January 2014

# Academic Achievement And Perceptions Of Nature Appreciation, Environmental Awareness, And Well-Being Of Participants In Sully's Hill Nature Education Program

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# ACADEMIC ACHIEVEMENT AND PERCEPTIONS OF NATURE APPRECIATION, ENVIRONMENTAL AWARENESS, AND WELL-BEING OF PARTICIPANTS IN SULLY'S HILL NATURE EDUCATION PROGRAM

by

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A Dissertation

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirement

for the degree of

Doctor of Education

Grand Forks, North Dakota
November
2014

This dissertation, submitted by Jared Duane Schlenker in partial fulfillment of the requirements for the Degree of Doctor of Education from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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|---|---|
| Title | Academic Achievement and Perceptions of Nature Appreciation, Environmental Awareness, and Well-Being of Participants in Sully's Hill Nature Education Program |
| Department | Educational Leadership |
| Degree | Doctor of Education |

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Jared Duane Schlenker
November 4, 2014

TABLE OF CONTENTS

LIST OF TABLES

ACKNOWLEDGEMENTS

I am indebted to several people for the completion of my dissertation. My immediate family of my wife Debra, my son Simon, and my daughter Sophia were instrumental in providing me the support and patience necessary for the four-year journey of my doctoral program. My loving wife and best friend Debra for her understanding of the time and finances needed for my degree; my intelligent and talented son Simon for being the catalyst for inspiring me to pursue my graduate degrees; and my beautiful and hilarious Sophia for her welcome interruptions of hugs and laughter while I was writing my paper.

I would also like to thank my committee of Dr. Gary Schnellert, Dr. Sherry Houdek, Dr. William Siders, Dr. Loretta DeLong, and Dr. Marcellin Zahui. My committee has been approachable, helpful, and supportive throughout the dissertation process.

The administration, teachers, staff, and students of Central Middle School and the school districts have been truly encouraging as well. Superintendent Mr. Privratsky for allowing me to conduct the study; the teachers of Central Middle School for devoting time to answer questions about the program; and the students of the middle school for providing me with valuable information for my project. I would also like to thank previous Devils Lake superintendent Dr. Steve Swiontek for providing me with valuable

input and ideas for my dissertation and previous Central Middle School principal Josh Johnson for laying the groundwork for this valuable nature education program.

And last but certainly not least, I am truly grateful for my parents, Gerald and Jeanne Schlenker, for being my role models. They have instilled in me the importance of hard work, which was the guiding factor in the completion of my graduate studies. I am forever thankful.

## ABSTRACT

Experiential and hands-on learning are important for any effective educational environment, and when combined with natural elements that can stimulate students' senses to enhance their learning, these educational methods may have a profound effect (Louv, 2008). The Sully's Hill Nature Education Program (SHNEP) allows fifth-grade students at Central Middle School in Devils Lake, North Dakota, to learn in an outdoor setting.

The purpose of this study was to determine if a relationship exists between Devils Lake fifth graders and sixth graders who participate(d) in the Sully's Hill Nature Education Program (SHNEP), and those students who have not participated in the program, regarding their academic achievement in math, language, and science as well as their individual perceptions of nature appreciation, environmental awareness, and overall well-being. The researcher reviewed math, language, and science and examined student attendance data. The researcher also surveyed fifth and sixth-grade students at the middle school to gain their perceptions of nature appreciation, environmental awareness, and overall well-being. The students who had not participated in the SHNEP acted as the control group.

Results from the study indicated statistical significance ($p < .005$) in the differences in student perceptions in all three areas of nature appreciation, environmental awareness, and well-being between students who were involved in the program and those

educated in the traditional setting. Academically, math scores grew at a higher rate for students involved in SHNEP; however, language and science scores were equal to those educated in the traditional setting. School attendance for SHNEP students also showed to be superior in comparison to that of traditional classroom students. The findings from this study suggest incorporating daily nature education into elementary school classrooms to increase student appreciation for nature, environmental awareness, and overall well-being and a recommendation is made to develop similar programs throughout the world.

# CHAPTER I

# INTRODUCTION

Experiential and hands-on learning are important for any effective educational environment, and when combined with natural elements that can stimulate students' senses to enhance their learning, these educational methods may have a profound effect (Louv, 2008). The Sully's Hill Nature Education Program (SHNEP) does just that. It allows fifth-grade students at Central Middle School in Devils Lake, North Dakota, to learn in an outdoor setting every day during the school year from 9:00 a.m. to 12:00 p.m.

## Background

### Devils Lake Public School District

The Devils Lake school district is located in the northeast corner of the state of North Dakota in the city of Devils Lake. At the time of the study, the city had approximately 8,000 residents and is considered the regional trade center of the area. The Devils Lake region is known for its fishing, hunting, and fluctuating lake levels. The rise of the waters of Devils Lake has impacted the community both negatively and positively. Although several area farmers, ranchers, and businesses have lost land due to the expanding lake, the city has been able to increase its tourism value by offering some of the best fishing and hunting in the tri-state area ("Devils Lake Public," n.d.).

The Devils Lake school district is 472.63 square miles wide, and during the 2013-14 school year, the K-12 enrollment was 1,648 students. ("Devils Lake Public," n.d.).

The enrollment of the district is also impacted by over 100 tuition waiver students from adjacent districts, particularly several children from the Spirit Lake Indian Reservation that borders the district to the south. Sully's Hill, the national game preserve where the program takes place, is also located on the Spirit Lake Reservation.

Devils Lake Public Schools (DLPS) includes three elementary schools serving 659 students, kindergarten through fourth grade (Minnie H, Prairie View, and Sweetwater); one middle school (Central) serving 479 students, grades five through eight; and one high school (DLHS) serving 510 students, grades nine through 12. Once a week, all fourth graders in the elementary schools are transported to Central Middle School for science classes taught by the Sully's Hill science teacher.

**History and Implementation of the Sully's Hill Program at DLPS**

The research on the implementation of a nature education program into the Devils Lake School District began in the year 2011. In the spring of 2011, Devils Lake's superintendent and middle school principal visited Prairie Wetland Learning Center, a nature education facility in Fergus Falls, Minnesota. They returned to Devils Lake with several ideas on how the district could implement a similar program within the Sully's Hill National Game Preserve. After several discussions throughout the 2011-12 school year, and following presentations to the school board in March and April of 2012, the district ultimately approved the project on April 16, 2012, to begin in the 2012-13 school year.

**Description of Sully's Hill National Game Preserve**

Sully's Hill is a National Game Preserve located ten miles south of Devils Lake, ND. Named after General Alfred Sully, son of painter Thomas Sully, Sully's Hill was

recognized as a National Park in 1904 and was then changed into a game preserve after the management of Sully's Hill was taken over by the Fish and Wildlife Service in 1931 ("Sully's Hill National Game Preserve," 2012). The hill and the surrounding area encompass over 1,600 acres and is the home to several buffalo, white-tailed deer, elk, and prairie dogs ("Sully's Hill National Game Preserve," 2012). The park is open during the summer, and it contains scenic driving routes, hiking paths, and a visitor center that houses a gift shop and educational artifacts.

**Description of the Sully's Hill Nature Education Program**

A typical day for students involved in the SHNEP first includes gathering in their homerooms within the Central Middle School traditional classroom setting. After attendance is taken within their traditional classroom, the 46 students, along with their classroom teachers and paraprofessional, board a bus at 8:45 a.m. to travel to the Sully's Hill wildlife preserve, which is ten miles away from the Central Middle School building. The bus ride from Central Middle School to Sully's Hill takes approximately 15 minutes. During the ride, students are encouraged to study their spelling words, review math homework, prepare for tests, etc. Immediately after arriving at the game preserve, the students walk into the woods with their instructors and perform "In the Moment." This activity consists of students standing still in a group for five minutes while they listen, look, and smell the natural environment. After the students have been silent for the few moments, they journal about what they experienced while they were "In the Moment."

Following this routine activity, the students enter the SHNEP's visitor center, which contains two traditional-style classrooms. One classroom contains 15 six-foot tables with two chairs per table. The students are grouped into pairs at each table and are

instructed in the areas of math, language, and social studies. Two teachers lead this group in a team-teaching format.

The other classroom, which contains six circular tables with students arranged in groups of four, is primarily the science classroom. The science teacher, paraprofessional, and Sully's Hill educational coordinator lead this group, and the students have discussions and activities within the classroom setting. Also during this time, students will leave the visitor center and participate in outdoor activities. Some of the highlighted events performed throughout the year include, but are not limited to kayaking, snowshoeing, and ice fishing. The students switch classrooms at approximately 10:30 a.m., and the classes are in session until 12:00 p.m. They return to the middle school for lunch and the remainder of the school day, during which the students experience music, reading, and physical education.

## Significance of the Study

Researching the Sully's Hill Nature Education Program is important for several reasons. Globally, citizens have a responsibility to become better stewards of the environment and to realize that climate change and a depleting source of natural resources are areas of major concern, and if children grow and learn with an appreciation for nature, environmental complications may decrease (Frantz & Mayer, 2014). Statistical research of SHNEP may provide documentation and validity of outdoor learning and may spark similar programs throughout the state and nation.

Furthermore, cases of obesity and depression continue to grow among our country's youth, and the main instruments used to combat these conditions are drugs and other medications (Louv, 2008). Learning in an outdoor setting may prompt elementary

students to understand the importance of natural living and an active lifestyle (O'Brien & Murray, 2007). Gaining insight from a survey focusing on well-being may indicate lifestyle trends in participants versus non-participants.

Although other studies of nature and environmental education have been performed, Sully's Hill is unique in the fact that it is a daily immersion into an outdoor classroom for a full school year. A vast majority of previous literature is studies based on short-term examples of outdoor learning, and the research from these studies may conceivably provide more legitimacy to incorporating nature and environmental education throughout a complete school year. Academic and perception data from the study can be utilized for support for other schools to initiate discussion with their current district for similar programs.

## Purpose of the Study

The purpose of this study was to determine if a relationship exists between Devils Lake fifth graders and sixth graders who participate(d) in the Sully's Hill Nature Education Program (SHNEP) regarding their academic achievement in math, language, and science as well as their individual perceptions of appreciation for nature, environmental awareness, and overall well-being and those students who have not participated in the program. The research method utilized a quantitative format by examining Measures of Academic Progress (MAP) data in math, language, and science. Furthermore, perception data were gathered from a survey (agreement and disagreement to statements on a four-point Likert scale) and analyzed in order to understand the impact of the nature education program on fifth and sixth-grade students at Central Middle School in Devils Lake, North Dakota. The dependent variables of math, language, and

science MAP scores and attendance data of students were examined. The following research questions were used to guide the study:

1. How does daily immersion in the SHNEP affect academic performance and daily attendance of participants compared to non-participants?

2. How does daily immersion in the SHNEP affect participants' perceptions of their appreciation for nature?

3. How does daily immersion in the SHNEP affect participants' perceptions of their environmental awareness?

4. How does daily immersion in the SHNEP affect participants' perceptions of their well-being?

## Researcher's Background

The researcher has been an educator and administrator in the North Dakota educational system for over 15 years. He has taught secondary English and has been a secondary principal for the past seven years, currently serving as the Devils Lake Middle School principal. The researcher has been awarded the Larry Klundt leadership scholarship through the University of North Dakota and was recently a "Transition to Teaching" presenter for the 2014 Professional Capital Leadership Symposium held at the Alerus Center in Grand Forks, ND. Additionally, he is a strong supporter of environmentally sound curriculum decision-making within school systems and is an overall advocate for natural well-being.

## Delimitations

The delimitation for this study is that it is limited to only one middle school.

## Assumptions

The assumptions in this study include:

1. The student survey is a self-reporting instrument with specific questions related to perceptions on student beliefs. It is assumed the students reported their perceptions honestly.
2. Teachers imported the attendance data correctly into PowerSchool, the middle school's attendance system.

## Definition of Terms/Acronyms

The following definitions and acronyms are for supporting the readers' understanding:

*ANOVA: Analysis of Variance*: This is a test of differences between two or more means within an analysis of data (Salkind, 2011).

*Cronbach's Alpha*: A test of reliability within items of a survey that determines the instrument's internal consistency (Salkind, 2011).

*Environmental Awareness*: For the purpose of this study, environmental awareness is a person's inclination to look for ways to protect the earth's environment.

*Environmental Education*: Environmental education focuses primarily on the promotion of responsible behaviors within our environment, ultimately leading to "develop understanding of the relationship between man and his biophysical environment" (Erdogan, 2011, p. 2233). Environmental education, essentially, is about establishing a population of people who have the knowledge to sustain the human race and its habitat.

*Experiential Learning:* Experiential learning is education focused on student discovery, which leads to greater connection to the material. It is learning from experience and may enhance long-term retention (Sindel, 2010).

*MANOVA: Multivariate Analysis of Variance*: Examines means within a data set that contains two or more dependent variables (Salkind, 2011).

*MAP: Measures of Academic Progress*: Central Middle School participates in MAP testing by utilizing the Northwest Evaluation Association's testing system. Assessments in math, reading, science, and language arts are conducted yearly to determine student academic growth.

*NAEAWB*: The nature appreciation, environmental awareness, and well-being survey that was utilized for this dissertation was created by the researcher. The nature appreciation and environmental awareness portions of the survey were adapted from a similar questionnaire developed by Drissner, Haase, and Gmund (2010) and Bogner and Wiseman (2006) for high school students. The well-being portion of the survey looked at mental, emotional, and physical health.

*Nature Appreciation*: For the purpose of this study, nature appreciation is the development of a fondness for a person's natural surroundings.

