phobias to nature encouraged by exaggerated news stories and popular media feeding into the fear that there is eminent danger in nature. While naturalists agree that there are dangers in nature if people are unaware or unprepared for the setting they are in, previous research shows phobias and fears have been greatly enhanced by the media, making it more difficult to establish a bond between the child and nature. As Louv states, “...there are also risks in raising children under virtual protective house arrest...threats...to their sense of stewardship for the Earth – and, most immediately, threats to their psychological and physical health.” (2007, p. 5)

An additional impediment to youth forming a connection with the natural world is a feeling they are not part of nature. In interviewing eight teens following an outdoor experience, Haluza-Delay (2001) found that the teens that participated felt that humans are separate from nature, even though some reported that getting into nature was important because it was relaxing and allowed them to “get away from their busy lives” (p. 46). While this separation from nature may be due to lack of experience outdoors, fear of nature, or a combination of reasons, another impediment could be:

Attitude structures are well formed by the end of high school; major change occurs most readily in the younger years. Attitude flux occurs throughout youth, up to the early teen years. At this time the attitudes solidify and become much less amenable to change. Therefore, developers of programs dealing with older high school students face a large challenge in attempting to change attitudes.

(Eagles & Demare, 1999. p. 36)

Along with Eagles and Demare's findings, Louv (2008) reminds us, "Even among children who participate in nature activities, a conservation ethic is not assured." (p. 140) Children may be participating in outdoor activities because it is part of a class, a family vacation, or any of a number of reasons other than because the child wants to participate. If participation is not voluntary, or the young person has already solidified his or her attitudes and beliefs regarding the environment, it may be much more difficult to make a change to more pro-environmental behaviors with that individual.

Although behavior change is not assured, it is important that educators and conservationists not give up on the upcoming generation. In *The Thunder Tree*, (1993) Robert Michael Pyle tells us:

In the long run, this mass estrangement from things natural bodes ill for the care of the earth. If we are to forge new links to the land, we must resist the extinction of experience. We must save not only the wilderness, but the vacant lots, the ditches as well as the canyonlands, and the woodlots along with the old growth. We must become believers in the world. (p. 152)

Another factor that may be affecting the bond today's youth have with nature is the amount of free time that young people are afforded. It is often reported that young people are scheduled into so many activities and groups that they do not have time to explore nature, or play freely. (Wridt, 2005. Olson, 2009) Wridt was addressing analysis of growing social problems by students. Olson is currently teaching health and decision-making classes in a Northern Minnesota high school. She stated via interview that students repeatedly self-report feeling that they do not have enough time to participate in all of the activities or to complete all of the demands made upon them during a typical day. Hungerford and Volk (1990) presented the following information at the World Conference on Education for all held in Thailand: "environmental sensitivity is a function of an individual's contact with the outdoors in relatively pristine environments either alone or with close personal friends or relatives...Of great importance is the fact that they reported that these activities took place over long periods of time." (p. 14) Long periods of time may no longer be a possibility for today's over-scheduled youth, which may be a detriment to young peoples' ability to develop strong bonds with nature and to their ability to consciously make behavioral changes. Few of the researchers who have studied environmental attitudes in young people have reported no evidence of pro environmental behavior or attitude change in the time frame of their studies. "As a result, many researchers have inferred that more time might need to be spent in order to influence the affective realm." (Chen-Yin, et.al. 2002. p. 28)

Parental fears being a possible impediment to behavior change is related to

another probable impediment, indoor activities being more acceptable than in the past. Louv reported in *No Child Left Inside*, (2007) “In a typical week, only six percent of children ages nine to thirteen play outside on their own.” (p.5) Brodin and Lindstrand found in their study on inclusion of children up to the age of 18 in outdoor experiences (2006):

Actually, many studies show that computers may be one reason why indoor activities are popular and sometimes prevent outdoor play but it is not the only one. Other reasons may be that the offering of media has increased, that children are left alone after school and prefer to stay indoors, that the western life style enhance indoor life and of course that the society as a whole support indoor activities. Many parents prefer that their children stay indoors as it is easier for them to have control of the child if they are at work. (p. 20)

Louv’s interviews of young people (2008) also aid in supporting indoor activities as preferential to outdoor as evidenced by the statement of the young man who said, “I prefer to play indoors because that’s where the electrical outlets are.” (p. 10)

Contact with nature can lead to caring for nature:

Not only does the loss of children’s outdoor play and contact with the natural world negatively impact the growth and development of the whole child and their

acquisition of knowledge, it also sets the stage for a continuing loss of the natural environment. The alternative to future generations who value nature is the continued exploitation and destruction of nature. Research is clearly substantiating that an affinity to and love of nature, along with a positive environmental ethic, grow out of children's regular contact and play in the natural world. (White, 2004. p. 3)

White, of the White Hutchinson Leisure & Learning Group, is not the only published work asserting that regular contact with nature in childhood and even into adolescents could be the building block for future care of and for nature. Donna Donald, Family Life Field Specialist for the Iowa State University Extension, stated in an interview:

Children who spend time in nature are more likely to care for the earth as they grow and become adults. As children discover the role that the environment plays in our lives and the resources it provides, they are more likely to be good caretakers of the natural world. (2009.)

Children need to have frequent contact with nature for their own benefit and to develop a caring attitude toward natural settings. The frequent contact fosters care and concern to develop and grow within the child and may lead to environmental behaviors. (White, (2009); Lude, (2007); Chawla, (1988); Cai, et.al., (2009); Johnston & Carter, (2007); Wells & Lekies, (2006); Louv, (2008).)

Robert Michael Pyle added his ideas on contact with nature in his 1993 book, *The Thunder Tree*:

It is through close and intimate contact with a particular patch of ground that we learn to respond to the earth, to see that it really matters...Everybody has a ditch, or ought to. For only the ditches – and the fields, the woods, the ravines – can teach us to care enough for all the land. (p. xviii-xix.)

Developing a bond with nature leads to stewardship:

In an interview with Richard Louv (2008), environmental activist Janet Fout attributes her “childhood spent in a natural setting as the source of her environmental activism in her adult life.” (p. 294) Fout is not the only one whose childhood lead to adult activism, in interviews of many persons known for their pro-environmental attitudes, such as E.O. Wilson, Robert Michael Pyle, Richard Louv, Rachel Carson, and the list could go on, (Wilson, 2006; Pyle, 1993; Louv, 2008) credit childhoods spent in nature as one of the chief reasons for their activism today.

Research also backs up the recollections of the environmentally active. Nisbet, Zelenski, and Murphy (2009) found in their study of people’s connection with nature to environmental concern and behavior that the more people relate to nature the greater the possibility of pro-environmental behaviors being displayed. Nesbit and colleagues also found that “Environmental concerns relate directly to the degree with which individuals see themselves as part of nature.” (p. 717) Seeing oneself as part of nature can lead to

stewardship of nature as a basic psychological principle of self-preservation. To be a steward of nature is to be a steward of oneself if you view yourself as part of nature.

Alan Peacock (2006) also found through his research into changing behaviors through school trips, that prolonged time spent in nature, especially in a particular area, creates a strong bond to nature and a tendency for stewardship activities to occur by the person who formed that bond. Peacock's study was regarding the long-term effect that an ongoing relationship between a school and the Nation Trust developed under the Guardianship Scheme. The research methods included the same school or schools visiting the same property owned by the National Trust for an extended period of time, the same personnel working with the students, engaging students in a variety of activities such as gardening, field research, conservation programs, etc., and obtaining personal testimony from the people involved in the study.

Time spent in nature does more than create stewardship tendencies in the immediate vicinity of the person. Exposure to nature can develop the sense of responsibility for the natural earth in persons who have the opportunity early and often to spend quality time in a nature setting. Wells and Lekies (2006) collected data from across the United States. People aged 18 to 90 years were asked to share their childhood experiences in nature and their present attitude and beliefs about the environment. A group of undergraduate students who reported via survey that youth activities such as hunting, fishing, playing outdoors, media, and "witnessing negative environmental events all contributed to ecocentric beliefs later in life versus anthropocentric beliefs." (p. 3)

Vaske and Kobrin (2001), in their study of how attachment to a particular place is related to environmentally responsible behavior, assert that “as individuals develop an emotional connection to their natural resources, they appear to act responsibly in day-to-day activities...” Not only does the research encourage children and adolescents to spend time in the outdoors for the benefit of their own minds and bodies, it will also assist in “developing a more responsible citizenry.” (p. 21)

Psychologist Louise Chawla has also studied the possible cause and effect relationship between spending time in nature and developing a sense of stewardship toward the Earth. Chawla’s research supports that there may be a cause and effect relationship between time in nature and stewardship. She was quoted in Louv’s 2008 edition of *Last Child in the Woods*: “the positive effects of involvement with nature on health, concentration, creative play, and a developing bond with the natural world that can form a foundation for environmental stewardship.” (p. 44)

Time in nature with a caring adult encourages pro-environmental behavior:

Along with an increased amount of time spent in nature and forming a bond with the environment, having a caring adult or mentor may increase the probability of young people experiencing a change to practicing more earth friendly behaviors. Chawla’s (2006) research showed environmental behaviors between Americans and Norwegians have similar origins: “The two most frequent motives are the same in each country: positive experiences of natural areas in childhood and adolescence and family role models.” (p. 59) Chawla clarifies the family role model in regard to the environment

when she states, “when children have access to the natural world, and family members encourage them to explore it and give it close attention, they have a strong basis for interest in the environment.” (p. 76)

Other researchers have found that it does not necessarily require that the role model be a family member in order for Earth friendly attitudes and behaviors to develop. Teachers, older friends, outdoor guides, etc. may all serve in the capacity of environmental role models with the same outcome as a family member. (Arnold, Cohen & Warner, 2009; Sobel, 1996.)