*Nature Education*: The examining of specific aspects of nature and then using that information to assess an organism's place in the greater universe. Using this knowledge, students involved in nature education can develop environmental awareness and gain a sense of the responsibility involved in inhabiting our world (Erdogan, 2011).

*NCLB: No Child Left Behind Act*: An act of Congress that called for students in all subgroups to be proficient in their grade level in reading and math by the year 2014 ("No Child Left Behind Act of 2001," 2008).

*NWEA: Northwest Evaluation Association*: A research-based, online testing system that assesses student growth, independent of grade level ("Our History," n.d.).

*PowerSchool*: PowerSchool is a web-based, student tracking information system used in schools throughout the country. Attendance data for the study was gathered from the system.

*RIT Scores*: Short for "Rausch Unit," a student's RIT score is found through NWEA testing and is based on a "curriculum scale that uses individual item difficulty values to estimate student achievement" ("The RIT Scale," n.d.).

*SHNEP*: Sully's Hill Nature Education Program

*SPSS: Statistical Package for the Social Sciences*: Statistical software package owned by IBM, which allows independent researchers to do their own statistical analysis (Salkind, 2011).

*Traditional Classroom*: For the purpose of this study, the "traditional classroom" will be defined as a classroom based primarily in an indoor setting with one classroom teacher.

*Well-Being*: For the purpose of study, well-being is defined as a person's health in respect to his or her mental, emotional, and physical welfare.

## Organization of the Study

This study is organized into five chapters. Chapter I presents the introduction, significance, purpose, researcher's background, delimitations, assumptions, and

definitions of terms and acronyms. Chapter II is a review of the literature related to nature education and student learning. Chapter III provides the methods used to gather and analyze data for the study. Chapter IV presents findings from academic data, attendance records, and student surveys and how they relate to the research questions. Chapter V contains summaries and analyses of the aforementioned data and conclusions based on the analyses, limitations of the study, and recommendations for further studies.

# CHAPTER II

# LITERATURE REVIEW

## Introduction

Literature pertaining to nature and environmental education and its relation to the research questions are presented in this chapter. The researcher's experience with SHNEP and his extensive search for literature relating to similar programs in the world led him to organize Chapter II in the format presented. The chapter is divided into six main sections. The first section includes a summary of the history and background of nature and environmental education. The second section provides examples of current nature and environmental education programs throughout the world. The third section reviews how an immersion in nature education can enhance students' intellectual cognition by intensifying all of their senses. The fourth section contains information about the importance of fostering an appreciation for nature at a young age. The fifth section considers how this appreciation can lead children to a more pronounced awareness for the environment. And finally, the sixth section connects involvement in nature education with a child's overall well-being.

## Background of Nature and Environmental Education

Although the two concepts of nature education and environmental education are somewhat different, it is important to examine the classification of both. In definition, nature education is the examining of specific aspects of nature and then using that

information to assess a human being's place in the greater universe (Erdogan, 2011). Using this knowledge, students involved in nature education can develop environmental awareness and gain a sense of the responsibility involved in inhabiting our world (Erdogan, 2011). In slight contrast, environmental education focuses primarily on the promotion of responsible behaviors within our environment, ultimately leading to an "understanding of the relationship between man and his biophysical environment" (Erdogan, 2011, p. 2233). Environmental education, essentially, is about establishing a population of people who have the knowledge to sustain the human race and its habitat. According to Tsekos, Christoforidou, & Tsekos (2012), environmental education falls into three connected categories:

1. Environmental Education about the environment
2. Environmental Education in or from the environment
3. Environmental Education for the environment

Despite small differences, environmental education has received more attention than nature education because of environmental education's connection with government policies and action-oriented goals, and, therefore, it has a more defined "history" than nature education. Environmental education in America may have its roots following the industrial revolution with progressive educators such as John Dewey, who believed that students needed to learn about the aesthetical qualities of nature and, consequently, become ethically sensitive as well (Saylan & Blumstein, 2011). This "nature study movement" of the late 19th century encouraged students to plant gardens in order to grow closer to nature and to ward off what the movement perceived as the isolation caused by urbanization and industrialization (Saylan & Blumstein, 2011, p. 23).

The first known coining of the phrase “environmental education” in the literature, however, coincided with the inaugural 1969 volume of *The Journal of Environmental Education*. In the journal, university professor Dr. William Stapp and his students defined the phrase: “environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware to help solve these problems, and motivated to work toward their solution." (Stapp et al., 1969, p. 31). With this initial literal definition, policies and programs began to develop. In 1970, the International Union for the Conservation of Nature and Natural Resources (IUCN) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) held an International Working Meeting on Environmental Education and the School Curricula (Crowell, 2011). This meeting, held in Carson City, Nevada, resulted in an additional definition for environmental education:

> A process of recognizing values and classifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his biophysical surroundings. Environmental Education also entails practice in decision-making and self-formulating of a code of behavior about issues concerning environmental quality. (Hesselink & C□er□ovský, 2008, p. 11)

The year 1970 also marked the first official “Earth Day” as well as the U.S. Congress’ passing of the National Environmental Education Act (Crowell, 2011). The United States Environmental Protection Agency (USEPA) was put in charge of the leadership “to increase environmental literacy” and to “incorporate learning about environment into the school systems of the United States” (Crowell, 2011, p. 25).

Despite its good intentions, the act was repealed in 1975 because of a lack of congressional involvement (Crowell, 2011).

Despite the failings of America's Congress to sustain a viable solution to increasing the country's awareness for environmental issues, internationally the United Nations was implementing its own strategies to help combat human effect on the changing environment. During the 1970s, the United Nations spurred the writing of three crucial documents that led to the beginning of current policies that the world currently holds: the Stockholm Declaration of 1972; the Belgrade Charter of 1976; and the Tbilisi Declaration of 1977.

The first document, the Stockholm Declaration of 1972, "called upon environmental education as a means to address environmental issues worldwide. The Stockholm Declaration was the first United Nations declaration to make reference to the need for education for environmental issues" (Crowell, 2011, p. 26; Tsekos, Christoforidou, & Tsekos, 2012). It set the stage for future proposals and policies concerning the environment.

Following the Stockholm Declaration, a subsequent United Nations meeting in 1975 Yugoslavia produced the Belgrade Charter (UNESCO-UNEP, 1976), which provided a single goal for environmental education to "develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones." (p. 2)

Eventually, these declarations led to quite possibly the most influential document, the Tbilisi Declaration. This declaration was instituted in 1977 with the First Intergovernmental Conference on Environmental Education. The conference essentially declared that environmental education needed to not only take place at a pre-school age, but also it was necessary to continue with the teaching of ecological concepts throughout a person's lifetime (Monroe, Andrews, & Biedenweg, 2007; Tsekos et al., 2012). The framework set forth by the Tbilisi Declaration set the baseline for the education of students in the areas of environmental awareness, knowledge, attitudes, and participation (Monroe et al., 2007).

During the George Bush administration in 1990, the act was revisited and reorganized. Reasons for the new implementation of the act included the following:

1. Threats to human health and environmental quality are increasingly complex, involving a wide range of conventional and toxic contaminants in the air and water and on the land.
2. There is growing evidence of international environmental problems, such as global warming, ocean pollution, and declines in species diversity, and that these problems pose serious threats to human health and the environment on a global scale.
3. Environmental problems represent as significant a threat to the quality of life and the economic vitality of urban areas as they do the natural balance of rural areas. (P.L. 101-619, 20 USC 5501-5510)

When signing the act into law, Bush asserted the need for increased awareness that choices being made every day by humans are negatively impacting the fate of the earth.

By incorporating the National Environmental Education Act of 1990, Bush believed that it would promote a responsible citizenry and workforce to guide the future of environmental security (Bush, 1990).

## Examples of Nature and Environmental Education

The advent of the aforementioned policies and legislative acts led to the development of several varieties of environmental and nature education. Throughout the world, schools have attempted to find ways in which they could establish a system that takes students closer to the natural environment and in turn create future stewards for a sustainable ecosystem (Saylan & Blumstein, 2011). Logistical obstacles, budgetary conflicts, and high stakes testing in reading and math have contributed to a seemingly slow push for environmental and nature education (Dyment, 2005). As a result, even field trips and other off-site experiences away from the traditional classroom have been reduced (Campen, 2012). The Internet, as well, has added to a decrease in first-hand experiences with nature because online learning has been a "major tool to connect children to the world" (Ballouard, Brischoux, & Bonnett, 2011). However, the biggest obstacle to creating field-based environmental schools may be tradition itself: decision-makers constrained to the old concepts and ideas (Jian, 2004). Nevertheless, schools with an understanding of the importance of including this type of learning into a curriculum have been able to provide successful programs for its students.

One of the ways in which schools are providing nature or environmental education is in temporary segments, giving students an opportunity to learn outside, using lessons within the current curriculum, and enhancing the projects with real-life examples. Since No Child Left Behind was implemented in 2001, with its primary focus on reading

and math, students and schools have struggled to find ways in which to incorporate science into their regular school day, let alone trying to find time to practice experiential learning in an outdoor setting (Harrington & Beale, 2010). Nature and environmental education frequently are confined to one to five day segments within a regular school year.

One such short-term example that has been used to study the acquiring of cognitive knowledge in relation to a natural environment away from a traditional classroom is the Nature Conservancy's Wings and Water Program in Utah. This program consists of a two-hour visit to the Great Salt Lake Shorelands Preserve, "a system of salt and freshwater marshes with mudflats, ponds, and pools that provides habitat for tens of thousands of migrating birds" (Cachelin, Paisley, & Blanchard, 2008, p. 2). The authors of a study (Cachelin et al., 2008) looking at the program compared the learning outcomes between fourth-grade students who participated in the outdoor sessions with fourth-grade students who learned in a traditional classroom setting. The results of the study indicated a stronger knowledge gain for those students involved in the outdoor setting, suggesting that involvement in nature education can promote positive academic benefits.

A similar comparison study marking the differences between the environmental attitudes of middle-school aged children who were involved in a morning session of a nature education "Green Classroom" setting with those who were in a control group took place recently in Europe (Drissner, Haase, & Gmund, 2010). The short visit to a facility near the Botanical Gardens in Germany was focused mainly on the students' feelings toward small animals. Although the students were only involved for a few hours, the questionnaires distributed after the experience yielded significant differences in attitudes

between the two groups, with the participants in the "Green Classroom" displaying a significantly higher positive response to animals in general than the control group (Drissner et al., 2010).

A "Green Classroom" technique is also being applied to the philosophy of the programs available at Peak District National Park in the United Kingdom. Dr. Richard Campen, the director of operations at the park, also concludes that "learning outside the classroom helps equip children with the skills and confidence they need, as citizens, to participate actively in addressing environmental problems" (2012, p. 31). Peak National Park allows time for area school children to become involved in real-life situations in which secondary school students inspect the park's landscape, evaluate it for how human activity affects the land, and discuss solutions to counteract environmental damage caused by humans. Called the Moorlands as Indicators of Climate Change Initiative (MICCI), the program impacts student attitudes toward the environment because they develop an intimate sense of how mankind can disturb the mechanics of the planet (Campen, 2012).

Long-term examples of environmental or nature education, such as Devils Lake's SHNEP, are more scarce and, therefore, have less data-based documentation of effectiveness, despite the fact that length of involvement of any environmental programs has a substantial influence on their efficacy (Rickinson, 2001). Integrating outdoor learning into a regular school day on a consistent basis takes extensive planning, supportive leadership, and a common understanding among all constituents about the importance of the concepts behind nature and environmental education. Some schools have been able to make these concepts become a reality.

One such longer-term example that permits students to engage with the earth is witnessed in several schools throughout the United States that incorporate garden-based learning within the traditional school day. Garden-based learning allows students to become involved with gardening, which accounts for the development of several skills, which include fostering inquiry as well as enhancing fine motor skills, especially amongst students with special needs (Rye et al., 2012). Students involved in garden-based programs are able to work with nature throughout the school year and see its seasonal progress.

These types of nature education projects according to Desmond, Grieshop, and Subramaniam (2004) "contribute to academic skill…[and] a child's development in social, moral, and practical or life skills" (p. 12). The potential of hands-on, garden-based outdoor learning opportunities are being utilized in Hill Elementary, a large suburban school that encompasses a variety of learners including over 700 students, 19 percent English language learners, with 23 percent special education (Rye et al., 2012). The school is then able to connect the garden-based learning program to the science education standards with a cross-curricular approach, allowing the school to combine nature education with legislative guidelines.

A higher intensity outside learning environment has been found in "Outdoor Adventure Education" (OAE) programs found throughout the world. D'Amato and Krasny (2011), in their journal article "Outdoor Adventure Education: Applying Transformative Learning Theory to Understanding Instrumental Learning and Personal Growth in Environmental Education," studied the experiences of 23 OAE students, looking for information in regards to their individual personal growth as well as their

attitudes toward fostering positive environmental behaviors. National Outdoor Leadership School located in Wyoming and Outward Bound schools found in multiple areas in the United States are just a couple of the examples. These schools provide students with the opportunity to rock climb, sail, kayak, and sleep outdoors (D'Amato & Krasny, 2011). Enrollment in these schools lasts up to 78 days and participants range in age from 15 to 24 years old. According to D'Amato and Krasny (2011), the authors of a study featuring these highly immersion-based programs, after reviewing qualitative responses from the participants, it was clear that although they "spoke mostly about the elements of the course that fostered personal growth, such growth was often intertwined with a commitment to change behaviors," indicating a need to involve students first-hand in outdoor learning experiences in order to effect positive environmental actions (p. 248).

Effecting pro-environmental behaviors is also the goal of ecology-based summer nature education programs found in Turkey. Mehmet Erdogan conducted a study similar to the researcher's in which Erdogan (2011) assessed elementary students' environmental knowledge, environmental attitude, and responsible environmental behavior after participating in the twelve-day program. A pre and post-test were administered to the students, and Erdogan found that "ecology-based summer nature education programs contributed significantly to the development of responsible environmental behavior." Also noteworthy to the study itself is that age was a strong indicator as to how much environmental effect students gained during the program, results indicating that the younger the participant, the more likely the student was to gain a higher appreciation for nature (Erdogan, 2011). This finding is consistent with the idea that involving students at

a young age with nature education may have profound effects on the prospect of creating life-long stewards of the environment.

Apul & Philpott (2011) have taken this idea into another realm of occupational possibilities and included the prospect of incorporating sustainability, place-based, and nature education into the field of engineering. Their study looked at how higher education engineering students could discover solutions for irrigation of the University of Toledo's outdoor classroom garden. Although this study looks primarily at older students, the notion of not only creating informed citizens is there but also the vision of producing a workforce that can provide the necessary tools in order to support the health of the planet (Apul & Philpott, 2011). The students involved in the project devised their solutions through a team-based, critical-thinking approach, which carries over well into any environmental or nature education program.

**Academic Success Connected to Nature and Environmental Education**

Despite the previous successful examples of environmental and nature education, traditional education is generally associated with the world of academia. Conventional classrooms composed of rows of desks with a teacher lecturing a roomful of students about the day's topic is a picture that several people have when they think of schools and learning. Nature and environmental education turn that notion upside down by allowing students outside of the traditional classroom to experience the world independent from a textbook. Accordingly, literature has shown that involvement in nature education is not a detriment to a student's academic success; in fact, it may be an enhancement (Eick, 2012; Mirrahimi, et al., 2011; Widhalm, 2011).

A report compiled by the State Education and Environmental Roundtable specified just that (Louv, 2008). After working with 150 schools in 16 states for 10 years, it was found, quite strikingly, that an environmentally-based education produced significant student gains in curricular areas across the board: language arts, math, social studies, and science. The report showed that nature or environmental education improved standardized test scores and developed critical thinking and interpersonal communication skills (Lieberman & Hoody, 1998; Louv, 2008). Critical thinking skills were also found to be considerably improved in a study performed by Serhat Arslan (2012) with eighth grade students involved in an environmental program in Turkey. In addition, Charles Eick (2012), in his case study of an exemplary third grade teacher's use of an outdoor classroom, showed that the teacher not only provided the enrichments of science and the outdoors in her pedagogy, but she was also able to maintain high reading and math scores within the pressures of the state's high-stakes testing. Francovicova & Prokop (2011) similarly found that outdoor programs enhanced knowledge and attitudes about plants compared to a control group that learned about the material in a traditional setting.

A substantial reason for this is because effective nature education is experiential education (Georgopoulos, Birbili, & Dimitriou, 2011). Experiential learning is about students participating and discovering phenomena on their own, which results in a greater understanding of the content (Sindel, 2010). To be given a chance to explore a natural environment allows children to discover the immediate operations of the physical world. Nature provides a sense of wonderment and a connection with learning that textbooks and technology are not able to provide. What environmental and nature education does provide is a holistic approach to learning, which is needed to understand the complex

processes and problems of the environment (Alagona & Simon, 2010; Zhanbao, 2004). According to Louv, "Much of our learning comes from doing, from making, from feeling with our hands; and though many people would like to believe otherwise, the world is not entirely available from a keyboard" (2008, p. 67).

The extent of what a child "experiences" in his learning has an overwhelming effect as to the extent of how much a child retains (Potts, 2011). If students are immersed in nature while learning, they make connections with all of the senses, which multiplies the chances of making strong connections to memory (Louv, 2008). Students must go outside and study nature first-hand in order to have the full benefit and gain a stronger understanding of information about our planet (Alagona & Simon, 2010). A study performed by Matsuoka (2010) demonstrated that even simple *exposure* to natural surroundings during high school students' lunch periods had an effect on academic performance. "Analyses revealed consistent, systematically positive relationships between student exposure to nature during their lunch time and scores on standardized tests, graduation rates, and plans to attend a four-year college" (Matsuoka, 2010, p. 280).

Learning experientially, especially in a natural environment, also has a strong connection to engagement and focus (Louv, 2008). Positive school outcomes are dependent upon engaged students, and schools that incorporate experiential learning practices into their instructional time create an educational environment conducive to school success (Davison & Hawe, 2012). A lack of engagement results in absenteeism, high school dropouts, and overall decline in academic commitment (Davison & Hawe, 2012). Students who attend schools that provide occasions to interact with nature have an opportunity to become attentive to tangible, genuine subject matter that connects

across curricula (Eick & Tatarchuk, 2011). Nature education increases focus, which corresponds to higher levels of engagement (Louv, 2008).

Nature and environmental education are usually associated with natural sciences; however, enhancement in all subject areas can be achieved as well. A recent study performed by Alagona & Simon (2010) looked at the impact of environmental education, specifically experiential environmental education, on college students. What they found was that although the students who took these courses initially had a high interest level in learning about natural science and acquiring technical knowledge about environmental science, it was found that "by the end of the course, many of these same students identified discussions of environmental history, philosophy, and literature as their favorite aspects of the curriculum" (p. 192). Although their initial interest in the natural sciences did not wane, their engagement in other content areas increased (Alagona & Simon, 2010).

Experiential, environmental learning can indeed help overall motivation. In addition, however, extreme lack of focus, often seen in cases of Attention Deficit Hyperactivity Disorder (ADHD), has also been shown to improve after periods in a natural environment (Louv, 2008). Green spaces and fresh air provide such students with a calming atmosphere, which in turn can decrease symptoms of the disorder (Dustin, Bricker, & Schwab, 2010). A study performed by husband and wife team Stephen and Rachel Kaplan (1989) gave insight into actual evidence witnessed in participants involved in an Outward Bound environmental education program. What they found was that after students participated in the wilderness program, their overall demeanor changed a great deal, noting extreme peace and ability to think more clearly (Louv, 2008).

Richard Louv describes this phenomenon as a "restorative environment" (2008, p. 102) in his book *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* in which he explains how children have been shown to exhibit increased focus when involved in outdoor programs as evidenced by the work of Kaplan and Kaplan (1989).

## Appreciation for Nature Connected to Nature and Environmental Education

First-hand experiences with nature and undergoing personal periods of peace and restoration within the environment can result in an even greater appreciation for the natural world itself. Children who participate in a nature or environmental education program can not only gain a better understanding of the ecosystem but can also grow to have a stronger connection with nature (Ernst & Theimer, 2011). Currently, a connection for children with nature is being lost with an inundation of technology, an insistence of standardized testing in K-12 education, a sensationalized fear of child abduction, etc. (Hung, 2008; Louv, 2008; Vadala, Bixler, & James, 2007). These and other factors may be leading to an overall loss of appreciation for our natural world and a sense of empathy for all living things. Learning to love the outdoors may have a strong impact on how children feel about their place in the world.

This place in the world begins with an understanding about the organization and workings of our natural environment. A nature or environmental educational program may hold an advantage over traditional schooling in this area in the fact that learning within the confines of nature itself will provide more vivid, concrete examples of the content being discussed. The advantage of the nature or environmental education

program comes in the form of engagement, and disengagement leads to withdrawal from many content areas within a school (Davison & Hawe, 2012).

Learning through examples of the natural world is evident throughout human history. Native American cultures, especially, linked the connection of celestial bodies to knowledge for centuries:

> Prior to 1492, education occurred as a part of life for Native Americans . . . Teaching materials were mother earth, the sky, and all that was in it . . . Learning herbs, grains, plants, trees, and roots that grew upon the earth and could heal and nurture human beings taught medicine, science, horticulture, agriculture, biology, and math. Watching the sky and recording how the earth moved in accordance with the moon and sun and how constellations were formed, Native people became meteorologists, astronomers, scientists, and storytellers. (DeLong, 2006, p. v)

Children, specifically Native American children, can discover this special bond with the earth, which will certainly help with engagement in their learning.

Engagement with the natural environment is essential in a fundamental element within environmental education: conservation education. This component of environmental education focuses on the natural content of our world and attempts to make the connection for students to gain skills and information necessary to develop into stewards of the earth (Schwartz et al., 2012). Participatory environmental education studies have shown an increase in environmental knowledge immediately following activities in nature (Schwartz et al., 2012).

In the preceding paragraphs, literature was presented that linked a stronger nature and environmental knowledge base to students who participated in a nature or environmental educational program. This knowledge base, in addition, may lead to a stronger connection to nature, especially for elementary students. "Childhood is the key period to introduce environmental education owing to the strength and lasting quality of an early relationship formed between children and the natural world" (Ballouard et al., 2011). This connection and overall attitude are influenced by all factors that a child encounters in his or her early years, and the school system is one such entity that can provide that impact.

By direct engagement with the wonders of the natural world, humans in general can come to terms with their association and relation with nature itself. "It is only in relation to this that nature can appear as it is. Only through such immediate and sensuous engagement with the particularity and manifold suchness of things rather than the abstraction and intellectual models is the reciprocity of the awareness of the self-arising and the enrichment of the life-world to be achieved" (Bonnett, 2009, p. 47-48). Children having an early understanding of humans as an aspect of nature itself may create an empathy for our planet that can be paramount in promoting global citizenship. Although teaching this more profound concept from a textbook or lecture may be lost on K-12 education students, a nature or environmental education course that can expose the students to the outdoors could quite possibly help them discover this concept themselves. Ruyu Hung states in his essay "Educating For and Through Nature: A Merleau-Pontian Approach:

> Let all the organs of sensation greet nature: to see, to sniff, to hear, and to touch. Let us use every part of the body to caress and be caressed by nature. Let us be in the midst of earth, air and water and infiltrate the whole body with them. If the bodily communing with nature could be provided as one of the learning pathways besides the traditional view of studying about nature, the young could have more chances to obtain the genuine experiences "through" nature, and so arouse in themselves the spontaneous feelings for nature. (2008, p. 363-364)

It has been suggested, however, that the ideals of current sustainable development education have drifted away from the idea that nature appreciation is at the heart of sustaining the world. Selby (2006) and Bonnett (2007) believe that sustainable development has taken on the philosophy that nature is for humans to manipulate and conserve for their needs and not to sustain all components of nature. Along with the disconnect between current sustainable development programs and appreciation for nature, some literature maintains that humans have taken on a principle of anthropocentrism or human-centrism, claiming the earth as theirs for exploitation (Hung, 2008). Education in general needs to include the element of a connection with the planet in order to have significant outcomes from students (Bonnett, 2007).

An empathetic worldview is evident in nature and environmental education programs. According to Harvard zoologist Edward Wilson, humans possess a capacity called "biophilia," in which mankind has an innate sense to become emotionally attached to other living things (Wilson & Kellert, 1993). Theodore Roszak (1995) reiterates this claim in the first chapter in the book Ecopsychology, stating that "those of us who feel trapped in an increasingly ecocidal urban, industrial society needs all the help we can find

in overcoming our alienation from the more-than-human world on which we depend for every breath we breathe" (p. 4).

On an even larger scale, R. Hong Chen argues in his essay "Bearing and Transcending Suffering with Nature and the World: A Humanistic Approach" that students should take into consideration the unpredictability and destruction that nature itself can cause (2011). This understanding gives students a glimpse of suffering, as evidenced by the 2008 earthquake in China, and it provides for them the balance between misery and happiness. Having students learn about the enormity of nature's powerful forces can help them develop an awe that will carry over into their attitude toward living an ethical life (Chen, 2011).

An educational setting that permits and encourages these relationships with natural habitats can produce for students this appreciative sensation of connection and oneness with their surroundings. Courses in ecology will not suffice, and all subject areas should explore the association between humans and nature if global environmental goals are to be met (Greenberg, 2011; Hung, 2008; Simsek, 2011). An overall aesthetic view of the world is superior to general knowledge about nature (Louv, 2012). "Too frequently, the way individuals think of environmental education is through projects and texts that emphasize lesson-planning, adopt-a-species programs, recycling initiatives, and other narrowly defined activities and curricula" (Roberts, 2007, p. 214). Recognizing the beauty of one's natural surroundings creates a connection that a textbook will not achieve (Roberts, 2007; Simsek, 2011).

Scott Rennie, in his essay entitled "Toward a 21st-Century Understanding of Humans' Relation," argues that current educational practices have failed to do this by

stating that “all educators should promote healthy sustainable relations with the natural world and a just distribution of power in society . . . Environmental education, as it is practiced today, only reinforces the conservationist assumptions that have led to the climate crisis” (2008, p. 60).

An appreciation, according to Rennie (2008), will come with an understanding of the role that connection to nature can play in students’ environmental advocacy.

## Environmental Awareness Connected to Nature and Environmental Education

If children can develop this appreciation and thus advocacy for nature, a population of environmentally friendly citizens may be on the horizon. To connect students with the importance of appreciating our planet, schools can transform children to become more keenly aware of environmental concerns, such as global warming and resource depletion (Simsek, 2011; Uzun & Keles, 2012). Conventional teaching of environmental concerns, using textbooks, wall charts, and fact memorization can have a negative effect on pro-environmental behavior (Shrigley, 1990). Nature and environmental education can become a gateway to societal attentiveness to the problems that face our world.

A well-informed and motivated citizenry is developed through a keen awareness of the issues (Monroe et al., 2007). To be educated in an effective environmental or nature education program does just that (Bonnett, 2007; Saylan & Blumstein, 2011). Louv (2008) contends that children are valuable commodities when it comes to facing long-term global issues. “One often-overlooked value of children is that they constitute the future political constituency, and their attention or vote – which is ultimately based

more on a foundation of personal experience than rational decision-making – is not guaranteed" (p. 147). Gaining an early understanding, appreciation, and love of our natural world develops in our children a sense of purpose when dealing with environmental policies (Louv, 2008; Wilson, 2006). Involvement in outdoor education programs has shown that the students not only experience personal growth, but also they are more willing to change behaviors related to the environment (D'Amato & Krasny, 2011). Furthermore, launching environmental or nature education facilities within our communities makes our public more aware of the importance of teaching young children the principles of a healthy planet (Jian, 2004).