The time spent in nature with a caring adult need not be free, exploratory time in order for a behavioral change to occur. Students have reported sustained pro-environmental behaviors following structured outdoor learning experiences. These experiences sustained over a period of time, and led by a caring adult can have as many positive effects on pro-environmental behaviors as free play in a natural setting. (Martin, 2006; Dutcher, et.al, 2007.)

Hands on experience:

Wells and Lekies found in their 2006 evaluation entitled: *Nature and the Life Course: Pathways from Childhood Natural Experiences to Adult Environmentalism* that no amount of time spent in a natural setting will fully benefit people if they are not allowed hands-on experiences. While just sitting and observing nature can be relaxing and rewarding, forming a bond with the environment takes interaction. Their evaluation focused on data collected in 1999 by Lohr’s research group from Washington State University. The original study by Lohr was to obtain information regarding “childhood

environmental experiences and adult sensitivities to urban and community forests” (p.6). E.O. Wilson is quoted by Louv (2008) regarding the necessity of hands-on opportunities as saying: “Hands-on experience at the critical time, not systematic knowledge, is what counts in the making of a naturalist.” (p. 151) Sobel agrees in his 1996 book, *Ecophobia*, stating: “When empathy and exploration are supported at the appropriate, critical periods in children’s development, connectedness with the earth can serve as a wellspring for social action.” (p. 33)

The hands-on experiences may take place either in “domesticated” or “wild” nature, as long as the experiences happen. There has been indication in studies that wild places create a stronger bond and more lasting impressions during hands-on experiences, (Wells & Lekies, 2006) but, as long as nature is present, children will find a way to engage themselves. Places as domesticated as naturalized playgrounds have provided observable benefits to children’s earth friendly behaviors and attitudes. (White, 2004)

Outdoor programs may also provide an opportunity for hands-on experiences. However, research shows that the program must be of sufficient length in order for a positive attitude change toward the environment to occur and be sustained. (Bogner, 1998. Kaplan, 2000)

The important thing to consider here is that no matter the manner of the hands-on connection, be it exploration, guided activities with a trusted adult, recess in a naturalized school yard, or outdoor camps and programs, the key is to provide young people with the opportunity for the experience. Research by Beck and Beck-Gernsheim, as reported by Ojala (2008), asserts that the future of the environmental movement rests on young

people having the opportunity to learn about nature for themselves: “Young people today, compared to earlier generations, are less inclined to merely obey orders from authorities but instead want to base their decisions on well-deliberated knowledge and inner convictions” (p. 793). While the previously noted research was in regard to recycling attitudes and behaviors, the findings can be expanded to most earth friendly behaviors. Finger (1994) conducted empirical research in Switzerland to apply an alternative framework based upon what he termed *life-world* to environmental behaviors. Finger described the life-world as an “approach that sees the individual as being imbedded in his or her environment.” (p. 144). He found” information and knowledge acquisition do not seem to play a significant role at all...Environmental behavior appears to be mainly related to environmental experiences.” (p.159)

Chapter Summary:

While there is research supporting and refuting the hypothesis stated in chapter one, the evidence supporting the idea that attitudes and behaviors can change seems to appear in more of the research than the idea that behaviors cannot be changed. Attitudes may be developed by late adolescence, but there is hope for change when implementing some of the methods suggested by researchers cited in this chapter. Providing children of all ages the opportunity to experience undisturbed nature in a hands-on manner, to allow those children to be involved in planning and executing actions to improve their environment, and attempting to reduce the number or severity of impediments to children being in nature has been shown to have a positive effect on pro-environmental attitudes in those children. Not only may these children undergo a change in attitude and behavior,

they are more likely to develop a true bond with and care for the environment of the Earth. In conclusion, while there are impediments to changing one's behaviors vis á vis, the Earth, the more time children are afforded in a natural setting, the more likely pro-environmental attitudes and behaviors will be exhibited by those children.

CHAPTER THREE

Research Methods

In this chapter you will find the demographics of the students participating in the research and the demographics of the school in which the research was conducted. The process which was followed to learn if there is a connection between an increased time spent in nature and an increase in Earth friendly behaviors will also be explained.

Demographics:

Subjects participating in this study are fifteen to seventeen year old males and females enrolled in the general Biology course at a rural, northeastern Minnesota high school. Ninety-five percent of students enrolled in the Biology course have taken at least two other science courses with the investigator and one hundred percent of the students have successfully completed general Life Science (with the researcher), general Earth Science (with the researcher), and general Physical Science courses.

Students in the research group will not be informed that they are participating in a research project, as this may change the behavior of the students in their attempt to assist the researcher attain results supporting the hypothesis. As no student will be identified in the research, the human subject research data form was signed by the superintendent of the school district and research with the students proceeded at the commencement of the academic year.

The Biology course is divided into two sections, each of which meets every school day for fifty-two minutes. The fifty-two minute period will be referred to as “an hour” for research purposes. Each section of the course has a relatively equal male to

female ratio in the classroom. There are a variety of academic achievement levels within each class hour, academically gifted, average, and students with learning disabilities are all within the same classroom for Biology.

The demographics for the school in which this study is being conducted contains a student population of approximately two hundred fifty students in grades seven through twelve per academic year. The breakdown according to reported race is one percent American Indian, two percent Black, and ninety-seven percent Caucasian. Fifteen percent of the student body qualifies for Special Education services and thirty-nine percent qualify for free or reduced lunch.

Student beliefs:

A ten statement survey with Likert ratings will be given to the students enrolled in Biology once during the first week of school and one more time in the middle of the fourth month of the school year. (A copy of the survey used with the students may be found below.)

The purpose of the self reported data from the student surveys is to ascertain the level of attachment students have with the natural environment and the students' Earth Friendly behaviors prior to implementing research. As some of the research noted in chapter two, teens tend to have formed their beliefs and attitudes by the time they have reached the age of the subjects in this study. Other research showed that beliefs and attitudes in children and teens may change with extended exposure to natural settings. It

is important to know where student beliefs stand prior to and following implementing the research to ascertain if any change or growth has taken place.

The Environment

Below are ten (10) statements about the environment and things you might think. Please mark a truthful response to the statements. Remember, your name is not on this and being truthful is more important than marking what you think you should mark. Please rate your belief for each statement as follows: **5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree.**

Thank you for taking the time to do this. ☺

Statement	5	4	3	2	1
Recycling is something everyone should do.					
Recycling helps the Earth.					
I pick up garbage from the floor/street.					
Picking up garbage helps the Earth.					
I turn off the water while brushing my teeth.					
The Earth is running out of clean, usable water.					
The Earth is growing more polluted because of human activities.					
I am part of nature.					
I feel that taking care of nature is my job.					
I can make the Earth better for all living things.					

TABLE 1: Student survey of attitudes/beliefs

Increased time spent in nature and Earth friendly behaviors:

Under the guise of nature journaling, students will spend Friday's class hour every week of the school year in a natural setting, either alone or with one other student.

The natural areas will be varied from week to week. Visited areas will include: a bike trail in a forested area, a bike trail in a filled mine pit, a wooded area outside of town, and a field area with a stream running through it.

As related in chapter two, research has shown that exposure to nature on an ongoing basis has the possibility of helping student attitudes change to more pro-environmental than previously held beliefs. The students will therefore spend a total of approximately thirty-two class hours in a natural setting. This is in opposition to the nominal number of class hours spent in a natural setting that other students experience during a typical school day in the subjects' school.

For the duration of six weeks during the fall of the year, commencing the second week of classes and culminating the tenth week of classes, students involved in the research group will be observed by the researcher during Biology class to record each incident of pre-chosen Earth friendly behaviors. The purpose of observing and recording Earth friendly behaviors of the research subjects is to have an alternative set of data to chart any possible change in behavior other than the self reported data from the students. Due to survey results being anonymous, Earth friendly behaviors will also be recorded anonymously. Behaviors the researcher will be watching for include: recycling paper, recycling aluminum cans, recycling plastic, turning off water while soaping hands, picking up garbage, and reminding someone else to perform one of the previous behaviors. Participation in each of the listed behaviors is possible every school day in the Biology classroom. Each incidence of one of the target behaviors will result in a hash mark being placed on a data sheet for the appropriate class hour and week of research.

The data collected from each class will be added together per category at the end of each school week when data is collected. Data will be reported as a percentage of how many times each behavior was observed as compared to the total number of students in the research group.

Clarifications:

The percentages will then be plotted on a line graph to determine if a pattern of increased Earth friendly behaviors correlates with an increased amount of time spent in a natural setting, as the research cited in chapter two indicates should happen.

For counting purposes, a single student recycling paper at the start of a class hour and again in the middle or at the end of the class hour will count as two separate instances of recycling paper. A single student recycling a handful of papers or multiple cans/bottles at one time will count only as a single incident of recycling on the data collection sheet.

Week # _____

Class # _____

Recycles Paper	Recycles Can	Recycles Plastic	Turns off water while soaping	Picks up trash	Reminds someone else

TABLE 2: Earth friendly behaviors data chart

Summary:

The research process used is simple, but is set up to record the needed information without disrupting the regular classroom schedule and for the survey to be understood by students of all ability levels. The percentages for each category of targeted behaviors and the percentages calculated for each statement on the student survey taken both in September and December will show if the stated hypothesis for the research is supported, refuted, or if there is no change in behavior.

CHAPTER FOUR

Results

This chapter will relate the findings during the research study, the observed behaviors, self-reported behaviors, and the graphical and mathematical results of the data collected from September to December 2009. Analysis of the information will follow each set of calculated data.