Also, this connection results in an overall greater knowledge base about the environment, which consequently leads students to become better stewards for the earth (Uzun & Keles, 2012). A recent study performed by Kobierska, Tarabula-Fiertak, and Grodzinska-Jurczak in Poland confirms this idea, finding that an increase in knowledge about nature leads students to abide by policies regarding protected areas (2007). What is even more important about this study is that it was found that schools were second to media in perceived sources of gaining environmental knowledge, indicating that schools may not be providing engaging environmental material that impact student perceptions. Environmental and nature education can play an important role in reversing this trend:

> This study has demonstrated that a high level of environmental knowledge and its components are not always accompanied by pro-environmental behavior; however, detailed environmental knowledge is determined by pupils' behavior concerning contact with nature. This conclusion emphasizes the importance of

> the emotional factor (sensitivity) in shaping the appropriate attitude to the natural environment. (Kobierska, Tarabula-Fiertak, & Grodzinska-Jurczak, 2007, p. 17)

Evidence also points to the fact that current rates of environmental deterioration will lead to critically adverse changes to our climate, and current educational policies and curriculum have failed to reverse humans' rates of consumption and pollution (Saylan & Blumstein, 2011). This indicates a heavy responsibility on the part of the educational system. "An environment-based education movement – at all levels of education – will help students realize that school isn't supposed to be a polite form of incarceration, but a portal to the wider world" (Louv, 2008, p. 226).

To some extent, many environmental problems that our planet faces are based on a misunderstanding of the processes of our natural environment (Hung, 2008). According to Zsoka, Szerenyi, Szechy, and Kocsis (2013), a strong environmental education program needs to be exposed to all children, not just ones who have an initial inclination toward environmental awareness. These researchers indicated in their study of environmental education programs that there is a wide variety of attitudes towards environmental and sustainability issues and that "current environmental education seems to make the mistake to primarily reach committed students and further increase their pre-existing environmental consciousness, while missing the focus on students who are less committed" (Zsoka, Szerenyi, Szechy, & Kocsis, 2013, p. 137).

An understanding of humans' place in the general scheme of life on earth can also be made evident with a strong background in nature study, which is prominent in environmental and nature education (Horka & Markova, 2013). This understanding of how humans are not the most primary life form on earth can further lead to a feeling of

responsibility to protect the planet. "Of the billions and billions of living things that have existed since the dawn of time, most – 99.99% it has been suggested – are no longer around" (Bryson, 2003). In fact, argues Aldrich, the earth has a great chance of existing for billions more years, but mankind has little chance of survival unless drastic changes occur (2010). Human beings' seemingly precarious state in the evolutionary history of the world may be too heavy a reality for young school children; however, gaining respect for the natural environment as a whole may lead to higher empathy for other living things (Aldrich, 2010; Bonnett 2007).

The above concept is a contrast to early 17th century beliefs spearheaded by Sir Francis Bacon (1627) and his philosophy that humans should manipulate nature in order for mankind to progress and improve its own living conditions (Gilead, 2010). Baconian ideals have been practiced for years, but with the recognition in recent years of the degradation of the earth's ecosystem, concepts that put human endeavors at the forefront are being revisited. Successful environmental and nature education programs provide these new principles. A connection that allows students to see nature and humans as "we" provides the best opportunity to promote environmentally-sound behavior (Frantz & Mayer, 2014).

A shifting away from the Baconian philosophy should not be confused with a shifting away from beliefs and traditions of students who have a religious background in Christianity. Although some researchers argue that religion may advocate anthropocentrism and its dogmas that man rules over other aspects of nature, students with Christian upbringings are not necessarily taught this belief. In fact, according to a study done by Helton and Helton (2007) that looked at the relationships between

religious and non-religious students and their attitudes of the intrinsic value of nature, "Christian students are no more or less likely to believe in the intrinsic value of nature or advocate anthropocentrism than non-religious students" (p. 139).

## Nature and Child Well-Being

An ultimate goal of any environmental or nature education system should include the belief of producing citizens that are not only ecologically responsible but also mentally and physically healthy. "In simple terms, we cannot restore our own health, our sense of well-being, unless we restore the health of the planet" (Brown, 1995, p. xvi). Nature and environmental education can set a good foundation for this objective. Several studies and valid research have concluded that time spent in natural surroundings has profound effects on overall well-being (Louv, 2008). Schools that allow students time outdoors to explore and investigate have created opportunities for the children to become emotionally and physically well (Matsuoka, 2010).

Human happiness and psychological well-being are interrelated with a strong connection with nature (Louv, 2008; Nisbet, Zelenski, & Murphy, 2010). Furthermore, it has been suggested that time spent in nature, which can lead to a connection with the surroundings, can profoundly impact emotional welfare (Nisbet et al., 2010). Nature and environmental education, with its emphasis on outdoor, experiential learning, provides the time necessary for this wellness strategy to occur.

Participants in several outdoor education programs, studied by D'Amato and Krasny (2011), echoed this response, citing many psychological benefits to being in nature, including feelings of balance, comfort, and peace. Stress was found to be at a minimum, and simplicity, balance, and internal quietude were also noted (D'Amato &

Krasny, 2011). Personal growth associated with emotional health was evidenced throughout the study. Kamitsis and Francis (2013), in their study researching humans and a connection to nature, also concluded that "engagement with nature, through both direct sensory exposure and a sense of connectedness, was related to better psychological health" (p. 140).

A growing concern linked to emotional well-being is the increase of prescriptions of antidepressants to depressed patients, and even more disturbing, *children* with emotional problems (Louv, 2008). Louv (2008) contends that this sizeable increase in the prescribing of drugs, especially to children, correlates with our society's decrease in the time it spends outside. As children become more and more immersed in technology, which now constitutes much more than sitting in front of a television, Louv (2008) argues that prescribed time outdoors should override the prescribed antidepressant drug:

> Nature is often overlooked as a healing balm for the emotional hardships in a child's life. You'll likely never see a slick commercial for nature therapy, as you do for the latest antidepressant pharmaceuticals. But parents, educators, and health workers need to know what a useful antidote to emotional and physical stress nature can be. Especially now. (p. 49)

Spirituality, which also frequently accompanies feelings of happiness and positive psychological health, can also be enhanced with a strong nature or environmental education program (Kamitsis & Francis, 2013). Although the lines between church and state have been firmly drawn for schools, outdoor education can promote an individual sense of spirituality, leading to self-awareness and self-reliance, which are important aspects of emotional health (Uhlik, 2009). Allowing a child's mind to unite the earth

with the sense of spiritual inspiration and truth can help him or her develop a greater appreciation for humanity and, therefore, be more inclined to psychological well-being (Aldrich, 2010; Calsoyas, 2005).

In addition to emotional health, physical health can also be improved by an involvement in nature or environmental education. These programs include activities such as hiking, kayaking, snow-shoeing, etc., which provide students ample opportunity for exercise. Undoubtedly, exercise leads to better physical health, and outdoor activities truly promote this idea (Park, O'Brien, Roe, Thompson, & Mitchell, 2011). The notion that outdoor activities are associated with enjoyable experiences further enhances the sustainability of exercise for students (Dustin et al., 2010).

Incorporating the activities that a child learns during a nature or environmental education program into his or her own play is important as well. Outdoor, unstructured play has decreased over the years for several reasons, and although nature or environmental education programs need to allow for a certain amount of structure, these experiences can help a child to understand how to create his or her own play after the school bell rings (Dustin et al., 2010; Louv, 2008). Current physical education classes do not allow for as many opportunities to exercise outdoors (Delany & Madigan, 2009), and it is clear that natural settings are more beneficial, because exercise in nature has shown to produce superior results to exercise indoors. "Researchers in England and Sweden have found that joggers who exercise in a natural green setting with trees, foliage, and landscape views feel more restored, and less anxious, angry, and depressed than people who burn the same amount of calories in gyms or other built settings" (Louv, 2008).

This conclusion was also found in a study performed by Vadala, Bixler, & James (2008). These researchers surveyed 51 adults to determine how their recollections of childhood play affected their attitudes toward the environment and overall well-being. Several interesting results were found from the study, including the relationship between natural childhood play and physical proficiencies:

> Childhood play provides opportunities for developing layers of skill sets: physical coordination, ancillary skills (e.g., tolerance for dirtiness, heat, and cold; wayfinding), social interactions, and creative acts, including art and construction. Most children develop these outcomes by playing outdoors. (Vadala et al., 2008, p. 14)

Any opportunity for a child to learn outdoors can help with a general sense of calm and wellness; however, environmental and nature education programs that allow for ample time in nature can have an even greater impact because green environments have been found to be associated with people who "have better mental health, report fewer physical symptoms, and better general health than those deprived of access to nature" (Nisbet et al., 2010). This point is also true for recovery measures as well (Matsuoka, 2010). In a study performed in a suburban Pennsylvania hospital, gall bladder surgery patients were studied to see who recovered at a more efficient rate: those with a view of trees or those with a view of a brick wall. "In comparison with the wall-view group, patients with the tree view had shorter postoperative hospital stays, had fewer negative evaluative comments from nurses, took fewer moderate and strong analgesic doses, and had slightly lower scores for minor postsurgical complications" (Ulrich, 1984, p. 421).

## Organization of the Study

Chapter II provided a literature review of background and components of nature and environmental education. Chapter III will describe the methods used to conduct the study. Chapter IV presents the findings in quantitative means. Finally, Chapter V presents a summary, conclusions, discussion of the findings, recommendations of the study, and recommendations for future studies.

# CHAPTER III

# METHODOLOGY

## Purpose of the Study and Research Questions

The purpose of this study was to determine if a relationship exists between Devils Lake fifth graders and sixth graders who participate(d) in the Sully's Hill Nature Education Program (SHNEP), and those students who have not participated in the program, with their academic achievement in math, language, and science as well as their individual perceptions of appreciation for nature, environmental awareness, and overall well-being. The research method utilized a quantitative format by examining Measures of Academic Progress (MAP) data in math, language, and science. Furthermore, perception data were gathered from a survey (agreement and disagreement to statements on a four-point Likert scale) and analyzed in order to understand the impact of the nature education program on fifth and sixth-grade students at Central Middle School in Devils Lake, North Dakota. The dependent variables of math, language, and science MAP scores and attendance data of students were examined. The following research questions were used to guide the study:

1. How does daily immersion in the SHNEP affect academic performance and daily attendance of participants compared to non-participants?

2. How does daily immersion in the SHNEP affect participants' perceptions of their appreciation for nature?

3. How does daily immersion in the SHNEP affect participants' perceptions of their environmental awareness?

4. How does daily immersion in the SHNEP affect participants' perceptions of their well-being?

## Description of the Population

The SHNEP is a nature education program designed for Devils Lake fifth graders. Every spring of the preceding school year, students and parents of Devils Lake elementary fourth graders are given the opportunity to apply for the SHNEP. The fourth-grade science teacher in the district, who is also an organizer of SHNEP, discusses with her fourth-grade students about what SHNEP involves as well as the application process to get into the program. During the two years of its existence, approximately 50 percent of fourth-grade students filled out the application form. Students who did not apply did so for a variety of reasons: parental anxieties about students leaving school every day; preference for specific teachers in the traditional setting; parental feeling of the program having too much emphasis on conservation and environmental protection; or students simply losing the form.

Also in April of the preceding school year, the Central Middle School principals hold an informational meeting at the Central Middle School building for students and parents to go over the logistics of the program, risks that may be involved, and different projects that students would be participating in throughout the year. The staff from SHNEP also attends to answer any questions that parents or students may have. This gives parents and students another overview of what the school year entails for SHNEP

participants, and it gives them more time to think about whether or not they would still choose to apply.

In May of the preceding school year, a committee consisting of two instructional coaches, two administrators, and two special education teachers identifies equal student demographic representation for all five fifth-grade classrooms (three traditional and two SHNEP). The SHNEP students are selected based on several factors. Each fifth-grade classroom needs to contain an equal percentage of boys and girls, special education students, students with high and low academic achievement scores based on NWEA data, and a 25 percent Native American representation.

The first part of the experimental group for this study was the SHNEP fifth-grade students of the 2013-14 school year, consisting of 46 students (27 female, 19 male), ages 10 and 11, who were divided into two SHNEP classrooms of 23. The second part of the experimental group for the study was the sixth-grade students who had participated in the program the previous year, consisting of 43 students (20 female, 23 male), ages 11 and 12. Thirty-eight of the 46 fifth-grade students in the SHNEP had applied for the program and the remaining eight students, with parent permission, were placed for demographic reasons. Thirty-five of the 43 sixth-grade students who had been involved in the program had previously applied as fourth graders and the remaining eight students, with parent permission, had been placed for demographic reasons. In all, 89 students were in the study's experimental group.

The control group for the study included the students who were educated in the traditional classroom setting. The traditional fifth-grade classroom in 2013-14 consisted of 63 students (39 female, 24 male). The sixth-grade students in 2013-14 who had not

participated in the SHNEP the previous year consisted of 80 students (41 female, 39 male). Therefore, a total of 143 students were in the control group.

A possibility of 234 students was eligible to take the survey in the spring of 2014. Since not all permission slips were returned or the fact that some students chose not to participate in the survey, 184 students total (78 percent) completed the survey, which is above the confidence levels required for surveying (Banach & Banach, 2004).