Student survey results:

The survey in Table One, Chapter Two was completed voluntarily by 41 research subjects on September 8, 2009. Subjects were informed that the researcher was interested in knowing where the subjects were in their thoughts about the environment and were asked to complete the survey anonymously. Again on December 5, 2009, subjects were asked to complete a survey identical to the one taken on September 8, 2009. The December copy of the survey was completed by 38 students due to student absences. It also should be noted that one student who took the survey in September was no longer enrolled in Biology in December and thus did not complete the second survey. Another student enrolled in Biology after the September survey but did complete the December survey. The purpose of the second self-reported survey was to ascertain if students' beliefs or attitudes regarding the environment had changed through the course of the research. The raw scores from Likert style question were calculated as a percentage and are represented on Figures one through ten, which follow. The frequency distributions of the data may be found on tables three through 13 and the mean response to each statement on the survey may be found with the frequency distribution.

Calculation of the mean for each of the statements on the student survey were figured via the following equation: $\chi = \Sigma fx/N$, where χ is the sample mean, Σfx is the sum of the frequency of a score multiplied by the score, and N is the total number of scores. The difference of the mean is not considered to be a significant difference if the change in the mean would not result in the mean response changing. For example, if the September mean were 4.25 and the December mean were 4.35, the difference of +.10 would not change the student response on the Likert scale. However, if the difference in the mean were to change the student response on the Likert scale, it will be considered significant.

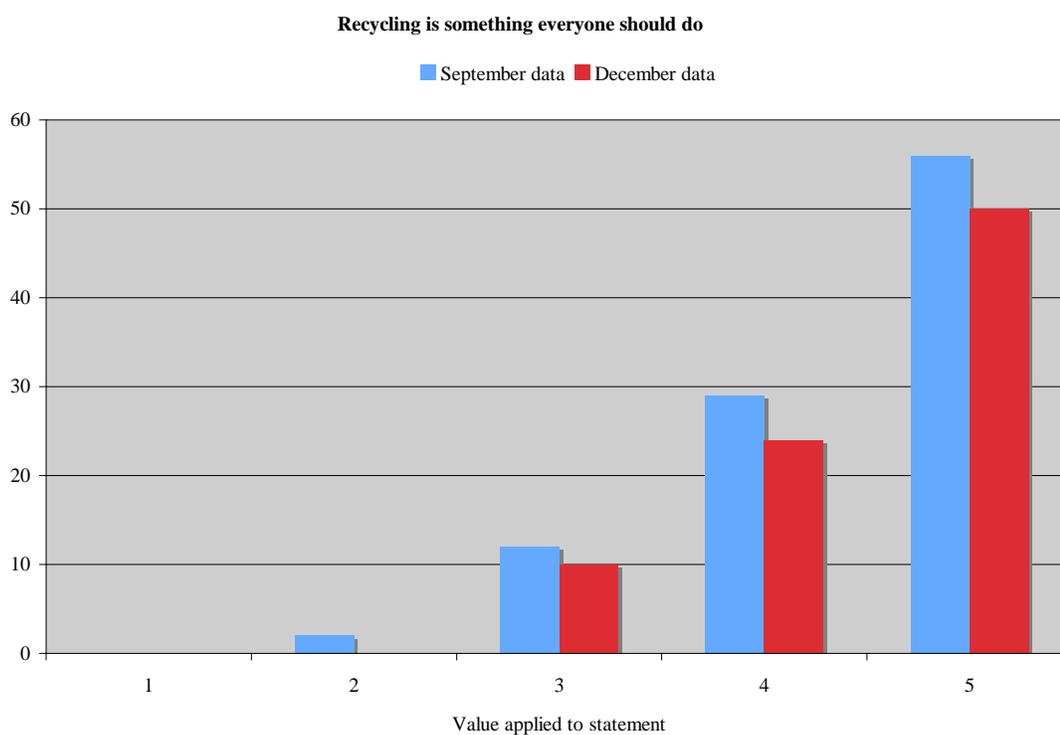


FIGURE 1. Percentage of student rankings of statement one on the student survey.

September survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	23	41
4	12	18
3	5	6
2	1	1
1	0	0

December survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	19	38
4	9	19
3	10	10
2	0	0
1	0	0

TABLE 3: Frequency distribution of statement one on the student survey.

The mean for statement one: Recycling is something everyone should do is 4.39 in September and 4.42 in December.

Interpretation of data related to statement one:

The mean shows that students overall agree with the statement that recycling is something everyone should do. From September to December, the mean did not change enough to change the response from “agree” on the Likert scale used on the student survey.

The hypothesis stated in chapter one is neither supported nor rejected by the findings for question one on the student survey. Students did not display a significant increase in the mean on the December survey compared to the mean of the September survey. Because the mean response stayed at “agree” there was no change in students’ attitudes on the topic of all people recycling.

The research in chapter two relates that young people are concerned about the environment and what can be done to improve conditions for the Earth. Bunting and Cousins 1985 research reports that children have an overall positive attitude toward nature. If their attitude is positive, it would make sense that they would agree with statements that encourage the protection of nature. David Sobel (1996) said that young people’s connection with nature could lead to social action and the New Jersey State After school Communities Committee referred to a study by the American Institute for Research indicating that students who spend time in nature will display more pro-environmental behaviors.

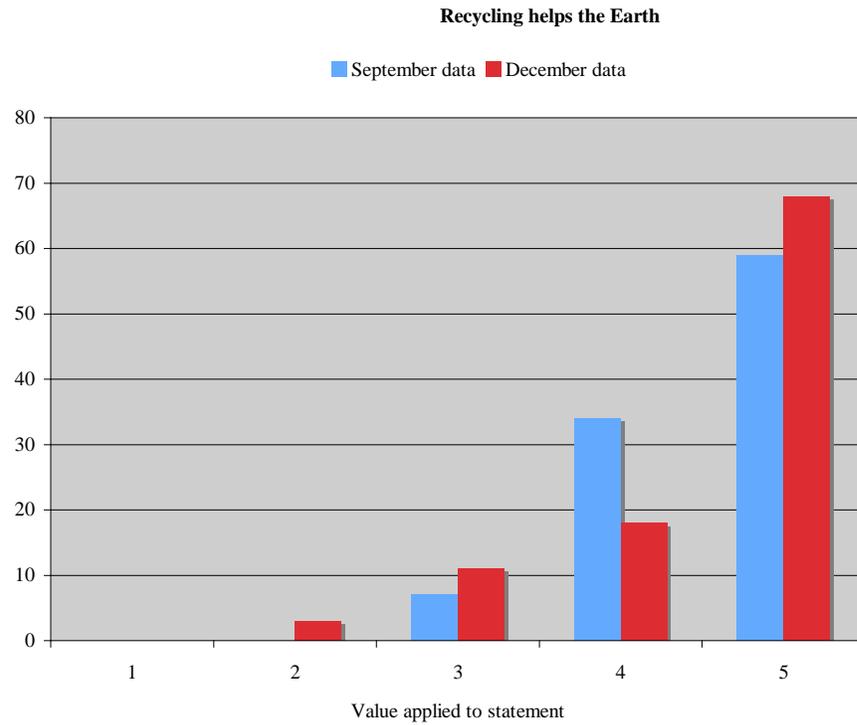


FIGURE 2. Percentage of student rankings of statement two on the student survey.

September survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	24	41
4	14	17
3	3	3
2	0	0
1	0	0

December survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	26	38
4	7	12
3	4	5
2	1	1
1	0	0

TABLE 4: Frequency distribution of statement two on the student survey.

The mean for the September survey was 4.51 and the mean for the December survey was 4.53.

Interpretation of data related to statement two:

Students' responses in September and December show that they agree that recycling helps the Earth. The change in mean from September to December was not a significant change.

The data collected regarding statement two on the student survey neither supports nor refutes the hypothesis stated in chapter one. Again, no significant change in student attitude or belief was noted after the research time period.

In chapter two, Donna Donald was quoted as saying, "As children discover the role that the environment plays in our lives and the resources it provides, they are more likely to be good caretakers of the natural world." (2009) The students involved in this

study received instruction on the role of the environment and natural resources in the lives of citizens of the United States in both their seventh and eighth grade science classes. Due to this instruction, it may be fair to assume that these students have an understanding of what is good for the Earth and what is not good for the Earth. Their previous instruction may have played a role in their responses not changing from the September to the December survey.

Louise Chawla was also cited in chapter two regarding her research into the relationship between nature and stewardship toward the Earth. Chawla reports: “a developing bond with the natural world can form a foundation for environmental stewardship.” (p.44) The students in this study live in a rural area where many families participate in hunting and fishing for recreation. The connection to nature these students have formed via family activities in nature may have assisted in pre-existing positive stewardship behaviors toward the Earth. With a supposed strong positive relationship to nature already formed, finding no change in response from September to December was not a surprising outcome.