Table 1. Fifth Grade Enrollment in 2012-13 and 2013-14.

| Fifth Grade Enrollment (SHNEP) | Control Group (non-participants) | Experimental Group |
|---|---|---|
| 2012-13 School Year | | |
| 123 | 80 | 43 |
| 2013-14 School Year | | |
| 109 | 63 | 46 |

**Survey Instrument**

The researcher developed the nature appreciation and environmental awareness portions of the NAEAWB survey (Appendix A) after reviewing two similar studies by Drissner et al. (2010) and Bogner and Wiseman (2006). Since the two studies' survey questions were intended for high school students, the researcher adapted several of their questions regarding nature appreciation and environmental awareness to be more appropriate for fifth and sixth-grade students. The third component of the survey looked at emotional, mental, and physical well-being.

To increase the validity of the instrument, the researcher gained feedback about the NAEAWB survey from the former superintendent and principal who had both been

instrumental in implementing the program. Furthermore, the survey received additional scrutiny from administrators and instructors from Prairie Wetlands Learning Center in Fergus Falls, Minnesota. After analyzing all of the advice, the researcher completed the final version of the NAEAWB instrument, deciding upon the ten most appropriate survey items per construct.

To further test the reliability of the survey instrument and its corresponding indices, the researcher conducted a Cronbach's Alpha test using Statistical Package for Social Sciences (SPSS 22) software. The results indicated strong reliability values for all three indices: Nature Appreciation (CA = .735), Environmental Awareness (CA = .711), and Well-Being (CA = .749). These three scores are indicative of having strong reliability, showing strong internal consistency within the indices (Salkind, 2011)

Devils Lake fifth and sixth-grade students were surveyed, seeking their perceptions of nature appreciation, environmental awareness, and their own well-being. The reason all students were surveyed is that one third of the students were or had taken part in the program, and the data taken from the survey was used to identify any differences or similarities between the Sully's Hill students and the non-Sully's Hill students regarding their perceptions.

## Data Collection

Devils Lake Middle School fifth and sixth-grade students' academic data was reviewed from the Measures of Academic Progress (MAP) testing. Math, language, and science data were reviewed. This data was reviewed through the district's MAP database. Approval from the district's superintendent is attached (Appendix B). No student names

or identifying factors were used. A spreadsheet was used to chart the test scores with participants and section(s).

Prior to taking the survey, a letter informing parents about the survey and asking permission for their son or daughter to complete the survey was mailed to them (Appendix D). The letter notified parents that this was a volunteer-based survey and any students who did not want to participate could choose to opt out. The students had the option to play a typing game privately with no consequence. The parents were also informed that participants will remain anonymous, and they could have called the researcher, advisor, or Institutional Review Board (IRB) with any questions they may have had.

After receiving permission from the University of North Dakota's IRB (Appendix C), the researcher surveyed fifth and sixth-grade students in Devils Lake Public Schools during the 2013-14 school year. The experimental group was the fifth and sixth graders who had participated in the SHNEP. The control group was the fifth and sixth-grade students who had not participated in the SHNEP. The survey consisted of 30 statements related to nature appreciation, environmental awareness, and student well-being. All participants will remain anonymous.

The survey was generated using UND's Qualtrics system. During a three-week period in May of 2014, the researcher administered the survey to 11 different sections of students, with approximately 20 students per section. In the Central Middle School computer lab, the researcher informed the students on how to complete the survey. The researcher instructed the class to open up the link to the survey, and they were told the survey would take approximately five to 10 minutes to complete. Students were given

the option to play an alternative typing game instead of taking the survey. The survey was finished during the students' designated computer period, so no loss of core class instruction occurred.

## Data Analysis

The researcher first analyzed MAP data from NWEA tests over the 2012-13 and 2013-14 school years in order to interpret differences of mean scores in math, language arts, and science between the SHNEP students and traditional classroom students. After analyzing overall MAP scores in the three subject areas, the researcher then analyzed growth scores during the school years in which the students were fifth graders in order to determine if involvement in SHNEP had an effect on academics. Science MAP tests were not taken in the fourth grade, so no growth data was available for that subject area.

Attendance data for the 2012-13 and 2013-14 school years was also examined for all fifth-grade students to determine if involvement in SHNEP had an effect on school attendance. The researcher looked at individual attendance of all fifth-grade students compared to their attendance during their fourth-grade year. An increase or decrease in attendance was then averaged for each class and compared between the SHNEP and traditional classrooms.

To answer research questions 2-4, the researcher used the IBM Statistical Package for Social Sciences software (SPSS 22) to analyze the data from the NAEAWB survey, which had been generated using Quatrics online survey software program. The researcher downloaded the survey data for statistical analysis in June of 2014. Descriptive data was related to number of survey respondents, gender, grade, and participants and non-participants in SHNEP. SPSS software was used to analyze student

perceptions of their appreciation for nature, environmental awareness, and overall well-being. Statistical comparisons were made between the students who were involved with SHNEP, those who had completed the program, and those who had not. Differences between the initial SHNEP students from the 2012-13 school year and the most recent students from the 2013-14 school year were observed. Male and female differences were also examined.

To determine statistically significant differences, the researcher conducted independent samples *t* tests and one-way ANOVA on the independent and dependent variables from the survey results. Participation or nonparticipation in the program was the independent variable, and the students' perceptions in nature appreciation, environmental awareness, and well-being were the dependent variables. To further scrutinize the data, the researcher used a two-factor MANOVA to determine differences within the 2012-13 and 2013-14 fifth-grade students and differences between male and females involved during the two school years. Citrix did not analyze for other subgroups because the survey did not ask specific questions about ethnicity, socioeconomic status, physical characteristics, etc.

## Organization of the Study

The methodology used to conduct this study was described in Chapter III. Chapter IV contains results gathered for the study. Chapter V provides an individual summary on each research question, conclusions drawn from the results, limitations of the study, and recommendations for further study.

# CHAPTER IV

# RESULTS

## Purpose of the Study

The purpose of this study was to determine if a relationship exists between Devils Lake fifth graders and sixth graders who participate(d) in the Sully's Hill Nature Education Program (SHNEP), and those students who have not participated in the program, with their academic achievement in math, language, and science as well as their individual perceptions of appreciation for nature, environmental awareness, and overall well-being. The research method utilized a quantitative format by examining Measuring of Academic Progress (MAP) data in math, language, and science. Furthermore, perception data were gathered from a survey (agreement and disagreement to statements on a four-point Likert scale) and analyzed in order to understand the impact of the nature education program on fifth and sixth-grade students at Central Middle School in Devils Lake, North Dakota. The dependent variables of math, language, and science MAP scores and attendance data as well as the results from the survey of students were examined. The following research questions were used to guide the study:

1. How does daily immersion in the SHNEP affect academic performance and daily attendance of participants compared to non-participants?

2. How does daily immersion in the SHNEP affect participants' perceptions of their appreciation for nature?

3. How does daily immersion in the SHNEP affect participants' perceptions of their environmental awareness?

4. How does daily immersion in the SHNEP affect participants' perceptions of their well-being?

## Analysis of Data

The analysis for this chapter begins by examining the number of students who were involved in each of the Sully's Hill classrooms and traditional classrooms from 2012-13 and 2013-14 school years. In the inaugural year of the Sully's Hill Nature Education Program, 43 fifth-grade students (F = 20, M = 23) of the total class enrollment (34.96 percent) of 123 students were selected for the program. The following school year, 2013-14, 46 students (F = 27, M = 19) of the total fifth-grade enrollment (42.20 percent) of 109 were selected (Appendix E).

The traditional classroom during the 2012-13 school year involved 80 students (F = 41, M = 39) of the total fifth-grade enrollment (65.04 percent) of 123. The following school year, 2013-14, 63 students (F = 39, M = 24) of the total fifth-grade enrollment (57.80 percent) of 109 were involved in the traditional setting (Appendix E). This data is indicative of the total number of students in fifth-grade classrooms during the 2012-13 and 2013-14 school years, but do not reflect the number of students who completed the NAEAWB survey, which was a total of 184 students. The total enrollment for fifth and sixth grade at Central Middle School for the 2013-14 school year was 235 students; therefore, 78.30 percent of eligible students completed the survey, which falls within the range to achieve a 95 percent confidence rating with a + / -5 percent sampling error for selected universe sizes (Banach & Banach, 2004).

Of the 184 fifth and sixth grade respondents, or 78.30 percent eligible, 70 students had been involved in a Sully's Hill Nature Education Program, and 112 had been educated in the traditional classroom. Two students did not respond to the "are/were you a Sully's Hill student" question." Also, 103 of the respondents were reported as female, and 81 were male. Table 2 indicates these numbers.

Table 2. Number of Respondents Completing the Survey (*n* = 184).

| | Respondents | Percentage |
|---|---|---|
| Total | 184 | 78.30% |
| Sully's Hill Classrooms | 70 | 38.04% |
| Traditional Classroom | 112 | 60.87% |
| Female | 103 | 55.98% |
| Male | 81 | 44.02% |

Of the 43 students from the original Sully's Hill classroom, who are now sixth graders, 36 (83.73 percent) completed the survey. This number includes 17 of the original 20 female (85.00 percent) and 19 of the original 23 male (82.61 percent) participants. In the 2013-14 Sully's Hill classroom, 34 of the 46 participants (76.09 percent) completed the survey. This number includes 19 of the current 27 female (70.37) participants and 15 of the current 19 male (78.95) participants. Table 3 depicts a summary of the percentages of respondents of both groups of Sully's Hill participants over the 2012-13 and 2013-14 school years. It includes the total number of respondents

Table 3. Summary of Percentages of SHNEP Respondents in SHNEP.

| | Enrolled | Percentage |
|---|---|---|
| 2012-13 Participants (current 6th grade students) | 36 of original 43 participants | 83.72% |
| Female | 17 of original 20 females | 85.00% |
| Male | 19 of original 23 males | 82.61% |
| 2013-14 Participants (current fifth grade students) | 34 of 46 current participants | 76.09% |
| Female | 19 of 27 current participants | 70.37% |
| Male | 15 of 19 current participants | 78.95% |

of each class, with a breakdown of the ratio of female to male. The percentages are of the students who did complete the survey in relation to the specific subgroup.

Of the 80 students from the traditional classroom in 2012-13, who are now sixth graders, 68 (85.00 percent) took the survey. This number includes 36 of the original 41 female (87.81 percent) and 32 of the original 39 male (82.05 percent) students. In the 2013-14 traditional fifth-grade classrooms, 44 of the 63 students (69.84 percent) took the survey. This number includes 31 of the 39 female (79.49) students and 13 of the 24 male (54.17) students. Table 4 depicts a summary of the percentages of respondents of both groups of Traditional Classroom participants over the 2012-13 and 2013-14 school years. It includes the total number of respondents of each class, with a breakdown of the ratio of female to male. The percentages are of the students who completed the survey in relation to the specific subgroup.

**Research Question 1**

How does daily immersion in the SHNEP affect academic performance and daily attendance of participants compared to non-participants?

Table 4. Summary of Percentages of Traditional Classroom Respondents.

| | Respondents | Percentage |
|---|---|---|
| 2012-13 Participants (current sixth-grade students) | 68 of original 80 traditional classroom students | 85.00% |
| Female | 36 of original 41 female | 87.81% |
| Male | 32 of original 39 male | 82.05% |
| 2013-14 Participants (current fifth-grade students) | 44 of 63 second year traditional classroom students | 69.84% |
| Female | 31 of original 39 female | 79.49% |
| Male | 13 of original 24 male | 54.17% |

The researcher examined 2011-12, 2012-13, and 2013-14 math, language arts, and science RIT scores to first determine the averages of each subject area with the corresponding students aligned as SHNEP or traditional classroom students. The researcher then identified the growth or regression of each individual student in math and language arts for the school year (science did not have fourth-grade baseline data from the spring of 2012 or 2013). Attendance data was also examined by reviewing averages of days absent for each class and then comparing that data to the students' previous years' attendance to determine if students were absent more often during their previous year of school.

**2012-13 Sully's Hill classroom.** Students who entered the inaugural Sully's Hill program began with an average of a 219.00 RIT score in math based on their spring 2012 fourth-grade NWEA tests taken during their fourth-grade year. At the end of their fifth-grade year in 2013, the Sully's Hill students' spring MAP assessment indicated a 224.14 average math RIT score. Therefore, the fifth-grade students in the first year of SHNEP increased their math RIT scores by an average of 5.14 points.

The average RIT score in language arts for the 2012-13 Sully's Hill Program students at the end of their fourth-grade year was 209.26. The spring test results in 2013 at the end of their fifth-grade year indicated an average RIT score in language arts as 213.05. The average RIT language arts score growth for 2012-13 Sully's Hill students was 3.79 points.

The science RIT score average for 2012-13 Sully's Hill program students in the spring of their fifth-grade year in 2013 was 206.47. Since MAP data for science was not assessed during their fourth-grade year, attaining a growth score was not possible.

Attendance data for the 2012-13 Sully's Hill students indicated that participants averaged 5.81 days missed during their fourth-grade year. While involved with the program as fifth graders, students missed an average of 5.86 days. When comparing all students' individual days missed to the previous year's, participants averaged .05 more days absent than their fourth-grade year or .01 percent more days.

**2012-13 traditional classroom.** Students who entered the fifth-grade traditional classroom in 2012-13 began with an average of a 215.84 RIT score in math based on their spring 2012 fourth-grade NWEA tests. The traditional classroom students' spring of 2013 data indicated a 220.14 average math RIT score. The fifth-grade students in the

2012-13 traditional classroom increased their math RIT scores by an average of 4.30 points.