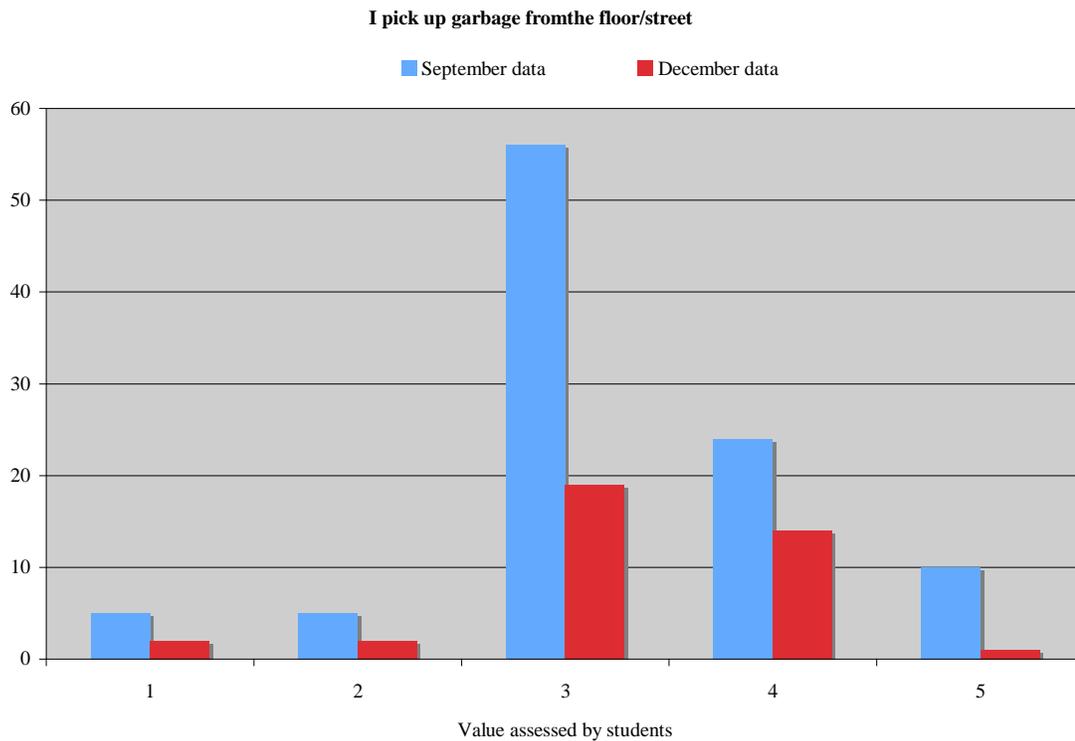


FIGURE 3. Percentage of student rankings of statement three on the student survey.

September survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	4	41
4	10	37
3	23	27
2	2	4
1	2	2

December survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	1	38
4	14	37
3	19	23
2	2	4
1	2	2

TABLE 5: Frequency distribution of statement three on the student survey

The mean for the September survey was 3.78 and the mean for the December survey was 3.26.

Interpretation of data related to statement three:

The graphic and the mean for the third statement show that most students have neutral feelings regarding picking up garbage from the floor or street. While the mean did drop a little over .5 point, it did not produce a significant change in the response to the statement on the survey.

Technically, the hypothesis for this research is not supported nor refuted by the data collected, however, the .52 decrease in the mean should be mentioned. The decrease could indicate that the students involved in the study may feel that picking up garbage off the floor or street might be embarrassing, but did not want to mark that they disagree with the researcher.

The idea that young people are less inclined to pick up garbage from the floor or street reflects back to Kahn’s (2002) idea of “environmental generational amnesia.” Perhaps the amount of litter on the floors and the streets has become normal to the students involved in this research and the garbage lying there does not seem out of place to them.

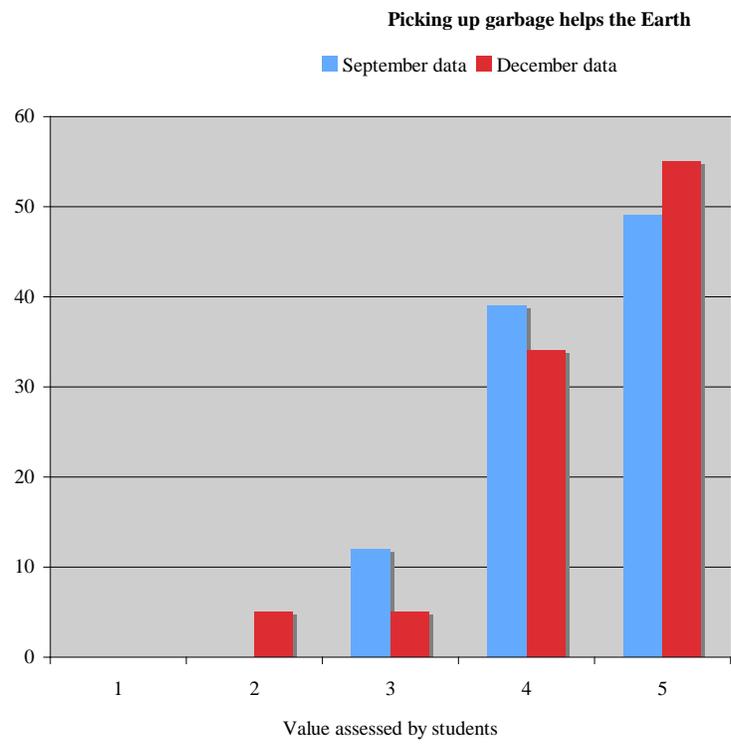


FIGURE 4. Percentage of student rankings of statement four on the student survey.

September survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	20	41
4	16	21
3	5	5
2	0	0
1	0	0

December survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	21	38
4	13	17
3	2	4
2	2	2
1	0	0

TABLE 6: Frequency distribution of statement four on the student survey

The mean for the September survey was 4.37 and the mean for the December survey was 4.39.

Interpretation of data related to statement four:

The mean for the data collected regarding statement four tells that this group of research subjects agrees with the statement that picking up garbage helps the Earth. Although the mean was within the “agree” category, the graphic data shows that the largest majority of students “strongly agree” with statement four.

The hypothesis is again neither supported nor refuted by the data analysis of statement four from the student survey. The students reported a high agreement level with the statement in both September and December without a significant increase in reported belief.

The data shows that the research subjects know picking up garbage is good for the Earth, but they are neutral about picking up the garbage themselves. In chapter two, the Kaplans were quoted as saying that teens are on a “time-out” from nature. The young people still care about nature, but they are more interested in and spend time doing things with other teens versus cleaning up the streets and hallways where garbage may be strewn. Another study by S. Kaplan found that people will be more involved if they help develop programs related to nature and preservation of natural places. The subjects involved in this study were not overtly encouraged to start or become involved in any pro-environmental activities during the course of the research. Lastly, adolescents may fear reprisal from their peers for picking up garbage, as this is not a typical teen behavior in the school in which this study was conducted.

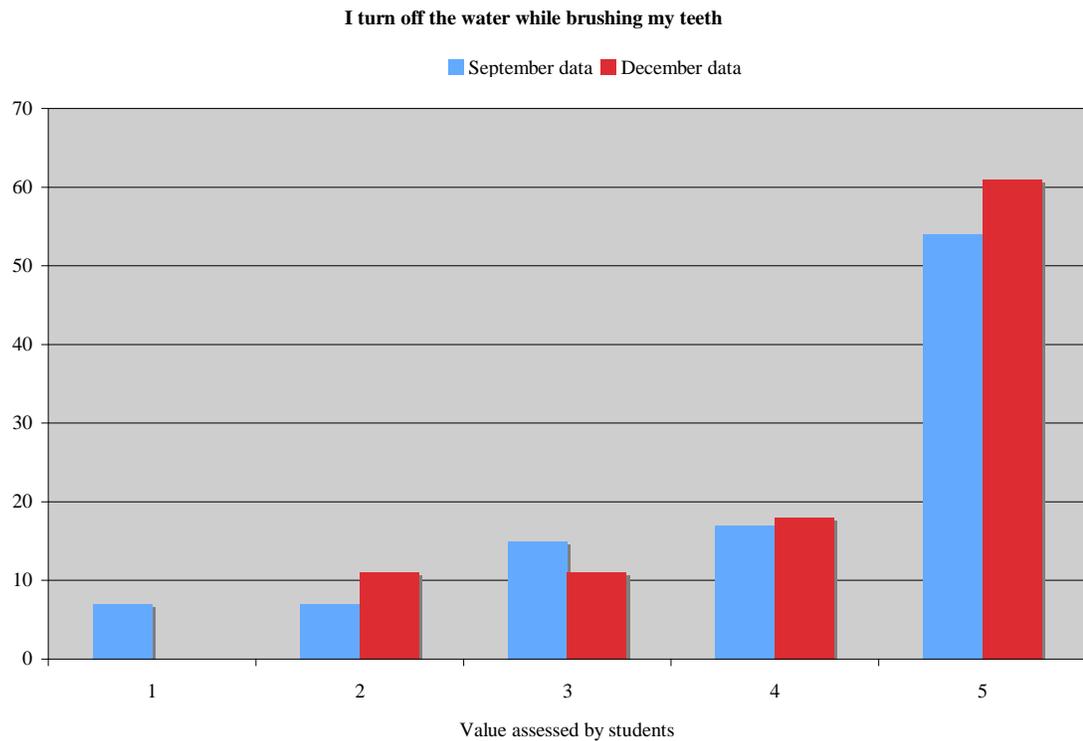


FIGURE 5. Percentage of student rankings of statement five on the student survey.

September survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	22	41
4	7	19
3	6	12
2	3	3
1	3	3

December survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	23	38
4	7	15
3	4	8
2	4	4
1	0	0

TABLE 7: Frequency distribution of statement five on the student survey

The mean for the September survey was 4.02 and the mean for the December survey was 4.29.

Interpretation of data related to statement five:

The data presented as a percentage shows that many of students in the research study strongly agree that they turn off the water while brushing their teeth. The mean supports the graphic data in that “agree” is Likert rating in both September and December.

The hypothesis is again neither refuted nor supported by the data. Although there was a slight increase in the mean, it is not enough to make it significant.

Students in this study reporting that they “agree” or “strongly agree” with turning off water while brushing their teeth indicates that these students have developed

“environmental cognition”. Malone and Tranter’s study introduced the idea of environmental cognition and supported the claim time in nature helps it to grow.

The subjects in this study all live in a rural area. Along with the outdoor family activities, the subjects in the study were allotted time during the regular school day to be in a natural setting. The opportunities provided the research subjects may have allowed their bond with nature to develop or strengthen. In chapter two, Donald stated that children who have been given the opportunity to understand how natural resources and nature are necessary for our way of life, they are more likely to be caretakers of those resources. The subjects in this study have received education on the water cycle and water use, pollution, and amounts available in both seventh and eighth grade science as well as having the opportunity to visit lakes, ponds, and streams in their area. All of these factors may have some impact on the rating the subjects reported on the Likert scale for statement five.

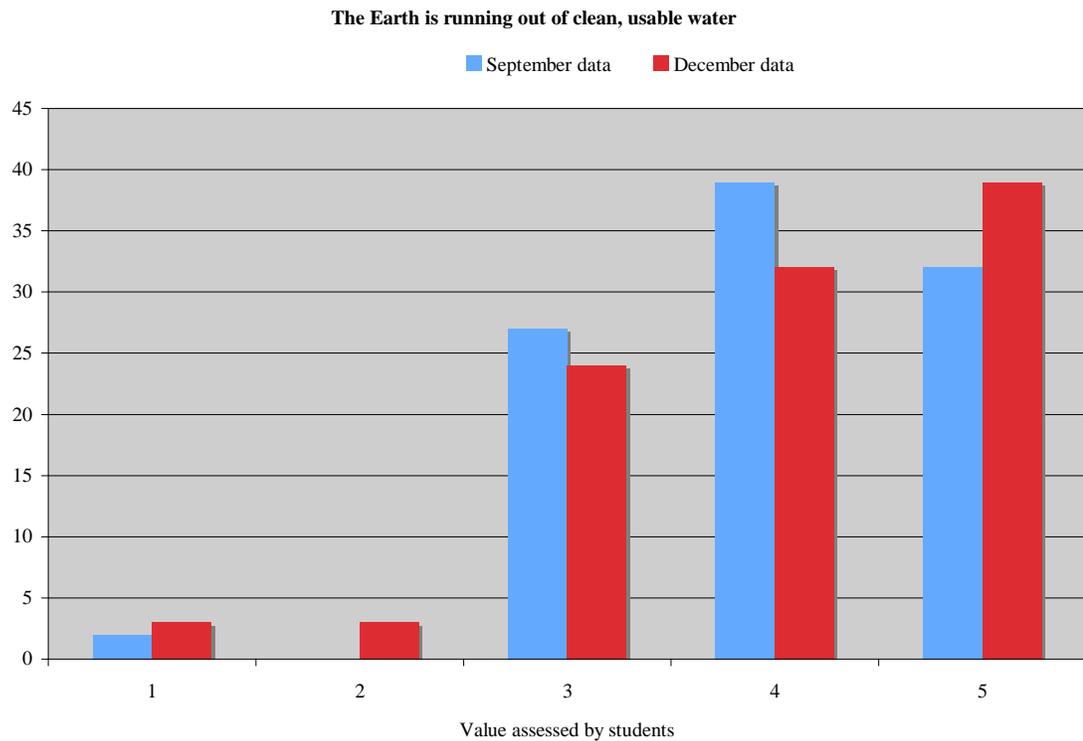


FIGURE 6. Percentage of student rankings of statement six on the student survey.

September survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	13	41
4	16	28
3	11	12
2	0	1
1	1	1

December survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	15	38
4	12	23
3	9	11
2	1	2
1	1	1

TABLE 8: Frequency distribution of statement six on the student survey

The mean for the September survey was 3.98 and the mean for the December survey was 4.03.

Interpretation of data related to statement six:

A majority of students involved in the research either “agree” or “strongly agree” that the Earth is running out of clean, usable water. The mean between September and December had a significant increase. The September mean indicated that students felt neutral regarding statement six while the slight increase in the mean for December indicated that students agree with statement six. The mean for the data should be considered side by side to the graphic data as the significance of the change was actually very small. The graphic data indicates that most students agreed or strongly agreed with statement six in both September and December.

The hypothesis in chapter one is supported by the data collected for statement six. Students involved in the study showed an increase in their agreement with or belief in the statement that the Earth is running out of clean, usable water. An increase in knowledge of nature and natural systems and the fact that there is a decrease in usable resources can be inferred from the data for statement six.

The ideas generated and literature cited as support of the findings for statement five also support statement six, as both are referring to water use. Chawla's research on the possible cause and effect relationship between time in nature and stewardship is related to the findings for statement six. Chawla stated that the positive effects of involvement with nature can be a foundation for stewardship. Finger's research into environmental behavior and experiences also supports the idea that the more contact people have with the environment in a hands on manner, the more likely they will feel connected to nature and want to protect it.

The Earth is growing more polluted because of human activities

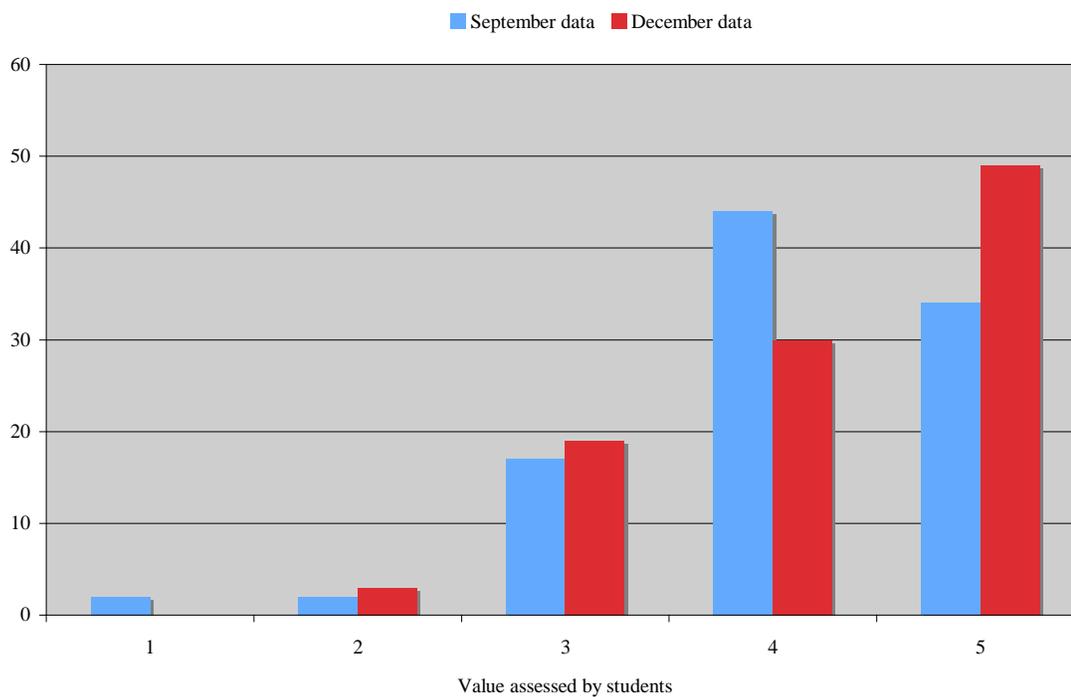


FIGURE 7. Percentage of student rankings of statement seven on the student survey.

September survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	14	41
4	18	27
3	7	9
2	1	2
1	1	1

December survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	18	37
4	11	1
3	7	8
2	1	1
1	0	0

TABLE 9: Frequency distribution of statement seven on the student survey

The mean for the September survey was 4.05 and the mean for the December survey was 4.24. It should be noted that only 37 students responded to statement seven on the December survey. One student left the Likert rating for this statement unmarked.

Interpretation of data related to statement seven:

The difference in the mean from the September to the December survey shows a slight, yet insignificant increase. The graphic diagram shows that the largest reason for the increase in mean is the number of students who changed their response from a four to a five on the Likert scale from September to December.

Again, the change in the mean does not support nor refute the hypothesis stated in chapter one. The graph does show a marked increase in the percentage of students strongly agreeing with statement seven in December versus the number strongly agreeing

in September. This does support the hypothesis stated in chapter one that increased time spent in nature may lead to a positive change in pro-environmental beliefs.

The belief by the subjects of this study that humans are polluting the Earth ties into the idea that White presented in his 2004 work. White tells us that without regular contact with nature, children will not develop a love and respect for the natural world and destruction of nature will continue. Wells and Lekies 2006 study also supports the idea that students realize that humans are having a negative impact on the health of the planet. They report that a group of undergraduate students relayed via survey that “witnessing negative environmental events contributed to ecocentric beliefs.” (p. 3) The subjects of this research study have grown up in an area where they constantly see the destruction of wooded areas due to open pit mining, hear about sewage overflows into local bodies of water at least twice per year on the local news, and see garbage strewn about the streets of the towns in the area.

It also should be known that approximately 75 percent of the students in this research group live outside of a town or city. This ties back to the findings of the Kaplans and Bunting and Cousins; the type of area in which a young person is raised has an impact on his or her environmental outlook. Perhaps being raised in a rural area, the majority of the subjects in this study do not see the amount of litter around them when they are in town “normal”, as proposed by Kahn, because of where they live. Perhaps this makes them more sensitive to the garbage around the towns and to the polluting of the planet by humans.