The average RIT score in language arts for the 2012-13 traditional classroom students at the end of their fourth-grade year was 207.83. The spring test results in 2013 indicated an average RIT score in language arts as 212.34. The average RIT language arts score growth for 2012-13 traditional classroom students was 4.51 points.

The science RIT score average for traditional classroom students in the spring of their fifth-grade year in 2013 was 205.77. Since MAP data for science was not assessed during their fourth-grade year, attaining a growth score was not possible.

Attendance data for the 2012-13 traditional classroom students indicated that students averaged 6.61 days missed during their fourth-grade year. While involved with the traditional classroom as fifth graders, students missed an average of 8.27 days. When comparing all students' individual days missed to the previous year's, students averaged 1.66 more days absent than their fourth-grade year or 25.11 percent more days.

**2013-14 Sully's Hill classroom.** Students who entered the Sully's Hill program in the fall of 2013 began with an average of a 216.61 RIT score in math based on their spring 2013 fourth-grade NWEA tests. The Sully's Hill students' spring of 2014 data indicated a 224.17 average math RIT score. Therefore, the fifth-grade students in the first year of the program increased their math RIT scores by an average of 7.56 points.

The average RIT score in language arts for the 2013-14 Sully's Hill Program students at the end of their fourth-grade year was 209.87. The spring test results in 2014 indicated an average RIT score in language arts as 213.67. The average RIT language arts score growth for 2013-14 Sully's Hill students was 3.80 points.

The science RIT score average for 2013-14 Sully's Hill program students in the spring of their fifth-grade year in 2014 was 205.17. Since MAP data for science was not assessed during their fourth-grade year, attaining a growth score was not possible.

Attendance data for the 2013-14 Sully's Hill students indicated that students averaged 4.78 days missed during their fourth-grade year. While involved with the Sully's Hill program as fifth graders, students missed an average of 5.95 days. When comparing all students' individual days missed to the previous year's, participants averaged 1.17 more days absent than their fourth-grade year or 24.48 percent more days.

**2013-14 traditional classroom.** Students who entered the fifth-grade traditional classroom in 2013-14 began with an average of a 210.19 RIT score in math based on their spring 2013 fourth-grade NWEA tests. The traditional classroom students' spring of 2014 data indicated a 214.95 average math RIT score. The fifth-grade students in the 2013-14 traditional classroom increased their math RIT scores by an average of 4.76 points.

The average RIT score in language arts for the 2013-14 traditional classroom students at the end of their fourth-grade year was 204.98. The spring test results in 2014 indicated an average RIT score in language arts as 208.22. The average RIT language arts score growth for 2013-14 traditional classroom students was 3.24 points.

The science RIT score average for traditional classroom students in the spring of their fifth-grade year in 2014 was 203.17. Since MAP data for science was not assessed during their fourth-grade year, attaining a growth score was not possible.

Attendance data for the 2013-14 traditional classroom students indicated that students averaged 7.20 days missed during their fourth-grade year. While involved with

the traditional classroom as fifth graders, students missed an average of 9.83 days. When comparing all students' individual days missed to the previous year's, students averaged 2.63 days more absent than their fourth-grade year or 36.53 percent more days.

Table 5 displays an academic comparison among all classrooms in the study. Table 6 displays an attendance comparison among all classrooms in the study.

Table 5. Academic Comparison Amongst All Classrooms in Study.

| Class | 4th Math RIT | 5th Math RIT | Math Growth | 4th L.A. RIT | 5th L.A. RIT | L.A. Growth | 5th Science |
|---|---|---|---|---|---|---|---|
| 2012-13 SHNEP | 219.00 | 224.14 | 5.14 | 209.26 | 213.05 | 3.93 | 206.47 |
| 2012-13 Traditional | 215.84 | 220.14 | 4.30 | 207.83 | 212.34 | 4.51 | 205.77 |
| 2013-14 SHNEP | 216.61 | 224.17 | 7.56 | 209.87 | 213.67 | 3.80 | 205.17 |
| 2013-14 Traditional | 210.19 | 214.95 | 4.76 | 204.98 | 208.22 | 3.24 | 203.17 |

Table 6. Attendance Comparison Amongst all Classrooms in the Study.

| Class | 4th Grade Days Absent | 5th Grade Days Absent | Difference | % More Days Absent |
|---|---|---|---|---|
| 2012-13 SHNEP | 5.81 | 5.86 | .05 | .01% |
| 2012-13 Traditional | 6.60 | 8.27 | 1.67 | 25.11% |
| 2013-14 SHNEP | 4.78 | 5.95 | 1.17 | 24.48% |
| 2013-14 Traditional | 7.20 | 9.83 | 2.63 | 36.53% |

**Research Question 2**

How does daily immersion in the SHNEP affect participants' perceptions of their appreciation for nature?

The first component of the NAEAWB survey was designed to assess students' perceptions of their appreciation for nature. Ten statements from the survey corresponded to Research Question 2. The survey utilized a four-point Lickert scale in which the responses were 1 (strongly agree), 2 (agree), 3 (disagree), 4 (strongly disagree). Any mean score less than 2 indicated general agreement, whereas any mean greater than 2 indicated general disagreement with the statements. The researcher used SPSS predictive analytics software to conduct independent samples *t* tests and one-way analysis of variance (ANOVA) to determine if there was a statistical difference between the SHNEP students' perceptions of nature appreciation and the perceptions of students educated in the traditional setting. The researcher also conducted a two-factor multivariate analysis of variance (MANOVA) via SPSS and corresponding unpaired *t* tests using a *t*-test calculator from graphpad.com.

Following the independent samples *t* test comparing the means of students who were involved with SHNEP and those educated in the traditional classroom setting during the 2012-13 and 2013-14 school years, the results of the NAEAWB survey in the area of nature appreciation indicated that at the $p < .05$ level there was a statistically significant difference in the mean ($p = .002$): SHNEP ($M = 1.64$, $SD = .34$) and Traditional ($M = 1.83$, $SD = .41$). An ANOVA test was also conducted to compare the means of the two groups. This test showed a statistically significant difference as well ($F = 10.07$, $p = .002$).

A follow-up two-factor MANOVA was used via SPSS in order to disaggregate the data to determine if there were variances in the perceptions of nature appreciation amongst the demographic groupings of 2012-13 fifth graders and 2013-14 fifth graders. The MANOVA gave the results of the mean score of each grade, as well as the standard deviation and number of respondents. Table 7 displays this information.

Table 7. MANOVA Mean Score and Standard Deviation of Each Classroom in the Study for Research Question 2.

| School Year | *M* | *SD* |
|---|---|---|
| 2012-13 (*n* = 33) | 1.66 | .31 |
| 2013-14 (*n* = 27) | 1.59 | .35 |
| 2012-13 (*n* = 62) | 1.89 | .43 |
| 2013-14 (*n* = 39) | 1.73 | .35 |

To examine this data further to determine if the differences in the perceptions of nature appreciation were significant between the two grades, a follow up unpaired *t* test using a *t*-test calculator from graphpad.com was conducted. Although remaining consistent with Research Question 2's results demonstrating the lower mean in respect to perceptions of nature appreciation with students who were involved with the program, no statistically significant differences at the $p < .05$ value were found. However, it should be noted that all means increased for sixth-grade respondents, indicating an overall lesser degree of nature appreciation from the sixth-grade students.

Another MANOVA was run via SPSS to look at perceptions of nature appreciation differences in responses from male to female. The MANOVA gave the

mean, standard deviation, and number of the females and males who participated in the survey. Table 8 displays this data.

Table 8. MANOVA Mean Score and Standard Deviation of Males and Females in the Study for Research Question 2.

| Class | Gender | *M* | *SD* |
|---|---|---|---|
| SHNEP | Male ($n$ = 32) | 1.58 | .37 |
| SHNEP | Female ($n$ = 29) | 1.68 | .26 |
| Traditional | Male ($n$ = 40) | 1.87 | .45 |
| Traditional | Female ($n$ = 61) | 1.80 | .38 |

To examine this data further to determine if the differences in the perceptions of nature appreciation were significant between the two genders, a follow up unpaired *t* test using a *t*-test calculator from graphpad.com was conducted. Although no statistically significant differences at the $p < .05$ value were found between genders, a significant difference between SHNEP males and traditional classroom males was detected ($p = .005$), suggesting the program has a stronger effect on the perceptions of nature appreciation for males in comparison to females.

**Research Question 3**

How does daily immersion in the SHNEP affect participants' perceptions of their environmental awareness?

The second component of the NAEAWB survey was designed to assess students' perceptions of their environmental awareness. Ten statements from the survey corresponded to Research Question 3. The survey utilized a four-point Lickert scale in

which the responses were 1 (strongly agree), 2 (agree), 3 (disagree), 4 (strongly disagree). Any mean score less than 2 indicated general agreement, whereas any mean greater than 2 indicated general disagreement with the statements. The researcher used SPSS predictive analytics software to conduct independent samples *t* tests and one-way ANOVA to determine if there was a statistical difference between the SHNEP students' perceptions of environmental awareness and the perceptions of students educated in the traditional setting. The researcher also conducted a two-factor multivariate analysis of variance (MANOVA) via SPSS and corresponding unpaired *t* tests using a *t*-test calculator from graphpad.com.

Following an independent samples *t* test to compare the means of the students who were involved with SHNEP and those educated in the traditional setting during the 2012-13 and 2013-14 school years, the results of the NAEAWB survey in the area of environmental awareness indicated that at the $p < .05$ level there was a statistically significant difference in the mean ($p = .003$): SHNEP ($M = 1.67$, $SD = .35$) and Traditional ($M = 1.85$, $SD = .41$). An analysis of variance (ANOVA) test was also conducted to compare the means of the two groups. This test showed a statistically significant difference as well ($F = 9.011$, $p = .003$).

A follow-up two-factor MANOVA was used via SPSS in order to disaggregate the data to determine if there were variances in the perceptions of environmental awareness amongst the demographic groupings of 2012-13 fifth graders and 2013-14 fifth graders. The MANOVA gave the results of the mean score of each grade, as well as the standard deviation and number of respondents. Table 9 displays this information.

Table 9. MANOVA Mean Score and Standard Deviation of Each Classroom in the Study for Research Question 3.

| Class | School Year | *M* | *SD* |
|---|---|---|---|
| SHNEP (6th grade) | 2012-13 (*n* =33) | 1.69 | .34 |
| SHNEP (5th grade) | 2013-14 (*n* = 27) | 1.66 | .35 |
| Traditional (6th grade) | 2012-13 (*n* = 62) | 1.91 | .43 |
| Traditional (5th grade) | 2013-14 (*n* = 39) | 1.75 | .35 |

To examine this data further to determine if the differences in the perceptions of environmental awareness were significant between the two grades, a follow up unpaired *t* test using a *t*-test calculator from graphpad.com was conducted. Although no statistically significant differences at the $p < .05$ value were found between the two SHNEP students, a significant difference was calculated between the sixth-grade students who were involved with the program and the sixth-grade students who had been educated in the traditional classroom ($p = .0126$). This result may suggest that the program may have a lasting impact on students' environmental awareness.

Another MANOVA was run via SPSS to look at perceptions of environmental awareness differences in responses from male to female. The MANOVA gave the mean, standard deviation, and number of the females and males who participated in the survey. Table 10 displays this data.

To examine this data further to determine if the differences in the perceptions of environmental awareness were significant between the two genders, a follow up unpaired *t* test using a *t*-test calculator from graphpad.com was conducted. Although no

Table 10. MANOVA Mean Score and Standard Deviation for Males and Females in the Study for Research Question 3.

| Class | Gender | *M* | *SD* |
|---|---|---|---|
| SHNEP | Male (*n* = 32) | 1.62 | .35 |
| SHNEP | Female (*n* = 29) | 1.74 | .33 |
| Traditional | Male (*n* = 40) | 1.97 | .45 |
| Traditional | Female (*n* = 61) | 1.77 | .38 |

statistically significant differences at the $p < .05$ value were found between genders, a significant difference between SHNEP males and traditional classroom males was detected ($p = .005$), suggesting the program has a stronger effect on the perceptions of environmental awareness for males in comparison to females.

**Research Question 4**

How does daily immersion in the SHNEP affect participants' perceptions of their well-being?

The third component of the NAEAWB survey was designed to assess students' perceptions of their overall well-being. Ten statements from the survey corresponded to Research Question 4. The survey utilized a four-point Lickert scale in which the responses were 1 (strongly agree), 2 (agree), 3 (disagree), 4 (strongly disagree). Any mean score less than 2 indicated general agreement, whereas any mean greater than 2 indicated general disagreement with the statements. The researcher used SPSS predictive analytics software to conduct independent samples *t* tests and one-way ANOVA to determine if there was a statistical difference between the SHNEP students' perceptions

of their well-being and the perceptions of students educated in the traditional setting. The researcher also conducted a two-factor multivariate analysis of variance (MANOVA) via SPSS and corresponding unpaired *t* tests using a *t*-test calculator from graphpad.com.

Following an independent samples *t* test to compare the means of the students who were involved with SHNEP and those educated in the traditional setting during the 2012-13 and 2013-14 school years, the results of the NAEAWB survey in the area of well-being indicated that at the $p < .05$ level there was a statistically significant difference in the mean ($p = .003$): SHNEP ($M = 1.79$, $SD = .39$) and Traditional ($M = 1.98$, $SD = .41$). An analysis of variance (ANOVA) test was also conducted to compare the means of the two groups. This test showed a statistically significant difference as well ($F = 9.106$, $p = .003$).

A follow-up two-factor MANOVA was used via SPSS in order to disaggregate the data to determine if there were variances in the perceptions of student well-being amongst the demographic groupings of 2012-13 fifth graders and 2013-14 fifth graders. The MANOVA gave the results of the mean score of each grade, as well as the standard deviation and number of respondents. Table 11 displays this information.

To examine this data further to determine if the differences in the perceptions of student well-being were significant between the two grades, a follow up unpaired *t* test using a *t*-test calculator from graphpad.com was conducted. Although no statistically significant differences between classes at the $p < .05$ value were found, the findings were consistent with the research question's results in which participation in SHNEP had an effect on student perceptions of their well-being.

Table 11. MANOVA Mean Score and Standard Deviation of Each Classroom in the Study for Research Question 4.

| Class | School Year | *M* | *SD* |
|---|---|---|---|
| SHNEP (6th grade) | 2012-13 (*n* =33) | 1.80 | .30 |
| SHNEP (5th grade) | 2013-14 (*n* = 27) | 1.73 | .46 |
| Traditional (6th grade) | 2012-13 (*n* = 62) | 2.00 | .45 |
| Traditional (5th grade) | 2013-14 (*n* = 39) | 1.93 | .38 |

Another MANOVA was run via SPSS to look at perceptions of student well-being in responses from male to female. The MANOVA gave the mean, standard deviation, and number of the females and males who participated in the survey. Table 12 displays this data.

Table 12. MANOVA Mean Score and Standard Deviation of Males and Females in the Study for Research Question 4.

| Class | Gender | *M* | *SD* |
|---|---|---|---|
| SHNEP | Male (*n* = 32) | 1.82 | .41 |
| SHNEP | Female (*n* = 29) | 1.71 | .33 |
| Traditional | Male (*n* = 40) | 1.99 | .39 |
| Traditional | Female (*n* = 61) | 1.96 | .45 |

To examine this data further to determine if the differences in the perceptions of student well-being were significant between the two genders, a follow up unpaired *t* test using a *t*-test calculator from graphpad.com was conducted. Although no statistically

significant differences at the $p < .05$ value were found between genders, a significant difference between SHNEP females and traditional classroom females was calculated ($p = .009$), suggesting the program has a stronger effect on the perceptions of student well-being for females in comparison to males.

## Summary

Research Question 1 yielded practical educational outcomes, revealing that RIT scores in math increased by a higher percentage for both school years for students involved in the SHNEP than they did for students who were educated in the traditional setting. Regular attendance was also found to be more consistent for the SHNEP participants to that of the traditional students. Language MAP data indicated no significant growth between the two test groups. Furthermore, although science MAP scores were slightly higher for those involved with the SHNEP, without a baseline score from the beginning of the year, an effect could not be determined. The researcher realizes that other variables for rationale could be provided as to why the differences occurred (i.e. different teachers, student maturity, etc.), but this was not part of this dissertation and could be examined in further research.

The results in Research Questions 2-4 indicated statistical significance at the $p < .005$ value for all three questions. When comparing the mean responses to the survey between students who were involved in the SHNEP with students educated in the traditional classroom, the results indicated a higher appreciation for nature, a higher sense of environmental awareness, and a more positive outlook on their overall well-being.

After disaggregating the data between the two school years associated with the study, a practically significant finding was the students' perceptions of nature,

environment, and well-being all decreased from students' fifth to sixth-grade years. Another disaggregation affected a statistically significant result between males' perceptions of nature appreciation and environmental awareness with those involved in the SHNEP and those educated in the traditional setting, indicating a higher appreciation and awareness for males compared to females involved in the program. Another similar test indicated the opposite was true in regards to student well-being in perceptions of males and females, showing a statistically significant value in females involved in the SHNEP compared to females educated in the traditional setting, indicating a more positive outlook on well-being for females compared to males involved in the program.

## Organization of the Study

Chapter V provides an individual summary on each research question, conclusions drawn from the results, limitations of the study, and recommendations for further study.

# CHAPTER V

# SUMMARY, CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS

Chapter V is divided into four sections: a summary of the results, conclusions, limitations, and recommendations for further study. The findings from this study were derived from a literature review, quantitative data analysis, and the researcher's background knowledge of the program.

## Summary

The purpose of this study was to determine if a relationship exists between Devils Lake fifth graders and sixth graders who participate(d) in the Sully's Hill Nature Education Program (SHNEP), and those students who have not participated in the program, with their academic achievement in math, language, and science as well as their individual perceptions of appreciation for nature, environmental awareness, and overall well-being. The significance of this specific study is that a majority of the literature on nature and environmental education is based on programs that are much shorter in length. SHNEP involves daily immersion for a full school year. The results from this study could have a considerable impact on increasing the number of similar programs throughout the country.

The researcher's study was based on four research questions: Question 1 was focused on student academic and attendance data and Questions 2-4 were based on the NAEAWB survey. He looked at academic data for Question 1 that was taken from MAP

results from the spring of the students' fourth-grade year to the spring of the students' fifth-grade year to determine if growth or regression occurred in the areas of math, language arts, and science (no fourth-grade science data was available.) The researcher also examined attendance data from that same time period to determine if attendance improved or worsened from the students' fourth-grade year to the end of their fifth-grade year.

The NAEAWB survey for Questions 2-4 contained 30 questions (agreement and disagreement to statements on a four-point Likert scale) assessing student perceptions in the areas of nature appreciation, environmental awareness, and overall well-being. The survey provided a valid measurement of student perceptions as evidenced by a .70 or higher Cronbach's Alpha score on all three research question indices. The researcher analyzed quantitative data generated from the fifth and sixth-grade student responses to the survey to examine whether or not there were differences in student perceptions between SHNEP participants and traditional classroom students. He performed additional statistical analyses to look at possible variances between male and females in the study as well as any disparities among the students over a two-year period.

## Conclusions With Discussion

### Research Question 1

How does daily immersion in the SHNEP affect academic performance and daily attendance of participants compared to non-participants?

Since SHNEP students were instructed in the areas of math, language arts, and science while on-site at Sully's Hill, those subject areas were the only ones the researcher assessed in the study. He compared the overall means of each subject area from baseline

data from the spring of the previous school year to the spring of the fifth-grade year. This data gave an indication of general growth or regression that occurred during their fifth-grade year.

Looking first at the math scores of the test group, the SHNEP students, the researcher found that entry level RIT scores were 219.00 for the 2012-13 school year and 216.00 for the students entering fifth-grade the following school year in 2013-14. At the end of the school year, the first group of Sully's Hill students increased their scores by an average of 5.14 points to 224.14, and the students in the 2013-14 school year raised their math scores by an average of 7.56 points to 224.17.

Evaluating the math scores of the traditional classroom students, the researcher found that entry-level RIT scores were 215.84 for the 2012-13 school year and 210.19 for the students entering the fifth grade the following school year in 2013-14. At the end of the school year, the first group of traditional classroom students increased their scores by an average of 4.30 points to 220.14, and the students in the 2013-14 school year raised their math scores by an average of 4.76 points to 214.95. The national average math RIT score for incoming fifth graders is 212.00 ("Normative Data"). By the end of a student's fifth-grade year, the national average math RIT score increases to 221.50 or a gain of 9.50 points ("Normative Data").

Language arts scores were also studied, and it was found that the entry-level language arts RIT score for SHNEP students in 2012-13 was 209.26 and 209.87 for 2013-14. At the end of the school year, the first group of Sully's Hill students increased their language arts scores by an average of 3.79 points to 213.05, and the students in the 2013-14 school year increased their scores by an average of 3.80 points to 213.67.

Evaluating the language arts scores of the traditional classroom students, the researcher found that entry-level RIT scores were 207.83 for the 2012-13 school year and 204.98 for the following school year in 2013-14. At the end of the school year, the first group of traditional classroom students increased their scores by an average of 4.51 points to 212.34, and the students in the 2013-14 school year raised their language arts scores by an average of 3.24 points to 208.22. The national average language arts RIT score for incoming fifth graders is 207.00 ("Normative Data"). By the end of a student's fifth-grade year, the national average language arts RIT score increases to 212.90, or a gain of 5.90 points ("Normative Data").

Science data was limited because of no incoming scores for fifth-grade students. For the 2012-13 SHNEP students, the spring science scores yielded an average score of 206.47. The traditional classroom from the same year produced an average score of 205.77. The 2013-14 SHNEP program had a spring science score average of 205.17, and the traditional classroom had an average science score of 203.17. By the end of a student's fifth-grade year, the national average science RIT score is 205.30 ("Normative Data").

Although the researcher did not use a *p* value to determine any conclusions of statistical significance from the academic data, a few practical concepts can be gleaned from the examination of scores. Primarily, math scores improved at a greater rate in each of the two years of the study for those students involved in the SHNEP with an increase of almost double of the traditional classroom in 2013-14. And, taking into consideration the suggestion from NWEA's website that students with lower RIT scores at the beginning of the year should increase their RIT scores at a higher rate, with the traditional

classroom's entry-level scores averaging a lower math RIT score, this number should be reversed (Dahlen, 2014). Several factors may be at play here, including differences in instruction or class dynamics, but there appears to be a correlation between the literature regarding academic success and nature education in the area of math.

Despite the increase of scores in the area of math for students in the SHNEP, language arts and science scores seem to be academically equivalent between the test and control groups. Statistical differences in language arts between the two groups seem to be minimal, with the traditional group actually improving at a higher rate than the SHNEP students in the 2012-13 school year. Furthermore, although spring science scores were slightly higher for students involved in SHNEP, scores in math and language arts indicated slightly higher entry-level scores, so a .70 difference between the two groups appears moot.

Attendance data, however, seems to be consistent over the two year period with a lower percentage of days missed for those students involved in SHNEP. With an average of 1.62 fewer days missed for SHNEP students in 2012-13 and 1.46 fewer days missed in 2013-14 in comparison to the students' fourth-grade school year, this gives an indication that this trend may continue in the future. Again, in conjunction with the literature, nature education programs may boost an intrinsic desire to attend school (Louv, 2008). Although only two years of attendance data have been documented, a connection to nature can lead to a connection to content and curriculum, and similar attendance gains may be seen in the future of the program.

**Research Question 2**

How does daily immersion in the SHNEP affect participants' perceptions of their appreciation for nature?

Ten statements in the NAEAWB survey were specific to student perceptions in the area of nature appreciation. This variable held a strong .735 Cronbach's alpha score and maintained internal consistency throughout all survey responses. According to the quantitative data yielded from the survey, a statistically significant difference ($p$ = .002) was found between students who had been involved in SHNEP ($M$ = 1.64, $SD$ = .34) and those who had not ($M$ = 1.83, $SD$ = .41). SHNEP students displayed a stronger indication to show appreciation for nature, rejecting the null hypothesis.

This finding is consistent with the literature, and it is one of the cornerstone beliefs of the program itself. Much of the time spent at SHNEP is outdoors with the teachers and staff members encouraging the importance of spending time in nature, not only during their time at the national game preserve, but in the students' own backyards as well. One specific learning activity that occurred during the two-year period was a project in which each student was to "adopt" a tree in the fall and track its development throughout the year. Students were interested in the changes "their" tree went through, which could truly foster what the research question's results indicated.

Three survey statements that presented the highest discrepancy between means of the two groups in the study, all of which correlated with a higher appreciation of nature for students in SHNEP, included the following:

#7: "I like learning about what kinds of creatures live in lakes and rivers." (.42 difference in mean)

#10: “I like sleeping outdoors in a tent better than sleeping in a motel.” (.26 difference in mean)

#11: “I wish I could stay inside all day.” (.30 difference in mean)

All three statements are associated to students’ interest in the outdoors, which generates a connection with the natural environment. What may be even more telling of the quality of the nature appreciation variable and the validity of the results is that SHNEP students had a mean favorable to nature appreciation for all ten statements in the category in comparison to the responses of the students in the traditional classroom.

Although not tied to the original research question, the researcher conducted a related analysis to determine if there were differences between the responses of fifth and sixth-grade students. A MANOVA test again displayed that fifth-grade SHNEP students as well as sixth-grade SHNEP students previously involved in the program demonstrated a stronger appreciation than traditional students when separating out the two classes. However, consistent with the literature (Ballouard et al., 2011), the sixth-grade class had a lower nature appreciation score than the fifth-grade class, which means that although the sixth-grade SHNEP students were still positive about nature in general, the younger students responded more favorably to the construct. The literature points to the fact that students need to be involved in a nature education program in their early years to have the greatest influence.

The researcher also looked for possible differences between males and females in a follow-up MANOVA. What was interesting was that while there were no significant differences between male and female responses to the survey, there was a significant ($p = .0045$) variance between males in the SHNEP and those in the traditional setting.

The females in each group showed a difference in mean, but the disparity did not exhibit statistical significance comparable to the males. This result could suggest that SHNEP may have a more profound effect on the appreciation of nature for males than it does for females.

**Research Question 3**

How does daily immersion in the SHNEP affect participants' perceptions of their environmental awareness?

Ten statements in the NAEAWB survey were specific to student perceptions in the area of environmental awareness. This variable held a strong .711 Cronbach's alpha score and maintained internal consistency throughout all survey responses. According to the quantitative data yielded from the survey, a statistically significant difference ($p$ = .003) was found between students who had been involved in SHNEP ($M$ = 1.67, $SD$ = .35) and those who had not ($M$ = 1.85, $SD$ = .41). SHNEP students displayed a stronger indication to show environmental awareness, rejecting the null hypothesis.

This finding is consistent with the literature that indicates involvement in nature or environmental education will aid in a student's tendency to promote causes to save the environment (Bonnett, 2007; Saylan & Blumstein, 2011). Staff members at SHNEP frequently use the opportunity they spend with children to discuss how human behaviors affect the earth's climate and sustainability of the planet itself. Staff members encourage students to incorporate this knowledge into their daily lives.