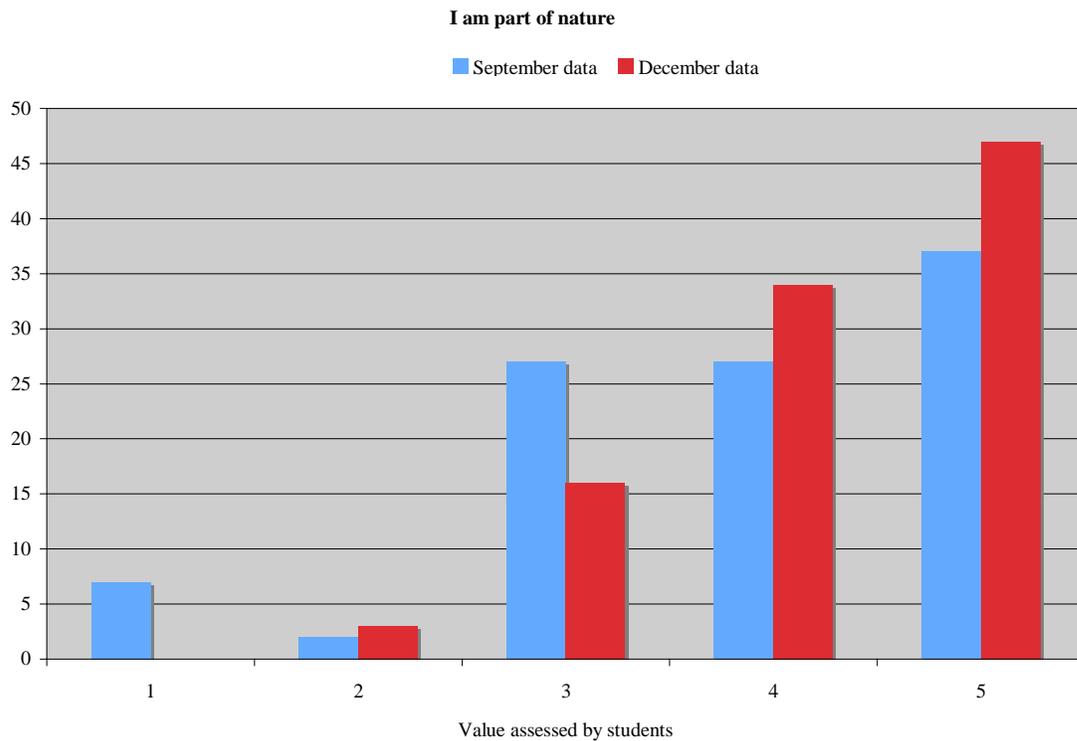


FIGURE 8. Percentage of student rankings of statement eight on the student survey.

September survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	15	41
4	11	26
3	11	15
2	1	4
1	3	3

December survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	18	38
4	13	20
3	6	7
2	1	1
1	0	0

TABLE 10: Frequency distribution of statement eight on the student survey

The mean for the September survey was 3.83 and the mean for the December survey was 4.26.

Interpretation of data related to statement eight:

There was a significant increase in the mean from September's survey to December's survey with a change from 3.83 – neutral to 4.26 – agree. The graph also shows an increase in the percentage of students agreeing or strongly agreeing with the statement, *I am part of nature* from September to December.

These results support the hypothesis in chapter one. After spending an hour a week for eight weeks out in a natural setting, a larger percentage of students agreed that they were part of nature than before spending that time outdoors. The students were given the opportunity for a bond to form with the natural surroundings.

Research supporting these findings includes the Kaplans 2002 research with teens in a nature camp setting. More teens in the Kaplans' study reported stronger pro-environmental feelings than prior to the study. Cynthia Thompson also reported in her 2002 study that students who were afforded time to be in nature reported a relationship with nature.

Louise Chawla's 2006 research found that "when children have access to the natural world...they have a strong basis for interest in the environment." (p. 76) In this case, the students seem to have an interest in the environment and have formed a bond to it. The high percentage of fours and fives on the Likert scale indicate that a bond has formed and these students believe on some level that they are a part of the natural world.

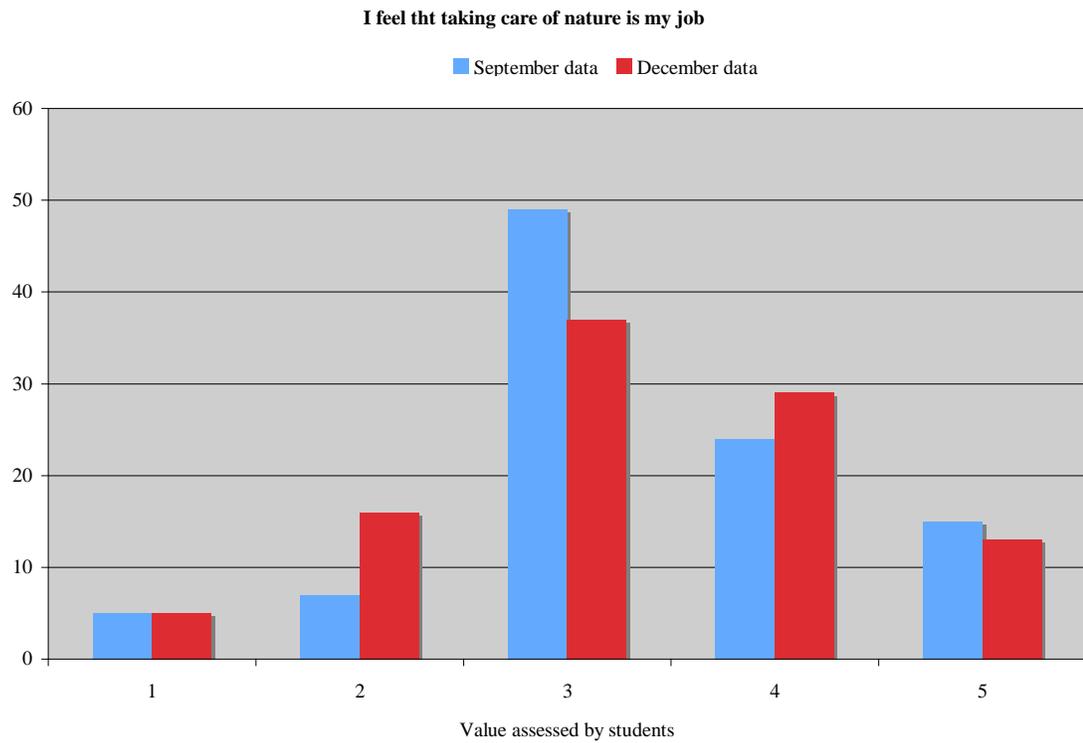


FIGURE 9. Percentage of student rankings of statement nine on the student survey.

September survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	6	41
4	10	35
3	20	25
2	3	5
1	2	2

December survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	5	38
4	11	33
3	14	22
2	6	8
1	2	2

TABLE 11: Frequency distribution of statement nine on the student survey

The mean for the September survey was 3.37 and the mean for the December survey was 3.29.

Interpretation of data related to statement nine:

The insignificant, yet noticeable reduction in the mean from September to December shows that although a large percentage of students in this research study feel that they are a part of nature, they do not necessarily feel that taking care of nature is their job. The fact that many students replied feeling neutral to this statement is supportive of the Kaplans' findings that teens are at a stage of development where social networking takes precedence and the connection to nature is on a time-out.

Another contributing factor in the response to this statement might be found in the literature that reports young people feeling that there is not enough free time. If students already feel pressure to complete assignments, participate in extra-curricular activities,

and work outside of school, the statement, *I feel taking care of nature is my job*, may seem overwhelming to the young person.

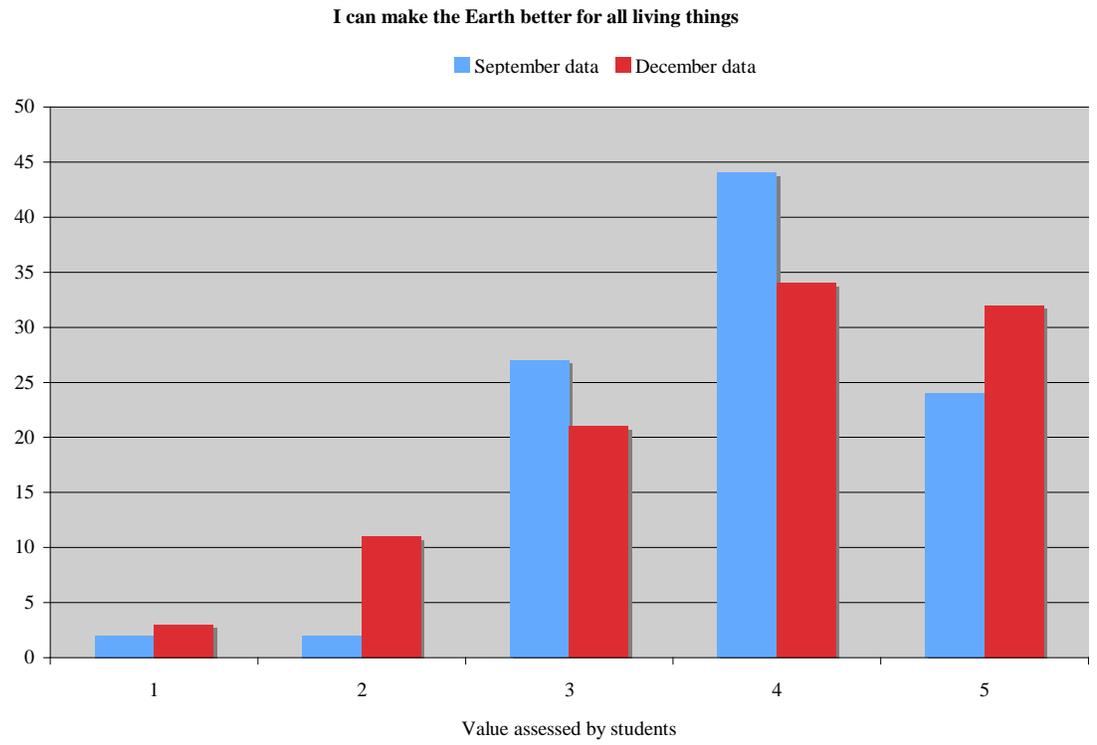


FIGURE 10. Percentage of student rankings of statement ten on the student survey.

September survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	10	41
4	18	31
3	11	13
2	1	2
1	1	1

December survey:

Score (X)	Frequency (f)	Cumulative frequency (cf)
5	12	38
4	13	26
3	8	13
2	4	5
1	1	1

TABLE 12: Frequency distribution of statement ten on the student survey

The mean for the September survey was 3.85 and the mean for the December survey was 3.82.

Interpretation of data related to statement ten:

The mean and the percentage data do not directly correlate to each other for statement ten. The graph shows a larger percentage of students agreeing or strongly agreeing with the statement, *I can make the Earth better for all living things* while the mean shows a neutral response. This is true for both the September and the December data. Due to the large difference in the responses marked either four or five on the Likert scale as opposed to those marked with a three, I feel that the percentage data is more accurate than the mean for this statement.