Three statements that presented the highest discrepancy between means of the two groups in the study, all of which correlated with a higher environmental awareness for

students in SHNEP and all of which were reverse coded in order to reflect a leaning toward "disagree," included the following:

#10: "Humans should be able to change nature if they want." (.29 difference in mean)

#11: "People worry too much about littering." (.29 difference in mean)

#14: "Instead of being protected, prairie lands should be plowed in order to grow crops." (.30 difference in mean)

All three statements are associated to students' ability to be aware of ways in which our society can make a difference in the protection of our natural world.

Another aspect of the research question that speaks to the quality of the environmental awareness variable and the validity of the results is that SHNEP students had a mean favorable to increased environmental awareness for nine of ten statements in the category in comparison to the responses of the traditional classroom. One statement in which the opposite was true was "I take a shower instead of a bath because it saves water." This statement may be irrelevant because a high percentage of students may already take showers instead of baths, and the reason may be moot.

Although not tied to the original research question, the researcher conducted a related analysis to determine if there were differences between the responses of fifth and sixth-grade students. A MANOVA test again displayed that fifth-grade SHNEP students as well as sixth-grade students previously involved in the program demonstrated a stronger environmental awareness than traditional students when separating out the two classes. However, consistent with the literature (Ballouard et al., 2011), the sixth-grade class had a lower environmental awareness score than the fifth-grade class, which means

that although the sixth-grade SHNEP students were still positive about protecting the environment in general, the younger students responded more favorably to the variable. The literature points to the fact that students need to be involved in a nature education program in their early years to have the greatest influence.

The researcher also looked for possible differences between males and females in a follow-up MANOVA. No significant differences were found between male and female responses to the survey; however, there was a significant ($p = .0006$) variance between males in the SHNEP and those in the traditional setting. The females in each group showed a difference in mean, but the disparity did not exhibit statistical significance comparable to the males. This result could suggest that SHNEP may have a more profound effect on the environmental awareness for males than it does for females.

**Research Question 4**

How does daily immersion in the SHNEP affect participants' perceptions of their well-being?

Ten statements in the NAEAWB survey were specific to student perceptions in the area of well-being. This variable held a strong .749 Cronbach's alpha score and maintained internal consistency throughout all survey responses. According to the quantitative data yielded from the survey, a statistically significant difference ($p = .003$) was found between students who had been involved in SHNEP ($M = 1.67$, $SD = .35$) and those who had not ($M = 1.85$, $SD = .41$). SHNEP students showed a stronger indication to show a more favorable perception of their own well-being, rejecting the null hypothesis.

This finding is consistent with the literature that indicates involvement in nature or environmental education will increase student well-being, in respect to their physical, mental, and emotional health (Louv, 2008; Nisbet et al., 2010). Student activities at SHNEP include several opportunities to explore the forested areas of the national game preserve, which entails several minutes a day of hiking and during the winter months, students have the opportunity to go snowshoeing. The time spent outdoors with students and staff involved in SHNEP includes many occasions for physical exercise, which is attributed to healthy physical well-being. Furthermore, peaceful time for reflection and rest while encompassed by nature, which happens frequently in the program, can be associated with healthy mental and emotional well-being.

Three statements that presented the highest discrepancy between means of the two groups in the study, all of which correlated with a higher perception of well-being for students in SHNEP and all of which were reverse coded in order to reflect a leaning toward "disagree," included the following:

#29: "I have difficulty paying attention in a learning situation." (.28 difference in mean)

#32: "I get angry easily." (.32 difference in mean)

#33: "I have stress most of the day." (.36 difference in mean)

All three statements point toward the therapeutic elements of time spent in nature. Disagreeing with the statements "I have stress most of the day" and "I get angry easily" involve the peaceful and emotional aspects of a nature or environmental education program. In addition, disagreeing with "I have difficulty paying attention in a learning

situation" suggests a connection to nature's possible connection to helping students with attention disorders.

Another aspect of the research question that speaks to the quality of the well-being variable and the validity of the results is that SHNEP students had a mean favorable to improved well-being for nine of ten statements in the category in comparison to the responses of the traditional classroom. One statement in which the opposite was true was "I have to go to the doctor a lot because I am sick often." The discrepancy in the mean was only .07; however, it is contradictory to the notion that time spent in nature should aid in a child's overall health.

Although not tied to the original research question, the researcher conducted a related analysis to determine if there were differences between the responses of fifth and sixth-grade students. A MANOVA test again displayed that fifth-grade SHNEP students as well as sixth-grade students previously involved in the program demonstrated a stronger perception of their well-being than traditional students when separating out the two classes. However, the sixth-grade class had a lower perception of their well-being than the fifth-grade class, which means that although the sixth-grade SHNEP students still felt positively about their health in general, the younger students responded more favorably to the variable.

The researcher also looked for possible differences between males and females in the follow-up MANOVA. Although no significant differences were found between male and female responses to the survey, there was a significant ($p = .0009$) variance between females in the SHNEP and those in the traditional setting. The males in each group showed a difference in mean, but the disparity did not exhibit statistical significance

comparable to the females. This result could suggest that SHNEP may have a more profound effect on the well-being for females than it does for males.

Through his involvement in the program and frequent observations of the student participants of SHNEP, the researcher has been highly influenced in his belief that education within a natural setting can have a powerful effect on student learning. Statistical data aside, witnessing students' interest in learning come alive, many of whom had struggled in the traditional setting, is evidence enough to know that the program is beneficial. Listening to a student excitedly explaining to his principal about the certain type of bird that was flying near them or watching the children's faces shining while their canoe is rolling into shore is confirmation of SHNEP's effects. Active, hands-on learning is essential to student engagement. Coupling this strategy with our natural environment is what makes the program work.

## Limitations of the Study

- The study was conducted in only one middle school.
- A pre-NAEAWB survey was not administered in order to see actual growth throughout the school year.
- Science NWEA scores were not available for the previous school year, so analyzing data of growth or regression in the academic area of science during the studied school years was not possible.
- The NAEAWB survey has only been utilized in this study.

## Recommendations for Further Study

- Longitudinal data to determine the long-term effects of a year-long nature education program within a middle school.

- Administering a pre-NAEAWB survey in the spring of the students' fourth-grade year to see true effects of the SHNEP.
- Using the NAEAWB survey in a variety of nature education programs throughout the country to determine the most effective educational procedures and structures for nature education.

# APPENDICES

**Appendix A**
**Student Survey**



**Default Question Block**

## Gender

- ○ Boy
- ○ Girl

## Grade

- ○ 5th
- ○ 6th

## Are or were you a Sully's Hill Student?

- ○ Yes
- ○ No

## The silence of nature is peaceful.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## I enjoy looking out the window while riding in the country.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## I enjoy sitting at the edge of a lake observing nature.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## I like learning about what kinds of creatures live in lakes or rivers.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## I would rather play outside than indoors.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

Learning about plants and animals is more interesting than learning about computers.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

I like sleeping outdoors in a tent better than sleeping in a motel.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

I wish I could stay inside all day.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

When I ride in a car, I always look out the window.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

I would rather go to a movie than play in the park.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

Instead of being protected, prairie land should be plowed in order to grow crops.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

I wish I could donate extra money to help save the environment.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

I turn the lights off when I don't need them anymore.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

I take a shower instead of a bath because it saves water.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

The government must protect natural areas to save endangered species.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

Forests should be cut down in order to grow crops.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

Our planet's natural resources will never die out.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

Humans should be able to change nature if they want.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

People worry too much about littering.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

Animals and other creatures are not as important as humans.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

I am happy most of the time.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

Running and exercising is fun for me.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## It is easy for me to stay focused in school.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## In general, I am healthy.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## I have to go to the doctor a lot because I am sick often.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## I have difficulty paying attention in a learning situation.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## I like being nice to others.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## I get plenty of sleep at night.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## I get angry easily.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

## I have stress most of the day.

| | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| Click your response. | ○ | ○ | ○ | ○ |

# Appendix B
# District Consent Letter

Date

Dear Mr. Scott Privratsky:

I am a doctoral candidate at the University of North Dakota. I would like to conduct a study of the Sully's Hill Education Program at Central Middle School. I would like to examine NWEA MAP data as well as attendance records to see if there are differences between those who are educated at Sully's Hill and those who receive education in the traditional setting.

I would also like to conduct a survey of fifth and sixth grade students to identify their perceptions on environmental awareness, environmental protection, and their overall well-being. This survey consists of thirty statements requiring students to agree or disagree with the statements. Participation in the survey is voluntary, and any student wishing to not participate will be allowed to opt out without any consequences. All student data and responses will be kept confidential.

If you will allow me to conduct this research, please sign the bottom of this letter. Please contact us if you have any questions. Thank you.

Sincerely,


Jared Schlenker
UND Doctoral Candidate
(701) 662-7664
jared.schlenker@my.und.edu

Sherryl Houdek
UND Associate Professor
(701) 777-4255
sherryl.houdek@email.und.edu


Signature indicating approval of research

10-21-13
Date

## Appendix C
## IRB Consent Letter

UNIVERSITY OF UND NORTH DAKOTA

INSTITUTIONAL REVIEW BOARD
c/o RESEARCH DEVELOPMENT AND COMPLIANCE
DIVISION OF RESEARCH
TWAMLEY HALL ROOM 106
264 CENTENNIAL DRIVE STOP 7134
GRAND FORKS ND 58202-7134
(701) 777-4279
FAX (701) 777-6708

December 31, 2013

Jared Schlenker
820 Sunset Drive
Devils Lake, ND 58301

Dear Mr. Schlenker:

We are pleased to inform you that your project titled, "Students' Participation in Sully's Hill Nature Education Program" (IRB-201312-220), has been reviewed and approved by the University of North Dakota Institutional Review Board (IRB). The expiration date of this approval is December 16, 2014. Your project cannot continue beyond this date without an approved Research Project Review and Progress Report.

As principal investigator for a study involving human participants, you assume certain responsibilities to the University of North Dakota and the UND IRB. Specifically, an unanticipated problem or adverse event occurring in the course of the research project must be reported within 5 days to the IRB Chairperson or the IRB office by submitting an Unanticipated Problem/Adverse Event Form. Any changes to or departures from the Protocol or Consent Forms must receive IRB approval prior to being implemented (except where necessary to eliminate apparent immediate hazards to the subjects or others.)

All Full Board and Expedited proposals must be reviewed at least once a year. Approximately ten months from your initial review date, you will receive a letter stating that approval of your project is about to expire. If a complete Research Project Review and Progress Report is not received as scheduled, your project will be terminated, and you must stop all research procedures, recruitment, enrollment, interventions, data collection, and data analysis. The IRB will not accept future research projects from you until research is current. In order to avoid a discontinuation of IRB approval and possible suspension of your research, the Research Project Review and Progress Report must be returned to the IRB office at least six weeks before the expiration date listed above. If your research, including data analysis, is completed before the expiration date, you must submit a Research Project Termination form to the IRB office so your file can be closed. The required forms are available on the IRB website.

If you have any questions or concerns, please feel free to call me at (701) 777-4279 or e-mail michelle.bowles@research.und.edu.

Sincerely,

Michelle L. Bowles, M.P.A., CIP
IRB Coordinator

MLB/jle

Enclosures

# Appendix D
# Parent Notification and Consent Form

Date

Dear Parent or Guardian:

Greetings! I am a doctoral candidate at the University of North Dakota. I am conducting a study of the Sully's Hill Nature Education Program at Central Middle School. The research has been approved by school superintendent Scott Privratsky and the University of North Dakota's Institutional Review Board (IRB).

I will be conducting a survey of the middle school's 240 fifth and sixth-grade students. The purpose of this study is to identify their perceptions on environmental awareness, environmental protection, and their overall well-being in order to determine the effectiveness of the Sully's Hill Nature Education Program. This survey (see attachment) consists of 30 statements requiring students to agree or disagree with the statements, and the survey will take approximately 5-10 minutes to complete. The survey is voluntary, and if you do not want your child to participate, he or she will be allowed to play a keyboarding game without consequence. The survey will be completed during the students' computer period in the computer lab, so no instructional time will be lost in a core subject area. There are no foreseeable risks for students to participate in the study.

The student may not benefit personally from being in the study. However, we hope that, in the future, other students might benefit from this study because we can see if involvement in nature education can have long-term effects on their education and perspectives of the environment. All survey responses and student data will be kept confidential. The data results will be presented at a school board meeting in the fall of 2014, and no student names will be used. The University of North Dakota and the research team are receiving no payments from other agencies, organizations, or companies to conduct this research study.

Please contact us if you have any questions. Thank you.


Jared Schlenker
UND Doctoral Candidate
Central Middle School Principal
(701) 662-7664

Sherryl A. Houdek
UND Associate Professor
(701) 777-4255


---

Please check one of the following:

Yes, I give my permission for my child to participate in the survey. _____

No, I do not give my permission for my child to participate in the survey. _____

_____ _____

Signature Date

## Appendix E
## Enrollment Numbers

Table 13. Enrollment Numbers (*N* = 89) for SHNEP Class.

| | Enrolled | Percentage |
|---|---|---|
| 2012-13 (*n* = 123) | 43 | 34.96% |
| Female | 20 | 46.51% |
| Male | 23 | 53.49% |
| 2013-14 (*n* = 109) | 46 | 42.20% |
| Female | 27 | 58.70% |
| Male | 19 | 41.30% |

Table 14. Enrollment Numbers (*N* = 143) for Traditional Classroom.

| | Enrolled | Percentage |
|---|---|---|
| 2012-13 (*n* = 123) | 80 | 65.04% |
| Female | 41 | 51.25% |
| Male | 39 | 48.75% |
| 2013-14 (*n* = 109) | 63 | 57.80% |
| Female | 39 | 61.90% |
| Male | 24 | 38.10% |

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