The change in percentage data from September (four = 44%, five = 24%) to December (four = 32%, five = 34%) shows that approximately ten percent of the students increased their belief that they could have a positive impact on the Earth. This directly ties to Meinhold and Malkus' study regarding self-efficacy and pro-environmental behaviors/beliefs. In Meinhold and Malkus' study, knowledge of nature, attitudes toward nature, and self-efficacy were used to attempt to find a correlation to environmental disposition. Due to the fact that the subjects in this research study have reported high connection to nature and a high level of knowledge of what types of activities are beneficial to the Earth, it may be fair to say by the subjects' response to statement ten that they have an overall high level of self-efficacy as far as pro-environmental behaviors are concerned.

The research by Finger (1994) may also be connected to the students' response to statement ten. Finger's life-world approach sees the person as being an integral part of the environment. If students feel that they are a part of nature, which the students in this

study reported, they are an integral part of the system and therefore could make the system of planet Earth better by their actions.

Statement on student survey	September mean	December mean
1. Recycling is something everyone should do.	4.39	4.42
2. Recycling helps the Earth	4.51	4.53
3. I pick up garbage from the floor/street.	3.78	3.26
4. Picking up garbage helps the Earth.	4.37	4.39
5. I turn off the water while brushing my teeth.	4.02	4.29
6. The Earth is running out of clean, usable water.	3.98	4.03
7. The Earth is growing more polluted because of human activities.	4.05	4.24
8. I am part of nature.	3.83	4.26
9. I feel taking care of nature is my job.	3.37	3.29
10. I can make the Earth better for all living things.	3.85	3.82

TABLE 13: Summary of statements on student survey, September mean per statement, and December mean per statement.

Summary of Student Survey Interpretation:

Overall, the subjects of this research study reported a high level of connectedness to the Earth and a positive belief in pro-environmental behaviors. There were few statements that had a significant change from the September to the December data,

indicating that the subjects in this study already placed a high value on pro-environmental behaviors and may already see themselves as part of the natural system.

The statements that did have a significant change on the Likert rankings changed in the positive direction, indicating that affording students time in nature has a positive correlation to the students' pro-environmental beliefs/behaviors.

Objective data results: Observations of students' pro-environmental behaviors

The following data was collected over six weeks (mid-September to mid-November, 2009) during the hours that the subjects were in the general Biology class at the research site. Data was collected during the two separate class hours and combined for reporting purposes. The average number of students enrolled in Biology over the six-week period was 39.5 and that number was the number used to calculate the percentages reported on the graph.

The graphic data will represent the percentage of students who participated in each category of pro-environmental behavior for the week of observation. The categories in which students were observed during the Biology class include: recycling paper, recycling cans, recycling plastic, turning off water while soaping his or her hands, picking up trash, and reminding someone else to do one of the previously listed behaviors.

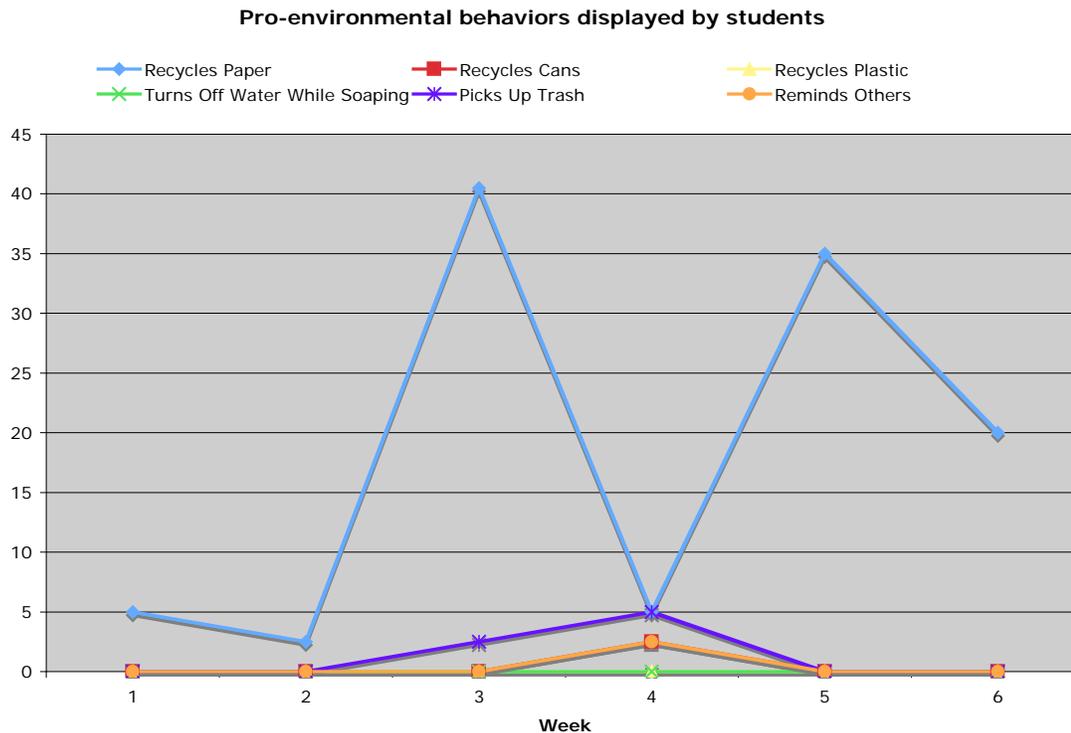


FIGURE 11: Pro-environmental behaviors displayed by Biology students over a six week period.

Interpretation of observed data:

The data collected by the researcher over a six-week period does not support the hypothesis stated in chapter one. The only category that showed a varying amount of change was *recycling paper*. There were no instances of recycling cans, recycling plastic, nor turning off water while soaping hands over the six-week period observed by the researcher. Only three students picked up trash (all three were off the street during class outings), and only one student reminded another student to recycle. Due to the very

low and non-existent level of behaviors in five of the six categories, the recycling paper category will be given the largest amount of attention.

The data shows a low percentage of students recycling paper the first two weeks during which observations were taken. In the third week there is a spike up to 40.5% of students participating in paper recycling behavior. The fourth week shows a drop back down to 5% with the fifth and sixth weeks rising to 35% and 20% respectively.

The fluctuation in percentages of students recycling paper could be due to a number of factors. The first factor to be addressed is that there were not papers returned to the students every week of the observation period. The students did not have papers to recycle when work was not returned to them. A second factor that could be contributing to the fluctuation in percentages of students participating in recycling behavior is the number of papers the students retained in their folders. The cumulative life science test required by the state of Minnesota at the end of a student's study of Biology may contribute to students retaining more papers than recycling them.

It is also possible that counting errors by the researcher contributed to the fluctuation in percentages reported. Keeping track of students recycling while handing back assignments may have resulted in missing one or two students who recycled paper when the researcher was in a different part of the classroom.

One factor that may be eliminated as a source of error is students placing paper in the trash can versus the recycling bin. The two receptacles are in different locations in the classroom and students traveling to the trash can would have been very noticeable.

The lack of data showing a trend increasing or decreasing pro-environmental behaviors over the period observations were taken ties back to Hungerford and Volk's findings that activities that positively influenced pro-environmental behaviors took long periods of time. Chen-Yin, Chyan-Chuan, and Kawala also reported that more time may be required for natural settings to have any effect on pro-environmental behavior.

Summary of observed data:

The data collected by the researcher does not support the hypothesis that an increased amount of time in nature may lead to an increased number of pro-environmental behaviors. No continual increase was observed in any of the categories set forth for this study.

Summary of all data:

The self-reported answers provided by students on the Likert style survey convey the idea that the students included in this research study had a neutral to high incidence of pro-environmental behaviors and beliefs prior to the independent variable being implemented. The only statements in which there was a significant change in behaviors were, *the Earth is running out of clean, usable water* and *I am a part of nature*. A significant increase in the mean of pro-environmental attitudes was reported by students in both of the categories, all other categories showed no significant change in mean.

The data collected by the researcher shows neither measurable support nor ability to refute the hypothesis stated in chapter one. The percentages of students participating in each category of observed behaviors fluctuated throughout the six-week observational period.

Overall, the hypothesis stated in chapter one was neither supported nor refuted by the data collected. There were a few statements in the self-reported survey by students indicating support for the hypothesis by either the mean or the graphed data, but on the whole, the data showed no significant change.

CHAPTER FIVE

Discussion

This chapter will include reflections on what has been learned through the research process, a recollection of the literature review, the further implications of what has been learned from the study, and limitations of the study. There will also be recommendations for future use and expansion of this research and possible uses of the results by the researcher and the teaching community in which the researcher works.

What has been learned?

Through the process of research, it was learned that the subjects involved in the study began the research process already functioning at a high level of pro-environmental beliefs and behaviors. The implementation of increased outdoor time during the regular school day only resulted in support of the hypothesis in two areas according to the students' self-reported data. The subjects recorded a significant change from September to December of 2009 in the belief that the Earth is running out of clean, usable water. They also recorded a significant increase in the percentage of students with an agreement or strong agreement that they are a part of nature.

The fact that students began the study with high reported levels of pro-environmental beliefs and behaviors made it more difficult to determine positive changes in the students. Though it was more difficult, it did provide a feeling of accomplishment to me, as I taught the same group of students for two years during their junior high school education. The self-reported data indicated that the students had internalized the pro-

environmental behaviors that I had modeled and taught during their previous classes with me.

The study confirmed my belief that young people truly care about the Earth and the environment in which we live through their responses to the student survey and the behaviors they exhibited during and after the direct observation period. There actually was an increased amount of anecdotal evidence that occurred after the six-week observation period that supported my hypothesis from chapter one. Students from one of the Biology classes in particular go out of their way to use washable food containers instead of disposables for their beverage and lunch needs. Those same students have also made a point of reusing poster boards for presentations, using both sides of their paper, and ask me questions regarding purchases that would be less detrimental to the Earth than others.

I learned that a simple method of tracking student behaviors worked well without disrupting the flow of the class. While I was always cognizant of watching for the six chosen target behaviors, the students were completely unaware that I was tracking behaviors nor were they aware that I was making observations during their class periods. Were I to conduct another study tracking student behaviors, I would use this same method. It seems to me that when students are not aware of behaviors being recorded, they will act in a natural manner and a more truthful representation of the data will be collected.

It became apparent thorough the course of the study and in compiling the data collected, human behavior based research seemed more time consuming and less fact

based than the scientific research I am used to conducting. This was a source of some frustration to me as there were no absolute answers nor were there definite findings that I am used to observing.

Literature revisited:

The study conducted at a rural, Northern Minnesota high school from September to December 2009 supported the findings of the studies cited in Chapter Two. Cynthia Thompson's 2002 research indicated that multiple, shorter excursions into a natural setting can support a positive attitude toward the environment. Students in this study reported overall positive attitudes toward the environment and reported believing they are a part of nature. The results of this study indicate support of Thompson's findings. While the positive changes in attitude were not significant, students did report high levels of positive attitude after a six-week period of excursions into natural settings.

Another study cited in Chapter Two regarding adolescents believing they are part of nature or not part of it, is the study conducted by Haluza-Delay in 2001. In that study, it was reported that the teens involved in the outdoor experience felt they were separate from nature. My study resulted in the opposite findings. The majority of teens involved in the research study from September to December 2009 reported believing they are a part of nature after the six weeks of expeditions into natural settings.

Believing one is part of nature also supports the 2009 work of Nisbet and colleagues. They stated, "environmental concerns are directly related to the degree that individuals see themselves as part of nature." (p. 717) The students in this study self-

reported a high level of concern for the natural world and a high degree of belief that they are a part of nature.

In his book, *Ecophobia*, David Sobel indicates, “What’s important is that children have an opportunity to bond with the natural world, to learn to love it, before being asked to heal its wounds.” (1996, p.9) This study was designed to afford young people time spent in nature in order to form or strengthen bonds with the natural world. The results show that the young people involved in the study have a positive relationship with the natural environment and understand, via the results of the survey, the environmental woes that the Earth is facing. Though not shown by the number of incidents of recycling and other pro-environmental behaviors during the observational period, anecdotal evidence after the research period indicate that the students involved in the study are cognizant of what actions they can perform to help the Earth. Students asked the researcher what type of appliances their parents should purchase for the new house they are building, what type of vehicle they should look for when obtaining their driver’s license, and which are better choices regarding lunch containers and clothing. These anecdotes support Donna Donald’s 2009 interview answers regarding children’s concern for the environment. Students involved in this study seem to have internalized the role the environment plays in our lives and are interested in taking care of the natural world.

Another tie to literature cited in Chapter Two and observed in this study is that an extended period of time is needed in order to find significant results. Chen-Yin, et.al. found in their 2002 study that long periods of time are needed in order to influence a permanent behavioral change in adolescents. This study, being only six weeks long, did

not seem to be a lengthy enough period in order for much significant change to occur in student's attitudes and beliefs about the natural world.

Wells' and Lekies' 2006 work showed that people who participated in outdoor activities such as hunting, fishing, hiking, etc. at young ages reported more ecocentric beliefs than anthropocentric beliefs as adults. The students involved in this study tended to answer the student survey questions in a more ecocentric manner than anthropocentric. Though they are not yet adults, the students in the study group are in their middle to late teen years and the majority of these young people regularly participate in outdoor activities with their families, friends, or alone. As anecdotal evidence supporting Wells' and Lekies' findings and the assertion made that many of the students are active outdoors people, during the White-tail deer hunting season and the opening of fishing season, students in the school where research was conducted are excused to participate in hunting and fishing with their families. Each year approximately 30 to 40 percent of the student body avail themselves of the excused absences to participate in hunting, fishing, or both activities. Students also anecdotally report four-wheeling, skiing, and snow mobile riding as typical after school activities in which they engage.

The final literature support that was apparent from the research conducted was that of a caring adult mentor making a difference in the actions and attitudes of young people. Chawla, Arnold, Cohen and Warner, Sobel, Martin, and Dutcher, et.al. all reported that time spent in a natural setting with an adult family member or other caring adult could lead to more pro-environmental behaviors by young people. Their findings are supported by the findings of this study. The students in this research group have

experienced four years of science education with two adults who are very environmentally aware and concerned. The junior high school science teacher and myself model Earth friendly behaviors on a daily basis in the science classrooms and make it a point to have recycling facilities available to all people in the high school building. Students in the research group generally act in a pro-environmental manner as evidenced by the recycling of paper when worksheets were handed back and by the anecdotal instances related earlier in this chapter.

Implications:

The results of outdoor learning seem to have many positive attributes and few negative ones. The beliefs and behaviors exhibited by students in this research group make me believe that science programs across the country need to be broadened to include an outdoor component. Perhaps it should not even be confined to science programs, but should instead be spread across the curriculum so all students have an opportunity to learn in an outdoor setting and to experience nature on a weekly, if not daily, basis. The literature cited in Chapter Two, and the findings of this study, support the idea of students learning out of doors. Outdoor learning improves their cognitive abilities, their behavior, and their belief that the natural world is important and worth protecting.

Limitations of the study:

Though I was personally pleased with the results of the study showing that students in this research group had and maintained a relatively high regard for the Earth, and exhibited behaviors congruent with those beliefs, I realize that there were factors

affecting the reliability of the results. The objectively collected data taught me that a six-week time period, in which classroom activities were extremely varied on a day-to-day basis, is too short a time to collect accurate and informative data. Students may be taking notes from a lecture one day, working on a research project for the next three days, and in lab for two days after that. The next week could consist of individual reading and worksheets, lab and journaling time. Students did not have opportunities everyday to recycle materials or demonstrate the pro-environmental behaviors being counted in the study.

Another factor that in retrospect limited the effectiveness of the study is that the students in the research group know the researcher too well. As stated in the methods chapter, 95 percent of the students involved in the study have completed two other one-year courses with the researcher prior to enrolling in Biology. Of the students enrolled in Biology, 32.5 percent of them are participating in Science Club, of which the researcher is the advisor. This factor, leads me to believe that the students involved in the study are cognizant of my expectations for all facets of behavior in and out of the classroom. They have observed me model for two years the type of behaviors with respect to the Earth that I want to see from them. They also have observed these same behaviors modeled by the other science teacher in the high school where research took place. The other science teacher and myself are extremely similar in beliefs and behaviors regarding care for the Earth and the expectations we have for the students in regard to the Earth and using its resources. With three years of experience with modeled behaviors and classroom expectations, it was unrealistic of me to expect that there would be a significant amount

of change in student behaviors. I should have realized prior to the study that these students would report high levels of pro-environmental behaviors and would display pro-environmental behaviors when given the opportunity.

The level of participation in Science Club by the students enrolled in Biology also may be considered a limitation. Because of the high involvement, it may be concluded that these students already have a fondness for science in general or a concern for the Earth. Thus this group would have a tendency to display the looked for behaviors prior to any intervention and recoding of the results of those changes in regular classroom procedure.

Recommendations for future research:

Were I to conduct a similar study in the future, I would choose a younger group of students as the subjects for the study. Firstly, a younger group of students would have had less time to be exposed to the behavior modeled by myself or by the other high school science teacher. Secondly, the younger students also would not have had as much science background as the students that were involved in this research study. The students I would chose to study in the future would most likely be in a junior high Earth Science class. Earth Science is the first class I teach to the junior high and it is the class in which students are first exposed to the use and abuse of natural resources by human beings. The students in Earth Science have little background in environmental issues and behaviors prior to their completion of the Earth Science course.

Another recommendation I have for future study is to lengthen the amount of time that students are observed for pro-environmental behaviors and also the number of weeks

that students go out into a natural setting. The six-week time frame was too short for observing behaviors, as explained in the limitations section. It also became apparent that three months of one hour per week spent in a natural setting was insufficient in significantly changing students' beliefs (via survey response) regarding their role in nature.

Lastly, I would like to re-survey this same group of students in their senior year of high school to see if the experience during the research study had lasting influence on their attitudes and beliefs regarding the environment. The literature cited in Chapter Two indicated that effects of nature experiences may or may not be lasting. It would be interesting to note if shorter amounts of time on a more regular basis made a lasting impact on this group of students or if it did not.

Communicating results:

To make use of the information I learned throughout the research process, I would like to make a presentation to my fellow faculty members during one of our workshop days. Based upon the literature read and the general positive attitude of students on days that they were going out into a natural setting, I would encourage teachers of all subjects and all grade levels to include outdoor learning time in their curricula. All subjects have components that could be taught in a natural setting, and may help the students learn and remember the material better than if they were to be taught the same information inside the classroom.

Another plan is to develop an outdoor-based class to offer through community education. The class could be developed for different age groups from exploratory

activities for toddlers to identification and tracking programs for adults. The important thing would be to have people out in a natural setting and offer them the opportunity to develop a bond with the environment.

Conclusion:

Throughout this research process, I have grown more knowledgeable about the benefits of allowing children of all ages time out of doors. Not only is the fresh air and movement good for their physical health, the time in nature may be calming to some people. The time also may contribute to people developing a relationship with the environment and in time, people may begin taking better care of the Earth and its resources.

The students involved in this study have restored my faith in the next generation being able to help solve some of the ecological problems facing our planet. The young adults demonstrated care and concern for living materials when we were out in natural settings and for the school environment when we were inside. The questions they asked were thought provoking and demonstrated an understanding of the complex issues facing the health of the Earth.

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